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SOCIETY NEWS

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DATES FOR YOUR DIARIES

(No further reminders will be issued).

Monday 22nd September	W. E. A. Lecture Course commences.
Friday 26th September	Joint Lecture.
Tuesday 30th September	Coach Excursion.
Wednesday 15th October	Lecture.
Thursday 25th October	One-Day School.
Friday 15th November	Local History Conference.
Wednesday 19th November	Presidential Address.

Society News is published quarterly in March, June, September, and December. The Editor is Mr. G. R. Gillam, 23, Merton Road, Enfield, Middx., to whom articles and notes for inclusion and correspondence regarding the Bulletin should be addressed. The Bulletin is free to members. Extra copies may be obtained from the Editor (9d post free).

THE ROYAL GUNPOWDER FACTORY
WALTHAM ABBEY

W. Gates, B.A.

powder has been described as "an intimate mixture of saltpetre, coal and sulphur". It was discovered early in the 14th century, and was responsible for a revolution in the tactics of warfare. Its manufacture seems to have been well established in England by the reign of Elizabeth I, and, about the year 1570, there were manufactories at Chilworth and Faversham, in Kent.

The site at Waltham, by the Lea, also seems to have been used for the production of gunpowder at this period. Formerly part of the lands belonging to the Abbots of Waltham, it is a low-lying area, well-stocked with willows and alders, and connecting by canal with the River Thames; in more recent times the ease of access with the Arsenal at Woolwich, and the magazines at Purfleet, and the development of the Royal Small Arms Factory, led to the factory at Waltham becoming the most important in Britain.

There are some accounts in existence, dated 1560, concerning the purchase of "Neapolitan saltpetre" and "Italian Brimstone", which refer to a mysterious store of 120,000 cwt of Brimstone at Waltham, so it seems likely that processes of some kind concerning the making of gunpowder were taking place here then.

In the 17th century, firmer evidence is offered by the writer Peter Heywood, who was a curate at Waltham Abbey. Writing in the year 1683, he says "More gunpowder is made by mills of late erected on the River Ley than all England besides...." and as if to qualify his superlative production he adds: "the mills having been 5 times run-up in 7 years".

The ingredients for gunpowder were mixed together, and this mixture was then pressed into blocks or cakes; these were then ground up into powder. The risks were obviously highly dangerous, and evidence is provided by the Register for Burials at the Church of the Holy Cross, Waltham,

"October 1665 Tho. Gutridge killed with a powder ye 4 day.

Edward Simons, carpenter, so killed ye 5 day".

Furthermore there is considerable evidence to show that the mills centred at Waltham Abbey tended to encroach on the farming rights of the local inhabitants.

The owner appears to have been Ralph Hudson. At a local Court Baron of May 27th, 1672, the Jury asserted that "Ralph Hudson erected a powder mill near a certain bridge called Hook's marsh bridge, upon land pertaining to the inhabitants of Upshire and Clefield to the great nuisance of the inhabitants there and of all persons passing by the footway leading by the said mill and the barges

and there constantly being, and to the great danger of the
bitants and of their cattle daily passing the said mill...."
can sympathise with them over this last point.)...."it is
ed that the said Ralph Hudson without delay shall remove the
mill and restore the said way under penalty of forfeiting to
ady of the manr: £5 ".

So far so good. However, a year later, on May 29th, 1673
nd the entry: "Ralph Hudson will not remove his powder mill.
ed £40...." with another complaint added: "in shutting up
ater, has done so to the nuisance of footway leading by Norne
to Cheshunt.... to repair the same before June 1st: £5 forfeit
se".

Hudson was also fined for "damage to Norne marsh by cutting
for banks: £5 on every time."

In spite of local consternation and agitation, (and heavy
, the powder mills remained, and were in full production in
arly eighteenth century. Another mournful reminder from the
n register: "November 1720. Peter Bennett of ye town killed
powder mills ye 21 day".

In 1735, a woodcut was made, showing a general view of the Powder
from a distance, entitled "Curious Gunpowder Mills at Waltham
owned by John Walton, a gentleman of known honour and integrity".
did gunpowder manufacture have a certain reputation, carried on
y by shady characters? Oo was the artist/author comparing him
he apparently unscrupulous Hudson?

t any rate, it shows various little buildings dotted about the
of a stretch of the Lea.

f the prosperity of the Factory can be judged or assesses by
urrence of explosions, it must have been doing very nicely
5, when, on December 3rd, two mills exploded, and had to be
t.

y the year 1770, it was noted that there were "several curious
der mills upon a new construction, worked by water, the old
aving been worked by horses".

t would thus appear that the mechanical process of grinding
of gunpowder into grains was previously carried out by hand,
horse power. It is known that there was a circular track for
ses, found certain grinding machinery at Waltham. The horse
ressed to a swivel beam, walked round the track and thus
the machinery. At a certain point on the circuit, a device
horse's harness triggered off a spring, which rang a bell,
very circuit. Thus the men would be able to hear the progress
erwise) of the horse from a distance.

ne original reasons for siting the Factory on the Lea at
a would seem to be, firstly, the availability of a mill,
y monastic, for industrial purposes; secondly, a relatively
d situation, with plenty of willow and alder for charcoal

ng - and thirdly, ease of transport, by water, of highly explosive ingredients, and the product.

If the introduction of water power for grinding in 1770 was a novelty, it may be conjectured that a certain amount of care, and controlled power, was necessary for the safety of the grinding process; the use of waterpower for turning the milling apparatus at this late date may mean that more sophisticated machinery had been introduced. Horses and men were still employed, as we shall see, and at this time the output seems to have been about 100 barrels (at each) a week.

The late eighteenth century proved to be a period of conflict in various parts of the world, and it is significant to note that in 1787, the Mills at Waltham Abbey were acquired by the Government, having been in private hands until then.

The establishment was entitled "The Royal Gunpowder Factory", and was placed under the command of the Board of Ordnance. Men were brought from the Government mill at Faversham, and both operations were controlled by Sir William Congreve, Deputy Comptroller of the Royal Laboratory at Woolwich. In October 1787, there were 76 employees.

In 1791, double horse-mills were introduced, and in 1795 gunpowder was sent to Purfleet, on the Thames Estuary for proofing. A serious accident in 1801, when a horse "cornering-house" exploded, and four horses and nine men were killed, led to the setting up of a Government Enquiry on Safety.

A Committee of the Royal Society visited Waltham Abbey, to examine and report on the possibility of danger from what they called "electrical excitation" (this sounds very much like 'static electricity'). This was thought to be caused by walking, or rolling on wheels, on leather covered floors, or by the use of sil-covered winding reels (those were used to remove fine dust from the powder, by induction). The Committee pronounced "no danger" from these sources.

During this period, considerable difficulty was found in procuring a vital ingredient - charcoal. Suitable wood was very scarce, especially in time of war, when demand was greater.

Improvements in the production of charcoal were made. In 1770 we find that charcoal was being burnt in retorts or metal stoves. This gave greater control over the process. In 1795, Government cylinder works were opened at Fisher Street and Hovehurst, in Sussex, and most of the charcoal needed was produced there, although some was still burnt in the forests and marshes at Waltham Abbey. In 1789, plantations of Dogwood, Alder and Willow were set, for this purpose.

The Clerk of the Cheque spent a great deal of time travelling in search of wood. In March, 1793, he scoured Suffolk and Essex, and in the 12th purchased at Navestock 79 $\frac{3}{4}$ cords of wood (equal to

ut 880 sacks of charcoal).

At Waltham, on April 6th, 1794, a barge returned laden with "cylinder coal", that is, charcoal obtained by the closed metal cylinder process. This was not only cleaner, but gave more power to the gunpowder mixture. The output of charcoal from Sussex reached massive proportions; e.g. in 1808: 132 tons per annum; in 1810: 142 tons; in 1812: 170 tons; 1813: 169 tons. In 1831 winders were installed and in use at the Waltham Abbey factory, ten years later, in January 1841, Dutch Willows, 8,000 alders and 1,500 dogwood trees were planted. Some forty or fifty acres of this plantation were in existence a few years ago. To return to gunpowder, the Napoleonic Wars led to an increase in production, and an extension of the premises. By 1804, 20,000 barrels of gunpowder a year were being produced. In 1805, the Government Board of Ordnance purchased Cheshunt Corn-mill, and in 1809, Waltham Abbey Corn-mill, for the sake of the water rights. By 1810 there were nine water mills and seven horse mills, but by 1813, this had increased to twenty-four water mills and nine horse mills. In October 1814, waterpower was substituted for the remaining horse-mills.

Sir William Congreve applied new ideas to the processes. After a powder explosion in a press-house in 1811, he substituted Bramah's hydraulic presses, for the old screw presses previously used to give the required density to gunpowder. In 1816 the old fashioned long-frame was replaced by his new patent granulating machine. The processes of manufacturing and marketing gunpowder were now very profitable.

In a statement dated 1811, covering the period 1 January 1789 to August 31, 1810, it seems that 407,708 barrels of gunpowder, weighing 100 lbs each, were produced in that time, providing a net profit of £288,357. 6s. 0½d. A glance at the annual totals reveals the fortunes of war:

1809	20,050 barrels.
1810	similar for 1810, 1811, 1812).
1813	25,060 barrels.
1814	10,161. "
1815	15,796. "
1816	4,000. "
1819	1,000. "

(War concluded in 1815).

By 1822, and the return of peace, the fortunes of the Factory were in decline. Only 34 persons were employed, and shortly afterwards the factory closed at Favorsham and Ballincolig, in Ireland, was sold off.

Nevertheless, Waltham Abbot Gunpowder Factory was not given up. By 1853, 140 acres of land, with buildings, and five miles of water rights, had been added to the original site. Production rose by mid-century, and with the shadow of the Crimean War

ng ahead , output reached 10,000 barrels a year by 1853. In a prudent Government installed lightning conductors, and on Fool's Day 1860, the Metropolitan Police took over responsibility for the security of the Factory. This had formerly in the control of Watchmen, working in three night-shifts, conspicuous by their large overcoats, rattles and bells. By 1870, thirtytwo pairs of incorporated mills were working, not only water; but also steam-power, employing 150 men. By time, the refining of sulphur and saltpetro, and the burning of coal were all done at Waltham.

Now processes were also introduced. Guncotton had been favored in 1846 by Schönbein, and its uses were appreciated well for it to be manufactured at Waltham in 1872. (This is a explosive substance, obtained by soaking vegetable fibre in and sulphuric acids, and carefully drying it).

Production ran at 250 tons a year, and in 1890 a new factory built. In the following year, the manufacture of Cordite was. This was the result of "Sir Frederick Abel's Explosive ttee", which initiated the development of "a propellant in lengths of cord" - that is, cordite. Its recipe? "58 nitroglycerine, 37 parts guncotton, 5 of mineral jelly". By 1901, 2,000 tons of Cordite and 150 tons of guncotton were produced, and the factory extended over 411¼ acres, including 300 buildings, and 5 miles of river and navigation, and employing about 1,200 persons.

Today, the Royal Gunpowder Factory has become an Explosive Research Establishment, carrying out experiments with rocket fuel, other modern propellants and explosives (- or so we understand).

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UNIVERSITY OF LONDON

Department of Extra-Mural Studies

PREHISTORIC BRITAIN AND FIELD ARCHAEOLOGY: S. E. ENGLAND.

Details of an experimental course combining a general introduction to the archaeology of the South East of England practical help in aspects of archaeological field work just been received. The course will consist of 24 lectures 4 field visits and will be followed by an examination. Further details can be obtained from Mr. A. Hall, 23, Uvedale, Enfield, Middx.

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