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- Article
- 'Old Glory' Nov 2006
- 'Restoring the Gumpwood  
Plot'

BRITAIN'S BEST-SELLING STEAM & VINTAGE MAGAZINE

# OLD GLORY

VINTAGE RESTORATION TODAY

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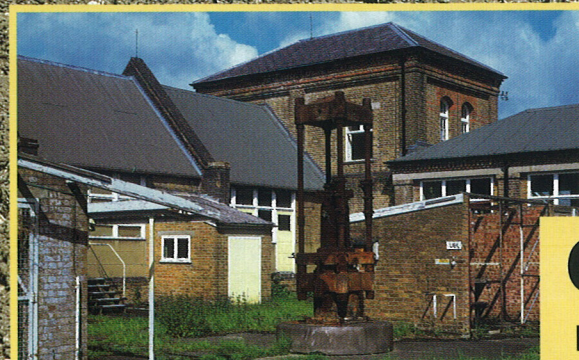
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1904 boiler explosion  
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### Gunpowder plot

Restoring the Royal Gunpowder Mills

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No 201 November 2006 £3.40



19 October - 15 November 2006

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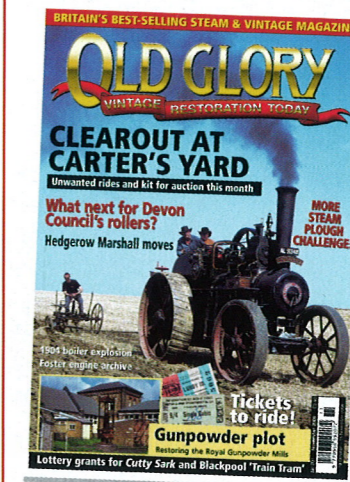
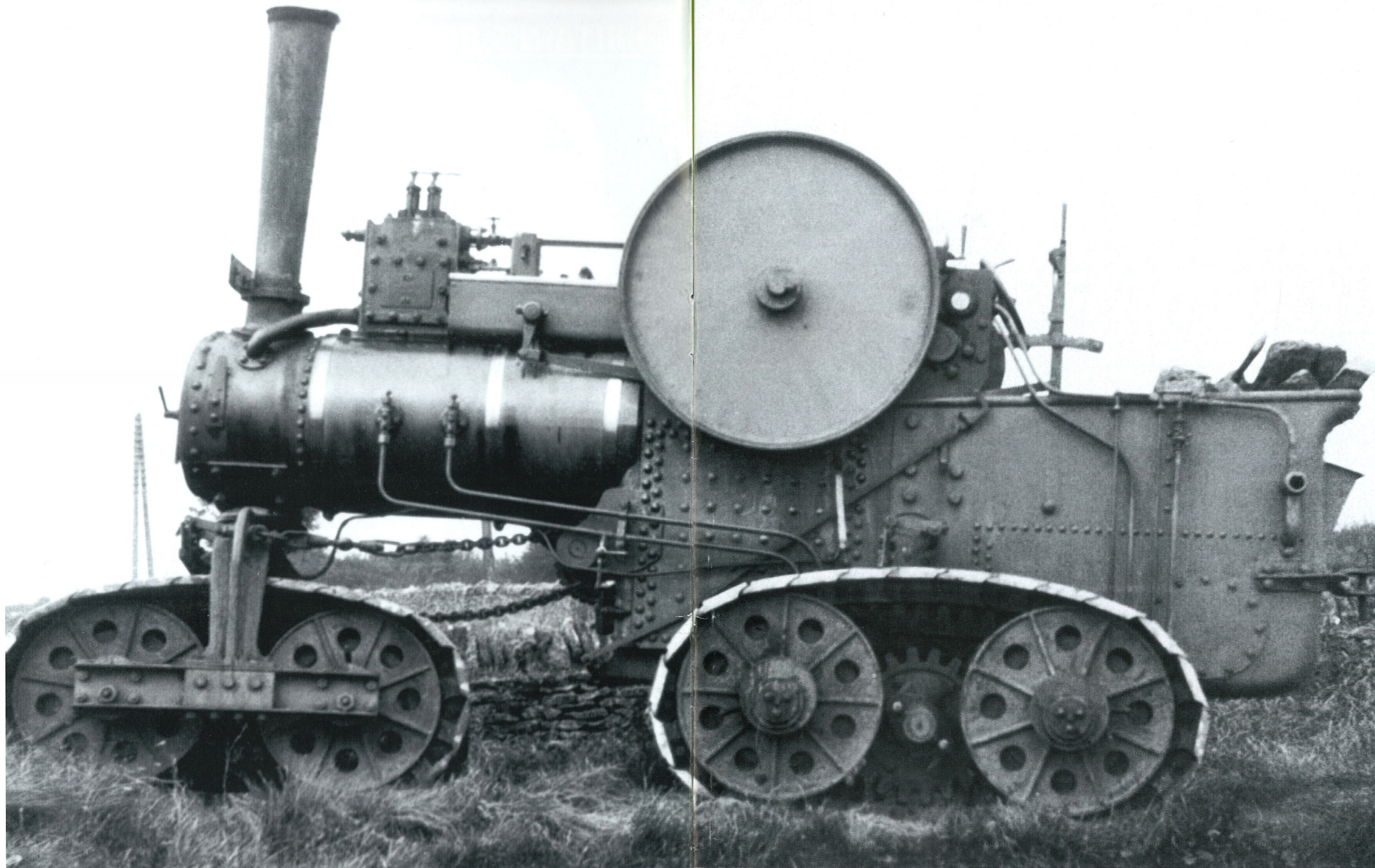
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Front cover: Clayton & Shuttleworth traction engine No 44103 of 1911 *Enterprise* has a go at a spot of direct ploughing on the occasion of the Steam Plough Club's record-breaking Great Challenge at Rempstone, Leicestershire, on 10 September. The engine is owned by Reg and Michael Beeby – the event also celebrating ploughing contractors Beeby's centenary. JAMES HAMILTON  
 Left: The 'Waveless roller', manufactured by John Allen & Sons (Oxford) from 1925-26, seen on the A423 near Shipton-on-Cherwell, Oxfordshire. RD THORNTON COLLECTION/OLD GLORY ARCHIVE

Autumn events online at  
[www.oldglory.co.uk](http://www.oldglory.co.uk)



The December issue of  
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 from Thursday 16 November.

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Four historic and complete fairground rides have now been built-up at the newly constructed Fairground Museum complex at Dingles Steam Village, where the Fairground Heritage Trust invited several guests to a preview on 21 September, reports John Hobbs.

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A photo report from Alan Barnes who was at Old Warden for the culmination event of a busy half century for the Bedford Steam Engine Preservation Society.

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Alan Stevens tells of his 40-year association with a Wallis & Stevens traction engine – now undergoing its second restoration – and asks for help from readers in satisfying his curiosity about one of its previous resting places.

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There's plenty of new DVD and book releases to give you a taste of something that you might like for Christmas – just leave the appropriate page open on the table with a big ring round it and your loved one will do the rest!

### 76 Trolley Good Show!

Presenting a photo special of a gathering of ex-London Transport trolleybuses held 'under the wires' at the East Anglia Transport Museum on 9-10 September. It included K2 Class No 1253, moving under its own power for the first time since 1961.

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This canal bridge at the Royal Gunpowder Mills dates from 1904.



# Restoring the gunpowder plot

With gunpowder and the month of November inextricably linked, Alan Barnes traces the history and restoration so far of the Royal Gunpowder Mills at Waltham Abbey, Essex.



Remains of the No 4 Press House, built in 1879.



The engine house has been restored by volunteers.



Avonside engine of 1916 Woolwich awaits restoration.



A reconstruction by Peter Jackson based on a 1735 engraving and showing the Gunpowder Mill buildings development along the Millhead Stream.

There's no doubt that the peace-loving monks of Waltham Abbey would have been horrified if they had foreseen the consequences of establishing a simple water powered fulling mill on the Millhead Stream.

For it was to be that from this single mill, used in the production of cloth, there would develop an industrial site dedicated to the production of gunpowder and explosives.

The English Army had used gunpowder in their artillery pieces at the Battle of Crecy in 1346, although the powder itself may not have originated in the country. English production was based on imported materials with the gunpowder being produced by hand at the Tower of London,

which also acted as the main store and the centre of distribution control.

Later in 1544 there are the first records of privately owned mills producing gunpowder at Rotherhithe on the River Thames.

Mills could easily be adapted for many uses, and by the early 17th century the mill at Waltham Abbey had been converted to produce vegetable oil. The outbreak of war with the Dutch led to shortages of gunpowder and the mill was converted again, this time for the production of gunpowder. In 1665 the mill came into private hands when it was acquired by Ralph Hudson. In the late 1600s it was bought by William Walton and this marked the start of a family connection

with the mill and the production of 'black powder' which was to last almost 100 years.

Increasing demand allowed the Walton family to expand their business, and in the years that followed further mills were built along Millhead Stream. By 1735 there were some 21 buildings at the works. Later described by local historian Thomas Fuller as the 'largest and completest works in Great Britain', the Waltham Abbey Mills were one of the first examples of an industrialised factory system.

However by 1780 there were concerns that the production of gunpowder remained in private hands. Concerns over security and the quality of the product led to recommendations that the



The Gunpowder Press House.



Loaded boats from the Gunpowder Mills at Waltham Lock in 1899.

Waltham Abbey Mills be bought by the Crown. In October 1787 the purchase was complete and this marked the beginning of its 204-year-long ownership of the Mills. Sir William Congreve was the driving force behind the Crown takeover, and under his leadership the manufacture of gunpowder changed from something regarded as a 'black art' to a much-advanced technology of the time.

As well as providing power to drive the mills, the Millhead Stream was also used as a canal, and a network of waterways was built on the site to allow the safe passage of both raw materials and gunpowder. By 1800 the canal system was starting to expand, with connection to two process buildings on the banks of the Old Barge River (the River Lea) which runs through the

Gunpowder Factory. The Powdermill Cut was dug in 1806 to connect the mills complex to the newly built Lee Navigation – allowing barges to transport gunpowder from the Grand Magazine at the north end of the Mills to the Royal Arsenal at Woolwich and Purfleet.

The canals were developed over two levels, and in 1878 a lock was constructed to enable the boats carrying raw materials to access all parts of the site. Eventually the canal system, with a

total length of some five miles, served almost all the processing buildings at the Mills. Restoration of even part of the canal network is obviously a long-term aim, but today there are still interesting traces to be seen. There were only 26 cast iron aqueducts in the whole of Great Britain, and four of the survivors can be seen at the Mills today.

To meet increasing demands during the Napoleonic Wars, the site expanded and production levels rose until Wellington's victory over the French at Waterloo in 1815. The period of relative calm which followed led to a dramatic decline in production volumes, and the number of staff employed at the Mills was also reduced. Despite this fall-off in demand, improvements and developments in production techniques continued to be made.

The outbreak of the Crimean War in 1854 marked another period of expansion and many new buildings were constructed on the site. Widely spaced for safety reasons, many of these buildings have survived. The need for increased amounts of energy to drive the mills led to the introduction of steam power in 1856. This brought its own hazards and the first mills to be built were destroyed on 27 May 1861 in a spectacular explosion.

The new mill complex grew up around the Queen Meads area, and the Group A mills built in 1857 were followed by the Group C mills in 1861, Group D in 1868, Group E and F 1878 and Group G in 1889. This group of mills made up



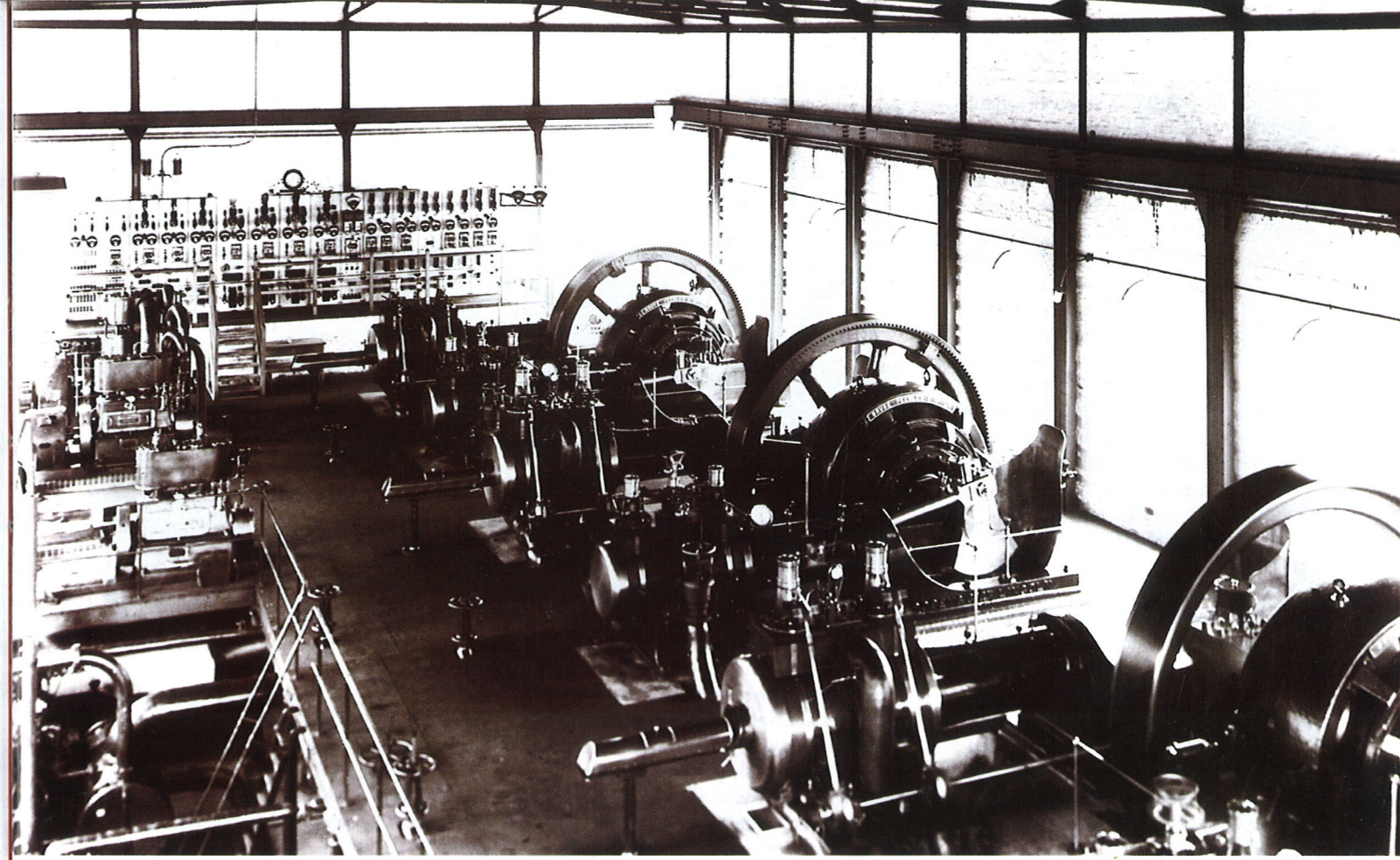
Part of the Group G Mills, built in 1889.



The workshops still stand but are as yet unrestored.



One of the Ruston, Proctor oil-fired locomotives with a train of cordite trucks in 1917.



The power station at the Gunpowder Mills North Site in 1915 with three Bruce Peebles 30vDC 200kw generators on the right, the nearest of which is running.

the largest steam driven gunpowder mill complex in the UK. The Group C Mills built in 1861 became the prototype construction for the line of mills later built along Queen Meads. Now a Grade I listed building, it featured a T-shaped unit with two mills on either side of a central engine house (a third mill was added later). At the rear there was a boiler room with a chimney (now demolished) and a coal yard. A steam powered beam engine in its own engine house drove the edge runners in the bays of each mill.

The mixed ingredients would be placed into the pan of the incorporating mills and the edge runners, which were large steel wheels, would run over the mixture for many hours until the raw mixture turned into a 'mill cake'. A drenching apparatus was fitted above each bay and if there was an explosion or fire, 40 gallons of water could be dropped onto the blaze. Thick solid walls between each mill were designed to confine any explosion to a single bay.

The Indian Mutiny followed by the Boer War between 1899 and 1902 gave an impetus for further development. Although the main function of the Mills was to provide supplies for military use, by this time there was an increasing demand for explosives for commercial use. Construction projects, quarrying and tunnelling all created a massive demand for gunpowder.

With the introduction of steam power to drive the mills came the first of the railways to be built at Waltham Abbey. The first line linked the charcoal mill, which was demolished many years ago, to the gunpowder mixing house. Built to a gauge of 2ft 3in, it was built on a 4ft wide wooden platform with wooden rails faced with

iron on the top and inner surfaces. The wagons and trolleys were pushed around by hand, although the system also featured small metal turntables enabling the wagons to be turned more easily.

Following the introduction by John Ramsbottom in 1862 of an 18in gauge railway at the LNWR loco works at Crewe, this new narrow gauge railway system was adopted by several government-run establishments. These included Royal Arsenal Woolwich and Chatham Dockyard, and by 1897 the Mills at Waltham Abbey had also been converted and the network extended. The wagons were still pushed by hand and one of the surviving trolleys is on display at the Mills.

The narrow gauge network expanded during WWI and a new line was built to connect to the nearby standard gauge Liverpool Street to Cambridge main line, and exchange sidings

between the two gauges were built. This new line was an impressive undertaking involving some three and a half miles of new track, a tunnel and three swing bridges to cross the waterways. Steam locos were not used for obvious reasons, and four Ruston, Proctor paraffin powered ZLH locomotives were purchased in 1917. Additional smaller battery powered electric locomotives were added later and these became the mainstay of the system until closure in 1954. At the end of WWI the larger Ruston, Proctor engines were sold and, unfortunately, none has survived.

There are a few signs of the extensive rail system left today. The site of the old engine shed and the main sidings are now occupied by houses in Beaulieu Drive at the approach to the Mills. Reconstruction of the entire railway network will be impossible, but some motive power and rolling stock have already been obtained.



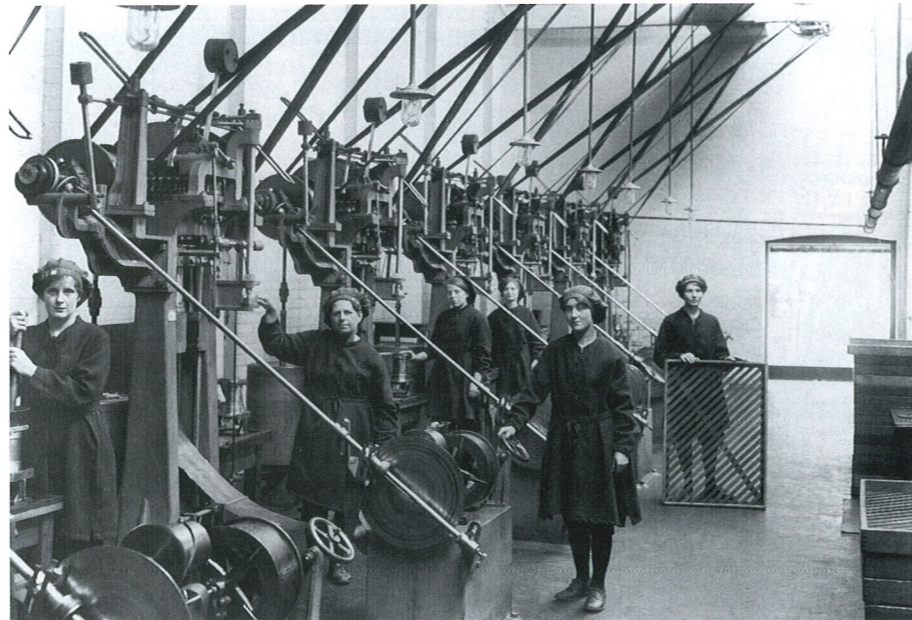
Ruins of the last of the Gunpowder Mills in the 1950s.

In 2000 the WARGM Trust bought some ex-Woolwich Arsenal stock from the Bicton Woodland Railway nr Exeter, and although they are not Waltham Abbey originals they were built to a similar Government design. The steam locomotive *Woolwich*, built in 1916 by Avonside of Bristol, has also been bought for restoration. This interesting engine is the sole survivor of a class of 16 engines and one of six designed to burn waste oil.

The Mills Collection is also home to *Carnegie*—a unique double bogie diesel locomotive built by Hunslet in 1954 for use at Woolwich, and this is currently being overhauled. Volunteers have begun laying a 2ft 6in gauge line with track and rolling stock donated from the Royal Ordnance Factory at Bishopton following its closure.

As well as gunpowder production, Waltham Abbey Mills was a centre for research and development. The research teams, led by Sir Frederick Abel, were responsible for the introduction of guncotton (patented 1865) which was followed by cordite (patented 1889). From the late 1890s the mills were converted for the production of cordite for use in artillery shells. The millions of tons of ammunition required during WWI created a huge increase in demand and staff numbers at the Mills increased by some 3000 to a total of 6230—many additional staff being local women.

Cordite production continued uninterrupted at Waltham Abbey until the new factory at Bishopton nr Paisley began operation in 1940. Gunpowder had been produced during the war in the old water-powered mills along Millhead, but



Women workers in the small cordite press house in 1917.

they suffered from outdated facilities and water shortages which affected production. They fell into disuse and were partly dismantled, and in 1941 they were badly damaged by German bombing. The last gunpowder mill remained until 1956 when it was finally demolished.

Waltham Abbey continued to produce cordite until 1943, and was also the sole producer of the explosive RDX during the first two years of the war. By October 1943 the transfer of production facilities elsewhere had been completed, with staff from Waltham Abbey playing a vital role in

establishing the new facilities. However, two years later in 1945 the site was adapted as a research centre, developing high explosives, military propellants, rocket fuels and rocket motors. These activities continued until the Ministry of Defence took the decision to close the site in 1991, and a charitable foundation was set up to protect and preserve it.

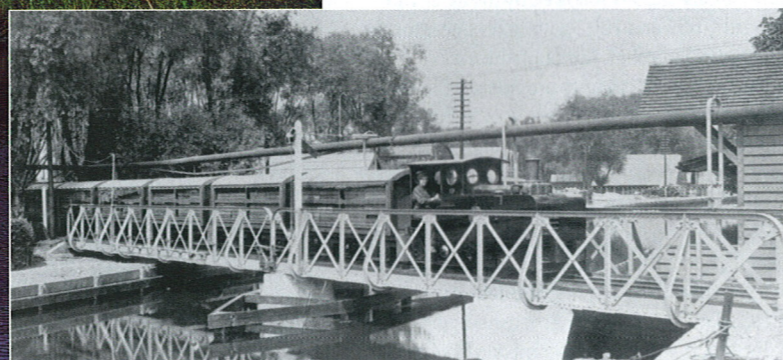
Visitors today have access to one of the most important sites of this country's industrial heritage. Thanks to the work of the Trust and its many volunteers, some of the buildings have been restored and house displays and collections relating to the history of the Mills. The site is extensive and a large area is given over to a nature reserve, which is an important part of the SSSI within the Mills.

By virtue of the security surrounding the activities at the Royal Gunpowder Mills for some 300 years, its significance went practically unnoticed by the outside world. Now the site has been opened to visitors, the vast potential of this interesting industrial complex is just beginning to be tapped. ■

Photography by Alan Barnes, archive courtesy Royal Gunpowder Mills.

■ Royal Gunpowder Mills, Beaulieu Drive, Waltham Abbey, Essex EN9 1JY. Information Line Tel. 01992 707370 [www.royalgunpowdermills.com](http://www.royalgunpowdermills.com)

Some stretches of the former canal system appear ready for use.



A Ruston and its cordite trucks crossing the canal swing bridge at Great Hoppit Island in 1917.

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