

# ON HER MAJESTY'S SERVICE

WASC1353

WA1571

'Extract from a  
Report of the Results  
of the Experiments carried  
on upon Marlboro' Downs  
this year afford much  
useful information relative  
to the manufacture of  
Gunpowder'

Wm. Congreve Comptroller  
of the Royal Laboratory  
Woolwich 31st August  
1813

Performance Table } scanned  
1809/10 }  
Winters p. 25 }

1353.

W0 44/642

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pp 717-727.

RICH

WASC 1353

A. INCLUDE IN TITLE

1. INCLUDING TABLE OF  
RESULTS OF GUNPOWDER  
PERFORMANCE TRIALS  
MARLBOROUGH DOWNS  
1809/10 - wai-0571-01-wasc-1353-01

2. EXTRACT FROM WINTERS

P. 25 LISTING COMPANIES  
AND RESULTS wai-0571-02-  
wasc-1353-02

B. ADD WAI No. 571

WAI

wasc 1353

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571

ADDED

[IMAGE IN ENVELOPE]

# GUNPOWDER PERFORMANCE TRIALS

## MARLBOROUGH DOWNS 1809/10

(RANGE IN YARDS - 10" SHELL, 9 LBS GUNPOWDER)

KING'S  
MILLS

ROYAL GUNPOWDER FACTORY, WALTHAM ABBEY

(4430)

ROYAL POWDER MILL, FAVERSHAM

(4360)

CONTRACTORS'  
GUNPOWDER

PIGOU

(4270)

BUTTS

(4187)

W. TAYLOR

(3922)

BRIDGES

(3898)

TAYLOR & Co

(3861)

KITCHENER

(3801)

WAsc 1353

WAI 571

Marlborough

Downs

Trials

1813

under the direction of Lieut.-General Congreve, both as to the strength and durability of the gunpowder manufactured in the King's Mills, at Faversham and Waltham Abbey, since the year 1783."

In the year 1783, Mr Pitt intended to have recommended to Parliament the sale of the Royal Powder Mills, at Faversham, it having been represented to him that the powder merchants could make better gunpowder and much cheaper than the King's servants. Fortunately, however, for the country, his Grace the late Duke of Richmond, then Master-General of the Ordnance, attended to the representations which General Congreve, at that time Comptroller of the laboratory, thought it his duty to make, by which it was proved that there existed a profit on the powder manufactured at the King's Mills; and if this profit were for a few years properly expended in improving the works, the Ordnance would be enabled to make both stronger and more durable gunpowder at the Royal Powder Mills, than had ever been previously made.

Profit to the Ordnance, in manufacturing, between the 1st January, 1789, and the 31st August, 1810, 407,408 barrels of gunpowder of 100lbs. each, at the Royal Powder Mills, Waltham Abbey and Faversham, being the difference between what that number of barrels cost manufacturing at the King's Mills, and the sum that would have been paid if supplied by the merchants, £288,357. 6. 0 $\frac{1}{2}$ . Profit to the Ordnance in recovering the strength of powder (returned from the Royal Navy, etc.) by re-storing and dusting at the Royal Powder Mills at Faversham and Waltham Abbey, and mixing at Purfleet, the operation having been performed with 127,419 $\frac{1}{2}$  barrels of gunpowder, of 100 lbs. each, between the 1st of Jan., 1790, and the 31st August, 1810, which, at 8s 4d per barrel, amounts to £53,091. 11. 3: total,

£341,448. 17. 3 $\frac{1}{2}$ . "In addition to what has already been stated as to Gen. Congreve having prevented the sale of the Faversham Powder Mills in 1783, that it was in consequence of his repeated remonstrances that the mills at Waltham Abbey were purchased; and here, therefore, it is proper, with regard to these mills separately, to state how the account stands. After paying off £45,622. 12. 4. the whole amount expended in the original cost in the extension of the works, in repairs and improvements, there is a balance in favour of these new mills alone of £50,096. 13. 5. Now, much has been said respecting the money laid out at the Royal Powder Mills at Waltham Abbey, it is important that this statement should be made known, and that the purchase of the water of the Cheshunt and Waltham Abbey Corn Mills was the only additional purchase recommended by Gen. Congreve, the necessity of which has been sufficiently justified; as, previous to this power being obtained, 15,063 barrels of gunpowder only were made in one year; but subsequently, 20,401 are manufactured per annum by the same mills, making an increase of 5,338 barrels annually."

Proofs of gunpowder made by the government and by several merchants, that made at Waltham Abbey in 1809 gives the highest range. "Ranges of a ten inch shell from a sea service mortar, loaded with 9 lbs. of gunpowder, on Marlborough Downs, 1809 and 1810. Faversham gunpowder; made in 1785 and 1809, range (yards)—4319 and 4360. Waltham Abbey in 1809, range (yards) 4430. By the merchants at that date—Messrs Pigon—range, 4270, Bridges 3398, Taylor, 3861, W Taylor 3922, Butts 4187, Kitchener 3801."

Printed statement of profits acquired in manufacturing gunpowder at Waltham Abbey, March 31st, 1801:—

Gunpowder

Relative to its Manufacture -  
Experiments on Marlboro's Downs

From

Ordnance Correspondence  
Laboratories

~~1870~~

1813

Copy

Extract from a Report of

The Results of the Experiments <sup>conducted</sup> upon  
Marlboro Down this Year afford much  
useful information relative to the Manufacture  
of Gunpowder.

1<sup>st</sup> Mill bake Powder \* cannot retain  
its strength because the Grains are  
too soft & porous and in consequence  
attract Moisture like a Sponge  
Mill bake Gunpowder which was  
made in the Year 1789 Ranged  
this Year 3620 Yards

2<sup>nd</sup> Mill bake Gunpowder which was  
made with Charcoal charred from  
light Woods ranged 3210 Yards

\* This Mode of making Gunpowder was  
practiced by the Contractors before the  
late Duke of Richmond improved  
the Kings Gunpowder in 1784



and such as contained Charcoal  
from hard Woods Ranged 3710 Yards  
each sort having been made 20 Years  
light Wood making porous grained  
Powder when not pressed.

3<sup>rd</sup>. Gunpowder Manufactured from hard  
pressed bake has a firm close Grain  
and consequently not liable to  
attract Moisture a charge of this  
Powder similar to the charges which  
were used with unpressed bake  
Powder Ranged 4193 Yards altho  
it had been made five Years  
longer than the two former sorts.

Σ 13 It may be necessary to remark  
that the Hill bake Gunpowder  
contained Air dried Salt Petre in  
its component parts which was  
the usual mode of preparing that

Ingredients for Powder) but the hard  
grained Gunpowder was made  
with Milled Salt Petre.

4<sup>th</sup>. Moderately Glazed Gunpowder is more  
durable than unglazed Powder  
because the Grains are rendered more  
firm & less liable to attract Moisture

5<sup>th</sup>. L.G.S.G. Gunpowder is not so  
strong nor so regular in its effects  
as the N<sup>o</sup>. 1 & 2. Powder of One Year  
Old. it Ranged 4032 Yards but  
the N<sup>o</sup>. 1 & 2 Ranged 4272 Yards.  
The proportion of the Ingredients  
are altered in forming the L.G.S.G.  
Gunpowder by a greater loss from  
some of the component parts than  
from the other in the process of  
reworking the Dust of N<sup>o</sup>. 1 & 2 Powder.

with which it is made -

6<sup>th</sup> The 75 lb. Proportion of Salt Petre  
(called the English) makes Gunpowder  
as strong as it can be made by  
using 80 lb. in the Proportion

9 lb. Charge      10 1/2 lb. Charge

Waltham	80 lb. Proport <sup>n</sup>	~ 4100	78	~ 4177	78
Abbey	75... d.	~ 4242	..	~ 4317	..
1809	70... d.	~ 4168	..	~ 4408	..

Small grained  
glazed Gunpowder  
made at Faversham  
from pressed  
cake in 1785 -

**B.S.G.**

~ 4193 .. ~ 4409 - -

7<sup>th</sup> Gunpowder which contains Glinder  
Charcoal in its component parts  
will retain its strength far better  
than that which is made with  
either common Pit Coal or that  
which has been charred in Pots

because the two last mentioned sorts  
have unavoidably more or less  
Deliquescent Salt mixed therein  
as from that mode of Charring the  
Elements are

Earth ————— } a Proportion  
Fixed Vegetable Alkali } unavoidably  
Fossilized Tartar. — } remains in  
the Coal.

But when Charcoal is made by  
Distillation in a close Vessel the  
Elements are

$\frac{1}{4}$  Water  
Empyreumatic Oil  
Native Vegetable Acid  
Gas  
Inflammable Air —

Consequently if the Cylindrical  
Retorts are constructed as Figure  
General Congreve recommended  
in 1784 N. 1 & not as altered in

of position to his Flare, like No. 2 the  
 coal is rendered pure. because the  
 Water the Vegetable Acid & the  
 Empyumatic Oil run off, & the  
 Gase & Inflammable Air fly off from  
 the Charcoal during the process of  
 Charring in Cylindrical Retorts  
 like Fig. No. 1

Fig. No. 1

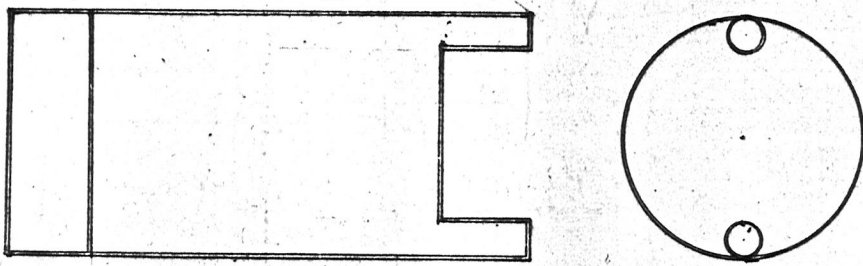
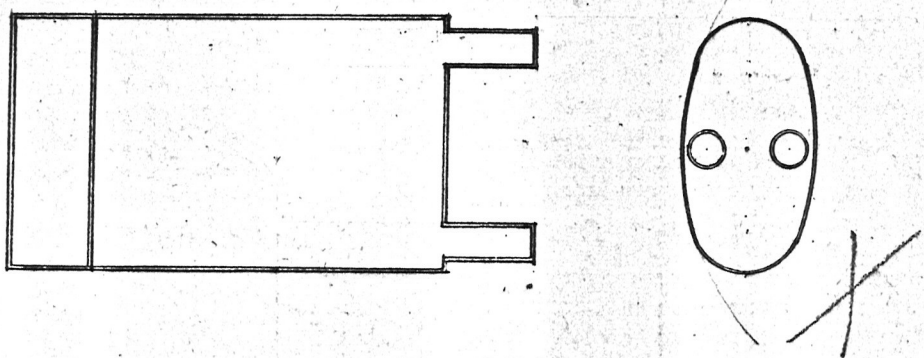


Fig. No. 2.



P. It is not necessary to use a greater  
 quantity of Salt Petre than 75 lb.

in a Proportion of 100 Lb<sup>s</sup> of the  
 component parts of Gunpowder  
 as that will give as great Range  
 as 80 Lb<sup>s</sup> of Salt Petre therein as  
 for instance

				Yards	
Made 1809.	100 Lb <sup>s</sup> of Salt Petre <div style="border: 1px solid black; padding: 2px; display: inline-block;">             Alder Cylinder           </div> No. 1 2	9 Lb <sup>s</sup> Charge	Longest Range - 4247		
			Shortest - do. - 4086		
			10½ d <sup>o</sup>	Longest Range - 4204	
				Shortest - do. - 4151	
		75 Lb <sup>s</sup> of Salt Petre <div style="border: 1px solid black; padding: 2px; display: inline-block;">             Alder Cylinder           </div> No. 1 2	9 Lb <sup>s</sup> Charge	Longest Range - 4242	
				Shortest - do. - 4219	
				10½ d <sup>o</sup>	
		Longest Range - 4317	Shortest - do. - 4220		

It is evident from the aforementioned  
 cases that the contractors imposed  
 upon the Board of Ordnance when  
 they obtained 77½ Lb<sup>s</sup> of treble Refined  
 Salt Petre for every Barrel of  
 Gunpowder, instead of the Proportion  
 which His Grace the late Duke of  
 Richmond allowed them, namely

75 Lb. to be manufactured into a  
Barrel of Powder and  $\frac{1}{4}$  Lb. for  
Waste in the process of the  
Manufacturing

9<sup>th</sup>. If at any time there should be  
a scarcity of Salt Petre in store the  
Prussian Proportion of Ingredients  
can be used for charges of Heavy  
Ordnance as appears by this years  
Experiments upon Marlborough  
Downs but as it has not had  
any trial on board His Majesty's  
Ships of War and as it does not  
make as long Ranges with small  
Charges as the 75 Lb. Proportion  
I cannot recommend it in  
preference to the Established  
English proportion of Ingredients  
Namely - 75 Lb. of Salt Petre  
15 . . . of Charcoal  
10 . . . of Sulphur

The aforementioned Results, clearly  
prove the great advantages of the  
Royal Powder Mills which will  
ensure good Gunpowder for His  
Majesty's Service: by being a constant  
check upon Powder Merchants.  
but to enable His Majesty's Service  
to reap the full advantage thereof  
the following particulars must be  
carefully attended to, by the Board  
of Ordnance - Namely

- 1<sup>o</sup> Seasoned Wood must be used  
in the construction of Powder  
Barrels.
- 2<sup>o</sup> Powder Barrels must be  
constructed with perfectly well  
jointed Heads & Staves -
- 3<sup>o</sup> The Barrels must be cleaned  
out & kept in dry Storehouses  
before Gunpowder is put therein



4<sup>th</sup> Proper Powder Vessels must be  
employed to convey Gunpowder  
from the Mills to the Magazines  
and not Contract Boys like  
those which belong to Queenboro'

5<sup>th</sup> Powder Barrels are to be rolled  
in the Sun, or dry air  
whenever a Ship can allow  
it

6<sup>th</sup> The Magazines & Powder Chests  
on board of His Majesty's  
Ships of War should be  
improved

(signed) W. Congreve  
Comptroller of the  
Royal Laboratory

Royal Laboratory  
Woolwich 31<sup>st</sup> August 1810