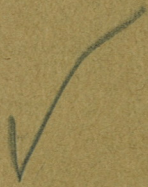


# On Her Majesty's Service

WASC 1806

WASC 1806

Pwfleet



WASC 1806  
Pwfleet

To: M. McLaren esq.

From: RNB Barwick.

Date: 29/11/88

Tel. 322

Your ref.

Our ref.

Subject:

Purfleet Gunpowder Magazine.

I wonder if you have ever come across the enclosed article which apparently appeared both in 'The Times' and 'The Engineer' but both rather a long time ago! WA is mentioned on pp 27 & 30.

Ken B

WASC

Rank/ Appointment ..... Name in Block Letters ..... Signature .....

From Panorama 28 (1986)  
(Journal of the Thurrock Local History Society)

Unrevised

BILLERICAY PETTY SESSION.

TUESDAY, OCTOBER 4

A Rum STORY

Mr. John Holt, landlord of the Dog and Partridge, Stifford, appeared to an information laid against him by Samuel Burrows, an officer, who seized upwards of a gallon of rum upon his premises which was 33 degrees below proof. - On the defendant being asked whether he had any wish to interrogate Burrows, he rather irregularly replied, that although the keg which the liquor was in had a seal affixed to the cork when taken away, there was none put upon the tap, shrewdly concluding that where there is the means of discharging there must be the same of receiving, but this idea did not turn much to defendant's advantage. The seizure and disposal of the liquor appeared to be perfectly regular, and the Bench declared defendant to be guilty, which subjected him to the forfeiture of the spirits. No fine was sued for. - Mr. Holt, by way of conclusion, observed that it was a wonder Mr. Burrows never discovered the improper strength of the liquor before, as he (Mr. B.) had so frequently helped himself from the same fountain.

★ ★ ★ ★ ★

1691 (?)

Manor of Bayhouse

An Act for enabling Francis More, Esq.; to sell the Manor of Bayhouse, and Lands in West Thorocke in the County of Essex; and to purchase and settle other Lands in lieu thereof.

★ ★ ★ ★ ★

1826

Mr. John Baker - Chalk sales 1826

TO GENTLEMEN, BUILDERS, FARMERS  
SURVEYORS of ROADS, WHITING MAKERS,  
LIME BURNERS, and Others

CHALK of a very superior quality, or Chalk mixed with Flints, for making roads; also BRICKS and LIME, to be SOLD, on very advantageous terms, by application to Mr. W. Woods, Kennington, Surrey; or to Mr. John Baker, Grays, Essex, where the different articles may be seen.

N.B. Oats, Hay, or Straw will be taken in exchange.

★ ★ ★ ★ ★

1826

Prize fight between Dutch Sam and Gipsy Cooper, at Grays 1826

BOXING. - The fight between young Dutch Sam and Gipsy Cooper, took place on Tuesday, at Grays, opposite Gravesend, for 50 sovereigns. Both men are well known in the ring as able professors, who had fought many battles. Harry Holt and Dick Curtis seconded Sam, and Jem Ward and the brother of Cooper officiated for him. Betting was 2 to 1 on Sam - and the result of the battle fully justified the odds, for he won in the fifth round. The fight lasted little more than a quarter of an hour.

26

## PURFLEET GUNPOWDER MAGAZINES

Tim Wood of the Coalhouse Fort Project kindly provided the following important article, discovered by him in 'The Engineer' of 21st October, 1864. It represents the fullest and most technically useful material so far known from any journal and is here reprinted in its entirety. 'The Engineer' had acknowledged 'The Times' newspaper as its original source.

## THE POWDER MAGAZINES AT PURFLEET.

Since the disaster at Erith a great deal has been said as to the general management of the Government magazines at Purfleet, and all sorts of statements have appeared as to the quantity of powder which is kept there, and the risks to which it is exposed. We propose, therefore, to give the public a plain account of how Purfleet is managed and what it contains. If, on the one hand, we state that the powder stored there is enormous - enough in quantity to appal the boldest when they think of the chances of accident - on the other hand, we shall be bound to admit that everything which the experience of a century, the progress of science, and even imaginative and over-scrupulous fears can suggest in the way of precaution has been adopted. If ever Purfleet blows up - and if it does London will be the first to know it - the accident will not be caused by Purfleet proper, but will be due to some one or other of the barges always landing or receiving powder there. The quantity of powder that blew up at Erith the other day was less than 1,000 barrels, or short of 50 tons. The quantity that Purfleet stores is 52,000 barrels, or 2,300 tons. It is not the largest magazine in the kingdom. There is another, within four miles of one of our most important seaport towns, which stores nearly 4,000 tons. This latter, however, is a mere surplus storehouse, which is rarely opened - a vault where the powder is entombed and carefully guarded. Another, which we have no scruple in mentioning, for its situation is a disgrace to the Admiralty - Upnor Castle - contains some 1,500 or 1,600 tons of powder. Sheerness and Chatham, with their forts and dockyards, would cease to be even geographical expressions if anything went wrong with the constantly opened magazine which is in their midst under Upnor Castle. There are other magazines, too, in different parts of the kingdom, which are as large as Purfleet; but these are mere magazines, i.e., storehouses, which are seldom opened or required but in time of war. The importance of Purfleet consists in its being the great receiving house where every atom of powder used by the Government - whether made at their own works at Waltham Abbey, or privately at Dartford, Faversham, and Hounslow - is landed, examined, tested, and if approved, passed into store, and if rejected returned at once to the barges. Thus in the ordinary fulfilment of its duties not a day passes without the magazine being open - scarcely a day in which it has not either to test, receive, or send away loads of powder. When first established, a century ago, the magazine was isolated from everything. Now there is a village close to it, and beautiful villas are scattered over the country around it far and near. The ground occupied by the Government is about twenty-five acres, and this is mostly moated round and walled and rewallled in almost a series of concentric circles about the magazines. There is a permanent guard of two officers and eighty men, with a large staff of watchmen, coopers, storekeepers, overseers, clerks, &c., all of whom with their wives and families live within the walls in the "garrison," as it is termed. Every one, no matter how remotely connected with the works in this part of the garrison, even the tailor who makes the flannel dress, and the shoemaker who stitches the soft leather shoes to be worn in the

magazine, is on the staff, and has to conform to the rules of being within the walls before 9, and having all lights and fires out in the quarters by 10.30. Yet, large as is this staff, the "powder-men," the actual workers in the magazines, are only nineteen in number, and all these are the sons, and, in some cases, the grandsons of those who first worked here. They have lived among powder all their lives, and are familiar with everything but its explosive character, for at Purfleet, as at all Government magazines, there has never been an accident. The first accident here would be the last, and would lay half Kent, Middlesex and Surrey in ruins. The visitor who is fortunate enough to obtain the rarely accorded permission to inspect these magazines is taken charge of by no less a person than the chief of the establishment, Mr. Cleeve, whose vigilance regards even a visitor as a possible source of danger, and therefore to be intrusted to no hands save his own. Passing through the sentries and a series of doors you come to one at which the watchman is on duty, which admits to a small turfed enclosure between high walls, where a sentry is pacing on a little strip of asphalt laid in the grass. This is the last of the sentries, for near at hand is the magazine ground, where, to the cautious eyes of the powder-men, a sentry, with his steel equipments, would be regarded with as much favour as a bonfire. Beyond the sentry is a small cooperage which leads to a long, low, narrow room, with a wooden partition, about 2ft. high, running across the floor, separating one end from the other. At the end you enter hang workmen's clothes and shoes; at the other, beyond the partition, which is magazine ground, nothing but flannel dresses and soft leather shoes are kept. At the further end of the room you leave your walking-stick or umbrella, or knife, or anything that is of iron or steel. Here, too, for the same reason, you pull off your boots, and, in case of mud or grit being on your dress, have furthermore to clothe yourself in a loose flannel blouse and trousers. Then only do you step over the partition to put on a pair of the soft stitched leather boots. Having thus fulfilled all the strict conditions which the duty of the "clothesman" imposes on you, he opens the last door of all, which admits you to a spacious grass-grown enclosure, crossed in all directions with little wooden pathways, and in the centre lightning conductors; all their doors are open, and you can just see through the half gloom the great tiers of powder barrels stacked in blocks like gigantic wine bins. Nothing strikes the visitors more than the silence of this place. The nineteen powder-men employed here are all busy, for at the wharf in front of the magazines one vessel has to be loaded, and another unloaded, so that the passage of the copper barrows, each with their two barrels of powder, is incessant, yet still there is no noise. The barrows move silently, and the men, in their soft shoes, seem to glide over the polished woodwork without the slightest sound. Not a word is spoken, and the dry creaking of the barrels in the magazines, as they are moved from tier to tier, comes with a sound which here is almost noise. Occasionally, as some less full than others are lifted down, one can hear the dry hissing rattle of the grains as they turn over, but this, and the actual creaking of the somewhat thin barrels, and the soft rumble of the trucks taking them away, is all that can be distinguished. Outside, on the wharf, one can hear the sound of gentle hammering, with occasional words of direction, but within the magazines themselves all is quiet, and almost as dark as, night. There is a regularity, a method, and an evidence of careful supervision everywhere, which insensibly imparts a feeling of perfect security even in the gloomiest of the high, narrow passages which wind among the stacks of powder.

The external aspect of these magazines, with their lean-to roofs and stable-looking architecture, gives no idea of their real features of construction. To use a familiar image,

each magazine is constructed like two railway arches, which are built of the strength called bomb-proof, and afterwards covered over with the sloping roof and walls with which all acquainted with the river are so familiar. There are five of these buildings, and each is fitted to allow the storage of forty-four "lots," of 200 barrels in each lot, with two end lots of 400 barrels, making the contents of each magazine 10,400 barrels, or 52,000 barrels in the whole five. Sometimes this quantity has been exceeded by 2,000 or 3,000 barrels being stored in the passages between the "lots," or bins, but it is always sought to avoid this if possible. As a general rule there is never more than 52,000 barrels nor less than 42,000. The latter quantity only is now in store. Though we speak of them as five magazines, yet in reality all five are one.

There is not more than 50ft. between each wall, and all are kept with open end and side doors during the day, except during the time the workmen are at dinner, when the thickly-plated double copper doors are closed, and the keys resigned to Mr. Cleeve, who alone of all the staff can enter the magazines at any hour of the day or night. Every lot or bin is numbered with the even numbers on one side, the odd on the other, and each lot contains solely the sample of one manufacturer, whether private or Government, with the maker's name and date of its reception, and the letters "L.G.," "L.G.R." and "E.R.," denoting large grain for common powder, large grain rifle or rifled guns, and "E.R." for the best kinds used only for Enfield rifles.

Thus, so perfect is the system of storing that at any hour of the day or night the exact bins or lots can be found by the powder man, and either stored away or taken out for shipment. In fact, the magazines are generally so dark that daylight makes but little difference in the gloom of their interior, and during the Crimean war, when the demand for powder was loud and urgent, the powder-men in relays worked night and day through the darkest winter nights - as a matter of course without lights, but, what is not a matter of course, without ever making a single mistake as to the "lots" and qualities ordered for shipment. In some of the gloomiest parts of the magazine a piece of copper framed in wood, like a hand mirror, and tinned over so as to reflect a light upon the name and number of barrels, is kept for use, but it is a mere formal piece of magazine furniture, and seldom called into requisition, so well do the men know the exact position of each barrel. It is almost needless to say that no lights or ironwork of any kind are ever allowed to approach even the outer walls which enclose the magazine building, and the most jealous scrutiny is maintained to see that not an atom of dust comes into the stores. The brickwork of the massive arches is lined with pegged boarding, which fits like cabinet work, to guard against the falling of a grain of dirt from the masonry. Incessantly are men employed in sweeping and sprinkling the wooden tramways, not only inside the magazine, but on all the wooden paths around it. A careful examination of the refuse thus brought together by the brooms only shows a fluffy kind of mixture almost entirely composed of hair off the blankets used, or wool from the workmen's dresses. Of dust, in the ordinary acceptation of the term, there is scarcely a trace, and of powder, or of anything which could be supposed to resemble it, there is absolutely nothing. The barrels are never rolled, but are wheeled in barrows, as we have said, two at a time. A leaky powder barrel is almost unknown at Purfleet, so rare is the occurrence, though some of the barrels have been in use since 1808 and 1813. When it does happen that a barrel leaks it is never placed in the magazine, but at once removed in a hide to the examining house, and its contents changed to a new barrel. There can be no question, however, but that all powder barrels are made too slight, and that a law which will render it compulsory to have powder barrels water-tight would at once do away with more than half the chances of accident from powder, especially when in transit from port to port, or from

mills to magazines. The great rules at Purfleet are, first, that nothing but powder is admitted to the magazines - that is to say, that portfires, rockets, shells, &c., are excluded with as much vigilance as if they were lights. The second rule is, that no powder, not even half an ounce, is ever left out of the magazines; the third, that nothing is ever done in a magazine but to lift in powder and lift it out again. To attempt to open or cooper a cask in the magazine, which Messrs. Curtis and Harvey's workman speaks of as being done habitually by them, would at Purfleet lead to instant and final dismissal. It is impossible to condemn this practice of working in the magazines too strongly. In one important respect, however, Purfleet has departed from its safe and wholesome rule of not admitting anything but powder in its magazines. Quarter-barrels and half-barrels of rifle ball-cartridges are now often stored there. Considering that it is still a doubtful question whether the greased cartridges do not heat when kept long in store, this deviation from the old rule seems at least to be questionable as regards its safety. In face of the gigantic issues at stake in case of an accident at Purfleet, would it not be more wise to avoid even a suspicion of calamity by storing the cartridges elsewhere? For the rest, as far as general precautions are concerned, nothing seems to be neglected. The alarm-bell is rung when there is any appearance of thunder in the air, that the doors and all the apertures of the magazines may be closed at once. This precaution is a wise one, though it would savour much more of precaution in its real sense if the antiquated lightning conductors, which now cover each low-lying magazine, were at once removed from the buildings themselves and placed higher on poles around them. During the night the watchmen have to admit the guard outside the magazine each hour, and the sentries themselves have to strike each quarter hour of their watch upon large bells, so that any want of vigilance in this respect is so easily discovered that it becomes almost impossible. In fact, as regards the magazines, the care which is taken of them leaves nothing to be suggested nor nothing to be desired, except, perhaps, that they were further away from London.

But the Purfleet magazines have to be regarded from three points of view - first, as a place where powder can be stored; secondly, a place for the transshipment of powder to and fro; and, thirdly, as a place for testing powder. These are its three great working aspects as regards the Government, though as regards the general public there is still another view to be taken of the whole, which is Purfleet as a place of safety. Looking only at Purfleet as a mere place of storage for powder, there is no doubt that it is safe enough. As far as its storage is concerned there seems no chance of accident unless from "*unavoidable calamity*." What that calamity would be to England our readers may guess by bearing in mind that less than 50 tons exploded at Erith, and that Purfleet as a rule, stores 2,300. As a place for testing powder, Purfleet, with its tremendous magazines of explosives, seems objectionable. Government cannot manufacture much more than half the powder it requires at Waltham Abbey, and has therefore, to buy at the rate of some 25,000 or 30,000 barrels a-year from private firms. All this powder, whether from private-houses or Waltham, is tested for cleanness, strength, and absorption of moisture at Purfleet, the private firms being allowed to be 5 per cent under the Government standard in each case, though why, we cannot say.

Supposing a firm to send in 1,000 barrels, 10 per cent, or 100 barrels, are opened, and a small sample taken from each, when all the samples are mixed together. These samples are inspected in the "examining room," which is a little apart from the magazines. It is lined with raw hides, and a bank of earth divides it from the powder houses. Still, though the same care is used here as in the magazines, the mere fact of 200 barrels of powder being sometimes

open at one time makes this a risky and objectionable feature of the Purfleet establishment. The samples taken are first tested for dust and dirt, and then for weight per cubic foot in comparison with that of the Government. Having fulfilled these standards it is removed to a totally different part of the establishment outside the walls, where it is tested first for "flashing" on glass to see that it leaves no improper or foul residuum. Next two ounces of it are tested for strength in a small Gomer mortar, loaded with a 68 lb. solid shot. The "L.G." powder (large grain) throws this shot 268ft., the "F.G." (fine grain) 276ft., the "E.R." (Enfield rifle) 320ft., and the "A.4" or "L.G.R." (large grain rifle), with three ounces, throws it 266ft. Any powder throwing the shot less than 240ft. is rejected. These, however, are not the only tests. What remains of the samples after firing is placed in chests bored in the top and sides with numerous holes - the Government powder being similarly placed in other chests. In this state it is left for twenty-one days to try its absorption of moisture, when it is taken out and tested for strength again. If on this second and most severe trial it falls short of the strength of the Government powder by even throwing its shot six inches less, the whole is rejected. All these experiments are carried on some 500 yards away from the magazines, and are of course conducted with the utmost care. Still it is much to be wished that they could be done somewhere else, and, above all, that the examining house was far away, instead of, as now, close to the magazine. As a matter of course, the loading and shipment of powder goes on every day at Purfleet. On Wednesday last a barge was laden with 800 barrels and sent away. This loading with such a quantity conclusively proves one of two things - namely, that Mr. James, the harbour-master of the port of London, knew nothing of the subject when he stated in his evidence at the Belvedere inquiry that 700 barrels are an illegal load; or, on the other hand, that the law as to the number of barrels is so little regarded that even the Government habitually transgress it. 600, 700, and 800 barrels, and even more, are not an uncommon load to arrive at Purfleet.

Powder-barges arriving at Purfleet are never let alongside the wharf till their lights and fires are out, which again shows that even the Government authorities recognise the use of lights and fires on board these craft. But no loading or unloading of powder is ever permitted at Purfleet unless at the hands of the Government powder-men themselves. The crews are always removed from the barges at once, and have a place regularly assigned to them outside the magazines, where there is a cookhouse, and where they can smoke. No barge, if it can possibly be avoided, is allowed to remain at the wharf all night. If, however, it should be compelled to remain, the crew are brought on board at nine o'clock, and have to turn in in the dark. When the powder is all on board and secured below, the barge is removed to a buoy, in the river, about 300 yards from the magazine. While at this buoy the crew can have their lights and fires, whether there is powder on board or not; yet an accident happening to a powder-barge with 800 barrels on board at only 300 yards' distance from the magazine would be the same as if it happened in the magazine itself. In this respect, and in this respect only, do the precautions at Purfleet appear less than they should be in the face of the tremendous havoc which would follow on any casualty. What would be the effect of an explosion at Purfleet it is almost impossible to conceive as regards its damage to the river and the surrounding neighbourhood. What its effect would be in London may be approximately calculated by a consideration of the chemical rules relating to the explosion of gunpowder, and according to which the metropolis would fare badly.

Two thousand tons of powder would occupy 75,000 cubic feet of space, or equal to a pile 100ft. long, 40ft. wide, and 20ft. high - quite the size of an ordinary parish church. As powder at the moment of its explosion exerts an elastic force of one thousand times the pressure of the

atmosphere (15,000 lb. to the square inch), the ignition of this quantity would instantaneously liberate a force equal to 14,000,000 tons. As the vibrations of force radiate equally in all directions, like those of light and heat, it necessarily follows that its intensity diminishes in proportion as the circle of its radiation increases in diameter. Thus taking the direct distance from London to Purfleet as sixteen miles, an explosion taking place at the latter magazine would by the time it reached the town, be distributed over 10,000,000,000 square yards of surface, and therefore the mechanical effect of the shock to the houses in London would be a little over 3 lb. per square yard of surface, or 220 lb. on the front of an ordinary average dwelling-house. This would be augmented to a slight extent from the fact that the power of the shock would not radiate downwards, in consequence of the earth, and would react in other directions. The quantity of powder exploded at Erith on the occasion of the recent catastrophe was 104,000 lb., or 1,733 cubic feet; this probably produced a force of 800,000 tons, and this, radiating to London, was spread over a space of 5,600,000,000 square yards, and reduced its effective force on the houses of the metropolis to about 6 oz. per square yard. It may seem surprising to many that this small force should have been so distinctly felt; but when it is remembered that a very few pounds exerted in banging a door will give rise to a very severe feeling of concussion in most houses, the surprise will cease. The pressure which would be exerted upon the houses of the metropolis by an explosion at Purfleet of 3 lb. or 4 lb. per square yard would probably be sufficient to break most windows facing in its direction, and houses would feel the shock very severely; for, though the pressure would not be more than that specified above, the wave of force arising from such a quantity of powder would be of great duration. Gravesend and Woolwich would probably be completely unroofed, and Erith vanish into air.

It would be well if, while public attention is aroused on this subject, the general conditions of what is called the powder wharf at Isleworth were considered. The amount sometimes accumulated there, and the regulations under which it is governed, should be inquired into; also if barges laden with powder barrels, and with fire on board, are not constantly in the habit of leaving there, and dropping down the river with the tide, till they anchor in the Thames in the midst of the City, or at Purfleet, or the Pool opposite the Docks. If anything happened to these barges while in what we may call City waters, our happy-suburban friends would find the ruins of St. Paul's somewhere in Copenhagen fields.



## Recent Books

**DEFENDING LONDON'S RIVER.** Available : Coalhouse fort and Society.  
By V.T.C. Smith, 1985.

Invaluable discussion of the Thames defences from the medieval to Nazi war, by the Research Officer and 'onlie begetter' of the Coalhouse Fort Project. The author pares down the immense technicalities of military strategy, architecture and armament, to exactly the right level for a general readership. Good plans and photographs are provided.

**COALHOUSE FORT.** Available : Coalhouse fort, Museum and Society.

By V.T.C. Smith, 1985. Concentrating more closely upon the several stages of military development at East Tilbury, this attractive booklet serves as the ideal comparison to A.D. Saunders' similarly-sized work on Tilbury fort upstream. Until now, the Coalhouse defences have never been thoroughly interpreted for the 'ordinary' visitor and clearly Victor's work will be heading for many reprintings as the tourist interest in our local fortifications gains strength.

**CYDER, SAFFRON AND HONEY.** Available : Menzies, Museum and various other retailers.

By W. Tinworth, 1985. Affection for the parish of Horndon-on-the-Hill is evident throughout this book which, devised as a series of walks around village and farm, draws nicely together the historical strands which have woven the present community. The authoress delves into much previously unpublished material to bring a valuable addition to the Essex collector's bookshelf. Production is of 'Panorama' style and the research value is good, with photographs ranging from timber-framed houses to recent excavations for World War Two aircraft.

**BEHOLD THE PAINFUL PLOUGH.** Country Life in West Tilbury, Essex, 1700 - 1850.

Writing is now completed on this extensive study, which is expected to be published during 1988 at about £12. 50. In the hope of encouraging a publisher for such a specialised volume, names are invited from those who feel they would probably wish to purchase one or more copies. The list will carry no obligation. Please contact any officer of the Society, or the Hon. Editor (Randal Bingley) G. T. 378348.



1985 has been an encouraging year on the publishing front for Thurrock and it is of some interest to note that, upon the occasion of his farewell reception at County Hall in 1986, the retiring Editor of the Victoria County History -- Ray Powell -- drew attention to the recent contribution of Thurrock in particular in the field of producing literature of value to Essex historians.

Currently comes news that Mrs. Jessie Payne has completed a history of Corringham, while Tony Benton -- one of our new contributors in this issue -- has his teeth into Little Thurrock and is hoping to tackle a full Victorian study of the parish.

A second parish volume is being worked on by Mrs. Tinworth at Horndon-on-the-Hill, while Rita Maclean, formerly of the Riverside Museum, is now finalising a much-needed centenary book about Tilbury docks and town.

Histories of Stanford le Hope and of Bulphan by Aubrey Saunders and Derek le May are held in typescript at the Museum, for future publication if finances allow. The goal of putting a complete series of single-parish publications for Thurrock on the home shelf before the century's close no longer seems unrealistic. *Hon. Ed.*

