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THE
VICTORIA HISTORY
OF THE COUNTY OF
ESSEX

EDITED BY WILLIAM PAGE, F.S.A., AND J. HORACE
ROUND, M.A., LL.D.

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INDUSTRIES

historian of the period asserts¹ that chalk from the quarries at Stifford was carried by farmers as much as thirty miles inland 'for manuring their lands.'

All the chalk used as manure in Essex was not, however, quarried in the county. Defoe, writing in 1722 of the pits near Gravesend, on the south bank of the Thames, says :²

From these chalky cliffs on the river side, the rubbish of the chalk which crumbles away when they dig the larger chalk for lime . . . is fetch'd away by lighters and hoys and carried to all the ports and creeks in the opposite county of Essex, . . . and sold there to the country farmers to lay upon their land, and that in prodigious quantities ; and so is it valued by the farmers . . . that they not only give from two shillings and six pence to four shillings a load for it, according to the distance the place is from the said chalk cliffs, but they fetch it by land-carriage ten miles, nay fifteen miles, up into the country.

This is the practice in all the creeks and rivers in Essex, even to Malden, Colchester, the Naze, and into Harwich harbour up to Manningtree and to Ipswich. . . . Thus the barren soil of Kent (for such the chalky grounds are esteem'd) make the Essex lands rich and fruitful and the mixture of earth forms a composition which, out of two barren extremes, makes one prolific medium.

A later writer adds³ that,

In Rochford and Dengy Hundreds, the Kentish chalk is generally preferred, as it dissolves and mellows the land better than the chalk from these parts.

At the same period, Kentish chalk was brought by water, in large quantities, to Maldon, Tollesbury, Wigborough, Mersea, and elsewhere, for use in the eastern and north-eastern portions of the county. Much of that landed at Maldon was sent inland by the Chelmer and Blackwater Canal ; but Young tells⁴ how, in 1784, chalk was carried from Maldon to Braxted (a distance of six miles) by means of large five-horse waggons, which made two journeys in the day—'the severest work I ever heard of.' Towards the close of the eighteenth century, chalk seems to have been less frequently used for manure ; for, although Young says⁵ it 'has been largely used in Essex from time immemorial,' he adds that he 'found it carried in the Hundreds near forty years ago in much larger quantities than at present,' when (he explains), much of the land having been chalked, less was required.

Though the old practice of systematically 'chalking' Essex land has been discontinued, the older industry of lime-burning still flourishes. It is carried on extensively at Grays by the Grays Chalk Quarries Company Limited, as well as by

firms or individuals at Saffron Walden, Great Chesterford, Heybridge, and elsewhere.

Within the last thirty years, a large and increasing proportion of the chalk quarried in Essex, especially at the Thurrocks, has been used for making Portland cement, as noticed elsewhere.⁶

An industry closely allied to the foregoing is the MANUFACTURE OF WHITING, which has been carried on at several places in Essex for at least a century and shows no sign of extinction.

In 1840, there were two whitening manufacturers at Colchester (John Blomfield, of the Hythe, and Joseph Willett, of Greensted), two at Maldon (William Baxter and Isaac King), one at Springfield (George Hayward), and others elsewhere.⁷ At the present day, the industry appears to have died out at Colchester, though it is carried on still at Maldon and Springfield. Moreover, new makers have sprung up at Grays (the Grays Chalk Quarries Company Ltd.), Saffron Walden, Wickham St. Paul, Manuden, and Great Henny.

The MAKING OF GUNPOWDER (an intimate mechanical mixture of saltpetre, charcoal, and sulphur) was probably first introduced into England early in the fourteenth century, but its manufacture cannot be said to have been regularly established here until the reign of Elizabeth. The earliest English powder-mill of any consequence was, without doubt (notwithstanding statements sometimes made to the contrary), that situated in the valley of the River Lea, in the south-west corner of Essex.⁸

The lands on which the factory stands belonged originally to the abbots of Waltham.⁹ With the exception of Quinton Hill, the land occupied is low-lying, thickly covered with trees (principally willow and alder planted to furnish charcoal for gunpowder), and intersected by tributaries of the Lea and by artificial canals, over which the materials are transported from process to process. The finished explosives are sent by barges down the Lea into the Thames and so to the magazines at Woolwich and Purfleet.

The earliest known record relating to the Waltham Abbey Powder-Mills bears date 2 March 1560-1. It is of interest as showing

⁶ See *post*, p. 492.

⁷ See *Pigor's Directory*, 1840, pp. 108, 132, 98.

⁸ The still-existing private powder-mill at Chilworth, in Surrey, was established in 1570 : that at Faversham, in Kent (which was a royal factory), about the same time. A large amount of interesting, but wholly undigested, information relating to the Waltham Abbey Factory is to be found in the *Centenary Memorial of the Royal Gunpowder Factory, Waltham Abbey, compiled from Original Sources*, by W. Winters (Waltham Abbey, 1887).

⁹ See Farmer, *Hist. of Waltham* (1735), p. 80 ; also Morant, *Hist. of Essex*, i, 42.

¹ 'Gentleman,' *op. cit.* iv (1771), pp. 340 & 364.

² *Tour* i (1724), letter 2, pp. 10-11.

³ 'Gentleman,' *op. cit.* iv (1771), p. 364.

⁴ *Gen. View* (1807), ii, 204.

⁵ *Ibid.* ii. p. 203.

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that, even thus early, the factory was of considerable extent and was engaged in producing gunpowder for the English Government. On the date named, one Marco Antonio Erizzo, an Italian, writes¹ to John Thomworth (or Tamworth), at Waltham Abbey, in reference to a tender he had made² to supply the Government with materials for making powder. Thomworth was the executor of the widow of Sir Anthony Denny (who had died in 1549), and was probably the owner or manager of the powder-mill.³ The tender in question was referred for consideration to William Bromfield, Master of the Ordnance, who advised⁴ that Neapolitan saltpetre at £3 10s. per cwt. was 10s. per cwt. too dear, and that the offer of 2,000 cwt. of Italian brimstone should be 'respyted,' as there were 'in store at this present [? at Waltham Abbey] 120,000 weight, whiche wyll make foure hundrythe lasts of corne powder and wyll not be wrought yet into powder this fowre yeres.' Ultimately, large quantities of powder-making materials were purchased from Erizzo, to the value of over £6,000, including Italian brimstone at 18s. per cwt. and Neapolitan saltpetre at £3 5s. per cwt.; all to be delivered in England.⁵ From that day, at any rate (and, doubtless, even earlier), the manufacture of gunpowder on a large scale has been carried on continuously at Waltham Abbey.

In his notice of the manufactures of Essex, Fuller (who became perpetual curate of Waltham Abbey about 1648) says⁶ that

More [gunpowder] is made by mills of late erected on the River Ley, betwixt Waltham and London, then in all England besides. . . . It is questionable whether the making of gun-powder be more profitable or more dangerous; the mills in my parish having been five times blown up within seven years, but (blessed be God!) without the loss of any one man's life.

The first deaths from an explosion at the powder mills are recorded in the register of burials of the parish of Waltham Holy-Cross, under date October 1665:—'Tho. Gutridg, killed with a powdermill, ye 4 day: Edward Simons, carpenter, so killed, ye 5 day.'

¹ S.P. Foreign Eliz. xxiv, 1.

² S. P. Dom. Eliz. xvi, 33-4.

³ In 1563, he was described (see Harl. MS. 80, fol. 24: printed in Winstone's *Epping and Ongar Highway Trust*, 1891, p. 291) as 'John Tamworth, of London, Esquier, one of the Chief Gromes of the Quenes hignes Pryuye Chamber.' On 12 May in the year named, the Queen or the Duchy of Lancaster granted him for 31 years after next Michaelmas 'all the usual and fallable woods and underwoods' in Wintry Wood, in Waltham, which belonged formerly to the Abbey, for a yearly rent of 40s. On 19 May 1565, he sold the same rights to John Searle, yeoman, of Epping, for £300 for the remainder of his term.

⁴ S.P. Dom. Eliz. xvi, 35.

⁵ Ibid. 36-7.

⁶ *Worthies of England* (1662), pp. 318-19.

At this period, one Ralph Hudson, gentleman, appears to have owned the powder-mill, and it is recorded among the manor rolls that, at a Court Baron held on 27 May 1672, the jury presented:

that Ralph Hudson has erected a powder mill near a certain bridge called Hook's Marsh Bridge, upon land pertaining to the inhabitants of Upshire and Hallefield, to the great nuisance of the inhabitants there, and of all others passing by the footway leading by the said mill and the barges lying & there constantly being and to the great danger of the inhabitants and of their cattle daily passing the said mill, and has obstructed the way leading from Hook's Marsh to Edmonsee, to the great danger of the inhabitants, they being deprived of the accustomed way. Therefore, it is ordered that the said Ralph Hudson, without delay, shall remove the said mill and restore the said way, under penalty of forfeiting to the Lady of the Manor, for every week the same shall continue, £5.

Hudson seems to have proved obdurate; for, at a Court Baron held a year later, on 29 May 1673, the jury presented:

that Ralph Hudson, gent., will not remove his powder mill, which is a great nuisance to the inhabitants and to travellers there passing, according to the order of the last Court. Therefore he is amerced at £40.

Also, they present that Ralph Hudson, gent., in shutting up the water, has done so to the nuisance of the footway leading by Norne Marsh to Cheshunt; and it is ordered by the Court that the aforesaid Ralph Hudson shall sufficiently repair the same before the first day of June next, under pain of forfeiting to the Lady of the Manor £5.

Also, they present that the aforesaid Ralph Hudson has done great harm to the Marsh called Norne Marsh and to the hoppet called Norne Marsh Hoppet by cutting the turf for the mending of his banks; and it is ordered that he shall not do the same under pain of forfeiting to the Lady of the Manor, for every time so offending, £5.

In November 1720, there was another fatal explosion, and the following entry appears in the parish register: 'Peter Bennet, of ye town, killed at ye powder mills, ye 27 day.'

Farmer, in his *History of Waltham*, gives a view (Fig. 14) of the factory as it was in 1735. From this view, it appears that there were then some twenty different buildings, as named thereon. Of the factory, Farmer says:⁷

Near the Town, on one of these Rivers [*i.e.* on one of the branches of the Lea], are curious Gunpowder-Mills, which supply the nation with great quantities of gunpowder, being esteemed the largest and completest Works in Great Britain, and are now the Property of Mr. John Walton, a gentleman of known honour and integrity.

This John Walton was (according to Winters⁸) a relative of Izaak Walton, the angler. On

⁷ Op. cit. 2-3.

⁸ *Centenary Memorial*, pp. 18 and 21.

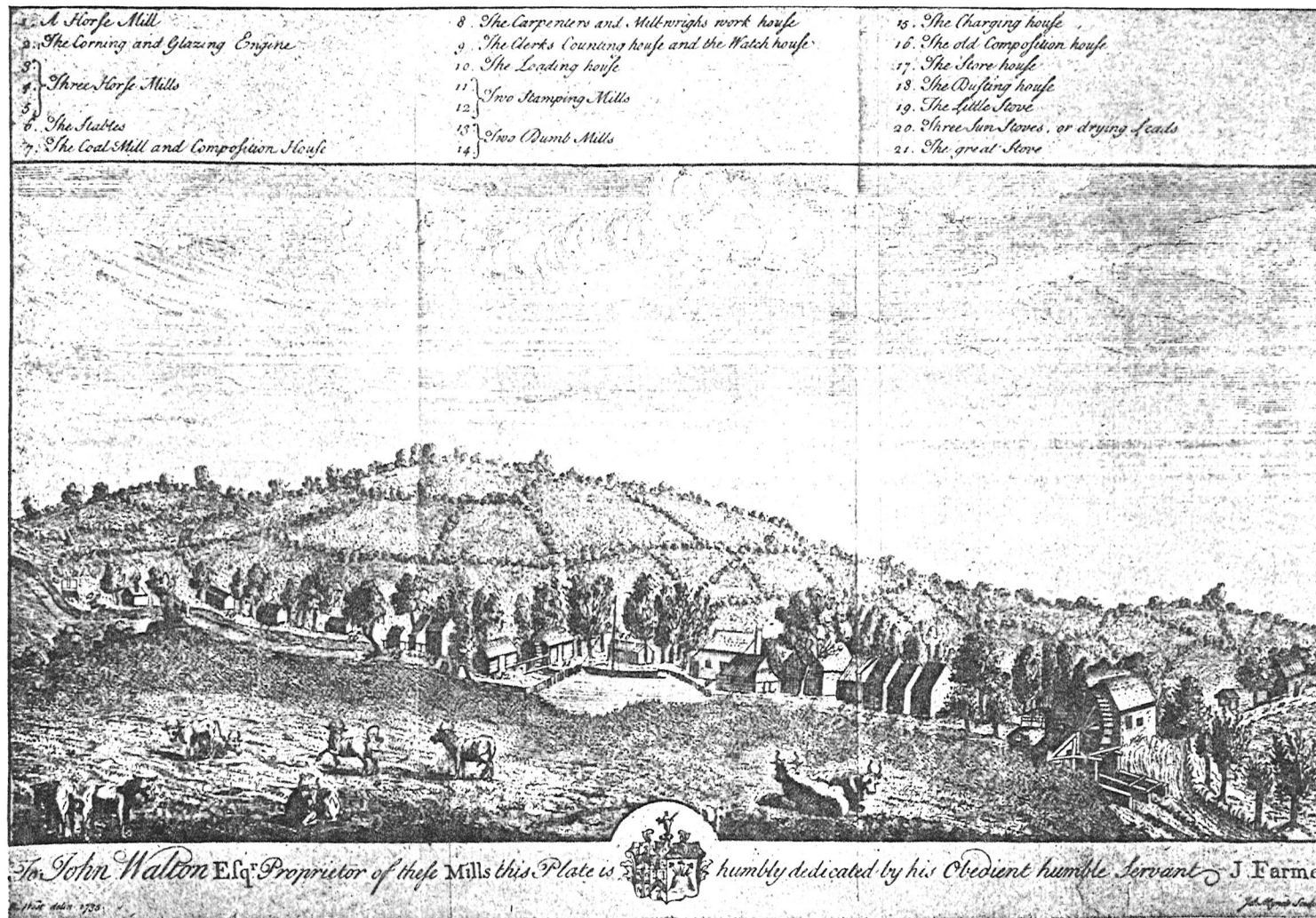


FIG. 14. THE GUNPOWDER FACTORY AT WALTHAM ABBEY IN 1735

(After Farmer)

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20 October 1675, in the Abbey Church at Waltham, he married Lydia Freeman, and became afterwards 'a gentleman of considerable substance and influence in the town.'

On 3 December 1765, there was another serious explosion, two mills being blown up, but fortunately no one was hurt.¹

In 1770, an Essex historian wrote² of the factory as

several curious gunpowder mills, upon a new construction, worked by water (the old ones having been worked by horses).³ They are reckoned the most complete in England, and will make near one hundred barrels weekly for Government service, each barrel containing one hundredweight. They are now the property of Bouchier Walton, Esqre.

Horse-power was used, however, to some extent, as will be seen, at a considerably later period.

In 1787, the factory was acquired by the Government from another member of the family, a later John Walton.⁴ From that time to the present, it has always been known as the Royal Gunpowder Factory. The surrounding lands were not finally purchased till 1795.

Upon becoming Crown property, the factory was enlarged by the Board of Ordnance, under whose management it fell. Some fourteen or fifteen of the old hands were retained and workmen were brought also from the King's Powder-Mill at Faversham, both the Faversham and Waltham Abbey Factories being worked under the superintendence of Major (afterwards Sir William) Congreve, Deputy-Comptroller of the Royal Laboratory at Woolwich. Forty-six hands were employed in October 1787, at which date stone runners and beds, such as are still employed, were in use for the process of 'incorporating' (i.e. mixing).

In 1791, the factory records speak of double horse-mills being in use; and, in 1795, powder appears to have been sent regularly from Waltham Abbey to Purfleet, for proof. Sometimes it went overland in ammunition waggons: at other times, by water in barges.⁵

Small explosions seem to have been not uncommon at this period⁶; but, as a rule, they did no serious injury. In 1801, however, a horse 'corning-house' (i.e. a building in which cakes of gunpowder are broken into grains) exploded, killing nine men and four horses. In consequence of this explosion, a committee of the

Royal Society visited the works to examine and report on the possibility of danger arising from electrical excitation, caused by walking or rolling barrels on the leather-covered floors, or by the use of silk-covered 'dusting reels,' in which the fine dust is removed from the grain powder. The committee reported, however, that there could be no danger from such causes.

The introduction into the manufacture of gunpowder of charcoal burnt in retorts or 'cylinders,' instead of in 'pits,' occurred about this time. In 1804 and for some years afterwards, government cylinder works, in connexion with the Waltham Abbey Factory, were maintained at Fisher Street and at Fernhurst, in Sussex.⁷ In the same year occurs the first mention of iron runners and beds for incorporating mills. The annual yield of the factory at this period was about 20,000 barrels, probably of 90 lb. each.

In 1805, the Board of Ordnance purchased the Cheshunt corn-mill, and in 1809 the Waltham Abbey corn-mill, for the sake of their water-power rights.

In 1811, in order to show that the manufacture of gunpowder could be carried on more economically at the Royal Gunpowder Factories at Waltham Abbey and Faversham than by private merchants, General (afterwards Sir Wm.) Congreve addressed a statement on the subject, dated 20 April 1811, to the Master-General of the Ordnance.⁸ This statement showed that the profit, between 1 January 1789 and 31 August 1810, on 407,408 barrels of gunpowder of 100 lb. each, made at Waltham Abbey and Faversham, amounted to £288,357 6s. 0½d.; and that the profit on 'regenerating' 127,419½ barrels, between 1 January 1790 and 31 August 1810, was £53,091 11s. 3d., or a total profit of £341,488 17s. 3¾d. The same statement gives the whole amount expended by the Government on the original purchase, and on new erections, repairs, and improvements, up to 31 December 1799, as £45,683 2s. 7½d.

On the morning of 27 November, 1811, there was another serious explosion, a press-house and a corning-house being blown up and eight men killed. After this, Sir William Congreve substituted Bramah hydraulic presses for the old screw-presses used previously for giving the requisite density to the gunpowder. In October 1814, it was ordered that, for working the machinery, water-power was to be substituted entirely for horse-power.⁹ In 1816, the old

¹ *Ann. Reg.* viii, 149.

² 'Gentleman,' *op. cit.* iv, 147.

³ According to Winters (*op. cit.* 20), the system of working by means of water-power had been introduced as early as 1739.

⁴ A pillar sundial, which belonged to this John Walton and has affixed to it a metal plate engraved with his name, still stands in front of the offices of the factory.

⁵ See Winters, *Centenary Memorial*, pp. 44-5 and 50.

⁶ *Ibid.* 34-5.

⁷ For information as to the steps taken at this time to supply the factory with charcoal, see p. 447.

⁸ *A Statement of Facts relative to the Savings which have arisen from Manufacturing Gunpowder at the Royal Powder Mills . . . since the year 1783* (1811).

⁹ At this time, in all probability, horse-power was finally disused. In 1810, according to Winters (*Centenary Memorial*, pp. 67 and 78), there were in use nine water-mills and seven horse-mills; and, in 1813

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corning-frame was replaced by a new granulating machine, patented by Sir Wm. Congreve.¹ It was erected on that portion of the factory known as the Lower Island.

During the war with France, very large quantities of gunpowder were produced at Waltham Abbey, the figures for the later years being as follows :

Years.	No. of Barrels.
1809	20,050
1810	20,688
1811	21,252
1812	21,000
1813	25,060
1814	10,161
1815	15,790

On the conclusion of peace, the output was much reduced. In 1816, it amounted to about 4,000 barrels only ; in 1819, it had fallen to about 1,000 barrels ; and, in some succeeding years, it was even less. In addition, however, large quantities of old powder were 'regenerated' each year at this period. In 1822, the establishment was fixed at thirty-four persons.²

In 1825, the Royal Factory at Faversham was sold ; and, nine years later, the Royal Factory at Ballincollig, in Ireland, was disposed of also. Waltham Abbey thus became the sole royal gunpowder factory, and has remained so to the present day.

In 1843, there was an explosion, attended with the loss of seven lives, of two corning-houses, a press-house, and a reel-house. Professor Faraday visited the works soon afterwards to report on various matters connected with the safety of the buildings.

At various times between 1803 and 1853, the Board of Ordnance purchased land and buildings adjacent to the factory, both in the town of Waltham Abbey and along the banks of the Lea, to the north of the factory, acquiring altogether about one hundred and forty acres. They purchased also the whole right of water of the River Lea and all its branches, from King's Weir, in

(when the war was at its height), twenty-four water-mills and nine horse-mills. Winters adds (p. 63) that 'The horses had bells on their harness ; and, when they passed round, they struck against a spring which caused the ringing of a small bell, to let the heads of [the] factory . . . know if they performed their work regularly and at the proper speed. These work-bells were to be heard jingling from mill to mill . . .'

¹ Patent no. 3937 of 1815 (3 July).

² In 1813, during the war, it had exceeded 250 hands, and the wages paid to them had amounted to £17,212 (see Winters, *Centenary Memorial*, pp. 75-8). This decrease after the war was sufficient to reduce noticeably the population of the parish (see *Census Report*, 1821, p. 100). At the time of the following census, thirty men were employed (see *Census Report*, 1831, p. 198).

Nazing, to the Black Ditch, in Sewardstone, a length of five miles.³

In 1853, the factory was capable of producing 10,000 barrels of gunpowder and of storing 5,000 tons of saltpetre and sulphur. The value of the buildings, land, and water-rights was estimated at £230,000.⁴

In 1857, Major J. Fraser Baddeley published a full description of the methods of manufacture then followed.⁵

In 1858, Sir W. Snow Harris, F.R.S., after an inspection of the factory, drew up a report for a system of lightning conductors for all the houses in it. They were subsequently installed.

On 1 April 1860, a force of Metropolitan Police was substituted for the 'rounders' and 'watchers' who had looked after the factory by night since the Government acquired it in 1787.⁶

In 1870, the factory contained thirty-two pairs of incorporating-mills, some driven by water and some by steam. These could incorporate annually materials for about 27,580 barrels of large-grain, or 13,690 barrels of fine-grain, gunpowder. The number of men employed was about one hundred and fifty.⁷ All the processes preparatory to the actual manufacture of the powder were carried on in the factory, in order to ensure the absolute purity of the finished article. These processes included the refining of sulphur and saltpetre and the burning of charcoal in cylinders.⁸

For many centuries, black gunpowder was the only explosive. Nothing else was made at the Waltham Abbey Factory until 1872, when the production of guncotton (discovered originally in 1846 by the German chemist Schönbein) was commenced on a manufacturing scale, according to a process worked out at the factory by Sir Frederick Abel.

³ *First Report of the Waltham Abbey Committee, appointed by the Honourable Board of Ordnance, 11 March 1853, upon the effect of the Water Bills now before Parliament on the Ordnance Establishments of Waltham Abbey and Enfield* (1855), p. 12.

⁴ *Op. et loc. cit.*

⁵ *Pamphlet on the Manufacture of Gunpowder, as carried on at the Government Factory, Waltham Abbey, (Waltham Abbey, 1857).*

⁶ Winters says (*Centenary Memorial*, pp. 126-7): 'The watchmen were provided with large overcoats and rattles. These men were stationed at each watch-house or box, and divided the watch into three parts—1st watch, from the time of leaving off work to ten p.m.; 2nd watch, from ten p.m. to two a.m.; 3rd watch, from two a.m. till the workmen came. Each watchman had to strike the various bells on his beat every hour, and was subject to meeting the rounder at any time during his watch. Beds were provided in the watch-houses for two watchmen, who were supposed to sleep while the third did duty.'

⁷ See *A Handbook of the Manufacture and Proof of Gunpowder, as carried on at the Royal Gunpowder Factory Waltham Abbey*, by Capt. F. M. Smith, R.A. (1870), p. 7.

⁸ *Ibid.* p. 10.

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The original guncotton factory consisted mainly of old buildings which had formed part of the saltpetre refinery and abutted on the principal street of the town. It was capable of turning out about two hundred and fifty tons of guncotton per annum. In 1885, one hundred acres of land, known as Quinton Hill, were purchased by the Government and a new guncotton factory, which started work in 1890, was erected there.

The kind of gunpowder known as 'brown' or 'cocoa' powder was introduced from Germany in 1883, and a number of new buildings were erected in the old part of the factory for its production, which was commenced in 1885.

In 1889, Major W. H. Wardell published another very full account of the methods of manufacturing gunpowder at Waltham Abbey.¹

Smokeless powders for military purposes were first produced in France in 1886. In 1890, Sir Frederick Abel's Explosives Committee recommended a smokeless powder, to which the name of 'Cordite' was given, and its manufacture was commenced at Waltham Abbey in 1891. Cordite is a mixture of nitro-glycerine 58 parts, guncotton 37 parts, and mineral jelly 5 parts. For its production, a nitro-glycerine factory was put up on Quinton Hill, where the necessary buildings for making cordite were also erected. Later, to meet the increased demands for cordite, owing to its having taken the place of gunpowder, a second nitro-glycerine factory was built in the old portion of the factory, and this started work in 1898. At the same time, the majority of the houses formerly used for the manufacture of gunpowder were converted into houses for the manufacture of cordite, the original cordite buildings being no longer suitable for the larger output required.

A modified cordite is now being made, in which the quantity of nitro-glycerine has been reduced to 30 parts and the quantity of guncotton increased to 65 parts. This modification entailed considerable additions to the factory and 94½ acres were acquired to the south of Quinton Hill for the erection of the necessary buildings. The guncotton factory was also extended.

At the present time, the factory is capable of producing annually 2,000 tons of cordite, about 200 tons of gunpowder, and about 150 of guncotton for mines, torpedoes, &c. It covers 411¼ acres, and has about five miles of navigable waterways. It comprises three hundred separate buildings, and the average number of hands employed has been, in recent years, between 1,200 and 1,300.

Allusion has been made already to the conveyance of powder (sometimes overland in waggons: sometimes by water in barges) from Waltham Abbey to Purfleet for storage. At this place, which lies on the north bank of the Thames in the Essex parish of West Thurrock, the

¹ *Handbook of Gunpowder and Guncotton* (War Office Official Paper, 1888).

Government powder magazine has long been situated. It was erected in pursuance of an Act, passed in 1760,²

for taking down and removing the magazine for gunpowder and all buildings thereunto belonging, situate near Greenwich, in Kent, and erecting instead thereof a new magazine for gunpowder at Purfleet, near the River Thames, in the county of Essex.

In 1771, an Essex historian writing of the place, says: ³

Here is the noble and curious magazine for powder, erected by government. It stands at the western extremity of the parish; is strongly arched; and every way well secured against fire, lightning, &c. A good quay is also erected by the water-side for the landing of the powder; also a handsome house on the hill above for the store-keeper, and barracks for one hundred mattresses ⁴ to guard the magazine.

Even at the present day, all British military stations, both at home and abroad, are supplied from these stores.

BRICK-MAKING and TILE-MAKING have been carried on in Essex from a very early period. This is natural in a county that contains practically no building stone. For the last four centuries, the brick-making industry has been of considerable and increasing importance and is now carried on to a greater extent than ever.

That the Romans made bricks in Essex is proved by the abundance of the very large, thin, square, tile-like bricks found at all places known to have been Roman settlements, and especially at Colchester.

After the time of the Romans, however, it seems clear that bricks were neither made nor used largely for several centuries. Yet the art of making bricks was not lost in England during this long period, as has often been stated, and bricks were used occasionally for building right through the middle ages. We have, however, in the county, no brick-building of this period, so far as I know, with the solitary exception of the thirteenth-century Early-English chapel of St. Nicholas, at Little Coggeshall. This remarkable building has quoins, dressings, and window-mullions of brickwork. The bricks are large and tile-like, about twelve inches long, six inches broad, and vary from one-and-a-half to two inches in depth.

It may be, however, that tiles were used commonly for roofing all through this period. At all events, one Alexander 'Tigulator,' who was a tyler, lived at Colchester in 1301, when his taxable goods were assessed at £1 7s. 11d. showing that he was a fairly wealthy man.⁵ A century and a quarter later, tile-making must have been an industry of some importance in the

² 33 Geo. II, cap. 11.

³ 'Gentleman,' op. cit. iv, 355.

⁴ Gunners or gunner's mates: an obsolete term.

⁵ *Trans. Essex Arch. Soc.* (new ser.), ix, p. 136.

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forming stone pipes by the means of circular saws.'

In the pamphlet mentioned, the inventor strongly urges (pp. 1-11) the benefit of his 'method of covering hay-stacks with pendent frames of the Patent Artificial Slate,' which seems to have been used in lieu of thatch. The adoption of the method on the Ray House estate had (he says) enabled large quantities of hay to be saved in good condition which would otherwise have been greatly damaged by wet. He sets forth also (pp. 12-30) the benefits which these 'pendent frames' conferred on those who used them by protecting stacks of wheat and other grain from depredations of rats and mice.

Sir James Wright had resided at Bath for some years before his death, which took place at Bathford on 8 March 1804.¹ His business of slate-making appears to have been discontinued very soon after his death, and Ray House was sold by his successor in 1807. Lysons, writing in 1811, says² that the business had then 'been several years discontinued and the buildings taken down.'

THE MAKING OF PATTENS was formerly a small, though flourishing, industry in Essex, as it was probably, in most other counties. It has now become extinct, owing to the total disuse of pattens.

In 1748, Pehr Kalm, the Swedish naturalist, who spent some time in England, much of it in Essex, wrote:³

The women leave in the passage their pattens: that is a kind of wooden shoes which stand on a high iron ring. Into these wooden shoes, they thrust their ordinary leather or stuff shoes when they go out, and so go by that means quite free from all dirt into the room.

In 1793, there were two patten-makers at Chelmsford, one (Ambrose Mumford), being described⁴ as a 'heel, patten, and clog-maker.' In 1823, John Johnson, of Stratford, James Beard, of Waltham Abbey, and John Lilly, of Thaxted, were described⁵ as 'patten-makers'; whilst, in 1826, Tim Sach, of Bocking, Thomas Mumford, of Moulsham, and three firms at Colchester were similarly engaged.⁶ In the *Census Report* for 1831, sixteen persons, and in that for 1841 seventeen persons (all males), were returned as 'patten & clog-makers.' After this date, the industry was perhaps absorbed by some other, for it ceases to appear.

THE CUTTING AND PREPARING OF CORK has never been carried on in Essex, so far as I know,

¹ *Gent. Mag.*, lxxiv, p. 284.

² *Environs, Supplement*, p. 365.

³ *Visit to Engl.* (1892), p. 13.

⁴ *Univ. Brit. Directory*, ii, p. 516.

⁵ *Pigot's Directory*, 1823, pp. 70, 78, & 303.

⁶ *Op. cit.* 1826, pp. 521, 525, & 531.

except at Colchester, where it has been a small industry for at least a century, but has been discontinued during the last year or two.

In 1793, the business was carried on at Colchester by one William Burrows⁷; and, in 1823, there were at Colchester three firms engaged in it—Samuel Greenfield, of East Hill, John Hale, of Magdalen Street, and William Lubbock, of East Street.⁸ Of these, only the second continued until recent years.⁹ Mr. John W. Hale, the present proprietor of the business, now carried on at East Hill did, years ago, a large and prosperous business with brewers, mineral-water manufacturers, chemists, and others all over the district round Colchester. Now, however, the business is practically dead and he has cut no corks for several years past. Such business as he has carried on lately has been solely the selling of corks imported ready-cut, and even that he is about to relinquish.

In the first half of last century, the MAKING OF WOODEN CHAIRS was carried on at Colchester (and, possibly, to some extent, elsewhere in Essex), just as it is now in Buckinghamshire; but, before the end of the century, it seems to have died out completely.¹⁰

In 1823, there were at Colchester four individuals described as chair-makers, namely, Thomas Ainsworth (Crouch Street), Samuel Dearsley (Wyre Street), J. Minks (Middleborough), and William Orrin (East Hill).¹¹ Nine years later, though some of these had disappeared, there were still five chair-makers at Colchester.¹²

In 1831, only three persons (all males over twenty years of age and living at Colchester) were returned as engaged in it,¹³ but the number must have been really larger. In 1841, twenty-five persons (twenty-three males and two females) were returned as employed in the chair-making industry. It has now been extinct, I believe, as a separate industry, for many years.

THE MANUFACTURE OF THE CONGREVE WAR ROCKETS, invented in 1804 by Sir William Congreve, was formerly a minor Essex industry. In 1840, the company manufacturing them had its works on the banks of the River Lea, on

⁷ *Univ. Brit. Directory*, 1793, ii, 522.

⁸ See *Pigot's Directory*, 1823, p. 290.

⁹ At the Census of 1831, four persons in Essex (all of them living at Colchester) were described as 'cork-cutters' (see *Rep.* p. 198).

¹⁰ Probably the industry is much older; for, among the Dutch refugees in Colchester in 1571, was a 'turnor of stoles,' one Francis de Kaerle, aged forty, born in Brabant, but resident in England four years (See S.P. Dom. Eliz. lxxviii, No. 9 (1); and Moens, *Reg. of Dutch Ch.* [1905], p. 101).

¹¹ *Pigot's Directory*, 1823, p. 290.

¹² *Ibid.* 1832, p. 674.

¹³ *Census Rep.* 1831, p. 198.

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the West Ham Marshes.¹ The works continued there as late as 1862,² though the rockets had been disused long previously.

The MAKING OF VINEGAR was carried on at two places in the county in 1840, when J. P. Osborne, of St. Botolph's, Colchester, and James Keir Hett & Co., of West Ham, were described³ as 'vinegar manufacturers.' When the industry originated and when it ceased, I know not.

The MANUFACTURE OF STARCH has been carried on to a small extent at more than one place in Essex during the past half-century, but has now, I believe, ceased.

In 1859, the Colchester Patent Starch Company Limited had works in St. Botolph Street, Colchester,⁴ but these have been closed many years. In quite recent years, the firm of Harvey & Neville, of High Street, Stratford, were described⁵ as 'starch-makers.'

The MANUFACTURE OF LINSEED OIL was carried on at or near Colchester for a century at least, but ceased there about twenty years ago and has not since been carried on, I believe, in Essex.

In 1793, one George Rootsey, of Colchester, was described⁶ as an 'oil-miller.' The firm of Firmin & Chapman, which owned the Lexden oil-mills, was founded, apparently, about 1830.⁷ By 1840, however, it was J. Chaplin only,⁸ and so continued to the end. The business was extensive, but ceased about 1878, when the mills were burned and not rebuilt.

The MANUFACTURE OF EMERY-CLOTH AND GLASS-CLOTH was carried on in 1840 by Messrs. Barsham & Lonsdale, of Stratford and London, who owned a patent.⁹ The industry is not now carried on in the county, unless in the metropolitan portion.

The MAKING OF PINS has never been carried on in Essex, so far as I know, except at Waltham Abbey, where a large pin-factory existed for a considerable period.

Small metal pins of the kind we now use for toilet and other purposes were not manufactured

in this country before the seventeenth century. Up to that time, larger pins of wood, bone, or metal had been in use, and had been used for a very long period. In 1865, when pulling down the old 'Blue Boar,' at Castle Hedingham, a very ancient house, the workmen found, carefully stored away, some polished thorns of the kind formerly used by ladies for fastening their dresses.¹⁰

The pin factory which existed formerly at Waltham Abbey was founded probably early in the eighteenth century, though Farmer, who wrote in 1735,¹¹ makes no mention of it. By 1760, it appears to have given name to Pinner's Green,¹² which still remains to commemorate it. By 1792, it must have been fairly extensive, for 'some hundred hands' were employed in it.¹³ On 4 June in that year (being the birthday of King George III), the proprietor,

to show his loyalty, illuminated his house and ordered a holiday to be given to all his hands, with a handsome sum to drink his Majesty's health, and the entire town joined in the festivities.

William Ellis, the engraver, has given an account of the methods of manufacture followed at Waltham Abbey at this time:¹⁴ The brass wire as received at the works was, he says, too thick for pin-making and had to be fined down by passing it through a small hole in an iron plate. It was cut first into lengths of three or four yards each and then into shorter lengths, each long enough to make six pins. Each end of each of these pieces was then sharpened to a point by boys who sat before two revolving grinding wheels—one coarse: the other fine, for finishing. By this means, 'a lad of twelve or fourteen years of age is enabled to point about sixteen thousand pins in an hour [? a day].' This done, a pin-length was cut off each end and the sharpening was repeated, till six sharpened pin-lengths had been cut from each piece of wire. The next operation was that of putting on the heads—'head-spinning,' as it was called. By means of a 'spinning-wheel,' one piece of wire was coiled spirally round another piece, which was then withdrawn. The spiral coil was then cut into short lengths by means of shears, every two convolutions forming a pin-head. As soon as cut, these incipient heads were softened by heating them red-hot and allowing them to cool slowly. They were then distributed to children who, taking up a pin-length of wire, sharpened at one end, thrust the blunt end into one of the little coils and then placed the whole between a

¹ See *Pigor's Directory*, 1840, p. 154.

² See *P.O. Directory*, 1862, p. 279.

³ See *Pigor's Directory*, 1840, pp. 108 & 154. At the census in 1841, only one person (a male, living at Colchester and probably the above-mentioned J. P. Osborne) was returned as engaged in vinegar-making in Essex.

⁴ *P.O. Directory*, 1859, p. 290.

⁵ *Op. cit.* 1890, p. 345.

⁶ *Univ. Brit. Directory*, 1793, ii, 524.

⁷ They appear as 'oil-millers' in *Pigor's Directory*, 1832, p. 675, but were not in the issue for 1826.

⁸ *Pigor's Directory*, 1840, p. 108.

⁹ *Ibid.* p. 153.

¹⁰ See *Chelmsford Chronicle*, 17 and 24 Dec. 1880.

¹¹ *Hist. of Waltham Abbey* (1735).

¹² Winters, *Waltham Abbey* (1888), p. xvi.

¹³ *Times*, 1792.

¹⁴ *The Campaigna of London* (1791-2), pp. 22-23.

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specially-constructed hammer and anvil before which each child sat. By this means,

the point and the head are fixed together in much less time than it can be described, and with a dexterity only to be acquired by practice, the spectator being in continual apprehension for the safety of their fingers' ends.

To whiten the pins, they were put for a time in 'a copper containing a solution of tin and the lees of wine.' The pins, when taken out, were of a dull white, but were quickly polished bright by putting them 'into a tub containing a quantity of bran, which is set in motion by turning a shaft which runs through its centre.' The bran was then winnowed away, leaving the pins ready for sale. The factory, says Ellis, afforded 'employment to a number of children of both sexes.'

At this period, apparently, the business was flourishing; for, in or about 1796, the factory was rebuilt on an enlarged scale.¹ Mr. Francis, the proprietor, was a man of enterprise, for, in 1814, his works were 'so constructed as to be put in motion either by water or a steam engine.'² Still later, Francis appears to have occupied other buildings as well, for Maynard, writing in 1865, says³ that

some years ago [he] held not only part of this [the corn] mill, but also large factories, both in the Romeland and in the way leading to the Abbey; thus employing a great number of men, women, boys, and girls.

Winters says⁴ that 'the pin factory' adjoined the Cornmill and that, early in the nineteenth century, the proprietor was one 'Mr. Francis, of Gracechurch Street,' father of the Rev. James Francis, afterwards vicar of the parish. In 1818, he appears to have sold or surrendered his factory to the Board of Ordnance, and it was used afterwards as a store in connexion with the Royal Gunpowder Factory.⁵ The business was, however, continued, apparently in a new factory in the Romeland. In 1832, the proprietors were Messrs. Durnford, Francis, & Co., of Gracechurch Street, London.⁶ They still owned it in 1840, when it was situated in the Romeland and the industry was said to be declining.⁷ In the following year, only twenty persons (eleven males and nine females) were engaged in pin-making in Essex.⁸ Of these, seven males were said to have resided at Colchester, but I know of no pin

factory which existed there. A few years later, the Waltham Abbey factory seems both to have been removed and to have changed hands; for, in 1848, it belonged to one James Mills, of the Market Place.⁹ It was, apparently, given up altogether a few years later.¹⁰ Probably it was driven out of existence by the introduction, about this time, of the modern solid-headed pin made by machinery, chiefly at Birmingham. This has many advantages over the old-fashioned pin, the heads of which often came off, while some twenty different operations were necessary to complete it.

CLOCK-MAKING has certainly never been carried on in Essex to any great extent, and is now practically extinct in the county. In days when all trades were less localized and less specialized than now, clocks were made, no doubt, in small numbers, by working makers, in many of our Essex towns. This was, it is said, especially the case at Colchester.

Mr. Ernest N. Mason says¹¹ that, from the latter part of the seventeenth century to about the end of the eighteenth, both 'bird-cage' and 'long-case' (or 'grandfather's') clocks were made in Colchester. He has found, he says, the names of no less than nine Colchester makers on the faces of such clocks: namely, Gulielmus Bacon, John Buffett, Cooper & Hedge, Nathaniel Hedge, Robert Hewes, John Osborne, — Smorthwaite, Jeremy Spurgin, and Thomas Thorp. Bird-cage clocks made at Colchester about 1740 are, says Mr. Mason, the earliest of their kind made in the town which he has been able to trace, though some long-case clocks made by Gulielmus Bacon appear, he says, to be much earlier.

All this may be perfectly true, but it does not prove that the making of these clocks was carried on in Colchester to a greater extent than was usual in any other town of equal importance.

⁹ White, *Hist. and Gaz. of Essex* (1848), p. 284.

¹⁰ At the census of 1871, however, two pin-makers were returned in Essex. Probably these had long since retired from business; for, in 1881, they were reduced to one, and none were returned in 1891. Similarly, at the census of 1871, seven 'needle manufacturers' (one man and six women) were returned as living in Essex. Possibly they had been employed elsewhere, but had retired to live in Essex. At all events, I know of no other evidence of needles having been made in Essex since 1571, when there were at least two 'neadellmakers' among the Dutch refugees at Colchester—John CErsterlinge, age twenty-six, and Leven Denehout, age thirty, both born in Flanders, but resident in England three and four years respectively, and both described as 'of an honest conversation' (see S.P. Dom. Eliz. lxxviii, 9). No Essex needlemakers were returned in 1881, but two (both men) were returned, curiously enough, in 1891.

¹¹ *Essex Standard*, 26 Sept. 1903.

¹ See *Beauties of Engl. and Wales* (1803), v, 442, and Hughson's *London* (1809), vi, 283.

² Ogborne, op. cit. p. 200.

³ *Parish of Waltham Abbey*, p. 92.

⁴ *Waltham Abbey* (1888), p. 58.

⁵ Winters, *Centenary Memorial* (1887), pp. 84-5.

⁶ *Pigot's Directory*, 1832, p. 716.

⁷ *Ibid.* 1840, p. 162.

⁸ *Census Returns*, 1841.

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(which employs now from 2,700 to 3,000 hands) has been known as the India-rubber, Gutta-percha, and Telegraph Works Company Limited, but the name of the founders, Messrs. S. W. & H. A. Silver, is commemorated by 'Silvertown,' a district carved out of the parent-parish of West Ham. The company's London offices are in Cannon Street.

Not far distant, on the bank of Barking Creek, Messrs. William Warne & Co. Limited, who occupy the old jute works, have carried on for some years a large business in the manufacture of india-rubber goods. In North Woolwich (also close at hand), the W. T. Henley Telegraph Works Company Limited manufactures submarine cables and electric and telegraphic appliances on a very large scale. North Woolwich is, however, in Kent, strictly speaking.

The REFINING OF SUGAR is confined, I believe, in Essex to the parish of Silvertown, where there are two large refineries, both of modern establishment there.

The most important and extensive is the Thames Sugar Refinery of Messrs. Henry Tate & Sons Ltd., the leading firm of its kind in Britain. Founded originally in Liverpool by the late Mr. Henry Tate (afterwards Sir Henry Tate, bart. : died 1899), the firm came to Silvertown in 1877 and established works there to develop the trade in 'cube' sugar. Previously, what is still called 'loaf' sugar had been sold for centuries in large conical loaves, which each grocer cut up for his customers in his own shop by means of a hinged chopper or 'guillotine.' Messrs. Tate acquired a patent for making sugar in the 'cubes' now used everywhere, and thus completely displaced the old 'loaves.' The output of the works is now enormous, exceeding, it is said, two thousand tons of cubes per week.

The second firm is that of Messrs. Abram Lyle & Sons Ltd., originally of Greenock. Their works were established at Silvertown in 1881, and are now of great extent. The firm is widely famed for its pure Golden Syrup, which is sold in tins.

Probably by far the larger portion of the persons returned at recent censuses as engaged in the industry in Essex are employed by these firms. In 1881, there were 503 persons so returned (498 males and 5 females); in 1891, 740 (731 males and 9 females); and, in 1901, 961 (936 males and 25 females).

The MANUFACTURE OF AMMUNITION is carried on extensively at Farm Hill, Waltham Abbey, by the firm of F. Joyce & Co. Ltd., which was founded in 1820, by Mr. Frederick Joyce, a chemist, for the manufacture of percussion caps, of which he was the pioneer and perfecter in this country. The firm's works were at first at 55, Bartholomew Close, West

Smithfield, London, but were removed in 1842 to Farm Hill, where they have remained ever since. The London offices have been since 1898 at 7, Suffolk Lane, E.C.

The Joyce percussion cap of 1821 was so successful that, within ten years, all earlier methods of discharging guns had become nearly obsolete. The manufacturing of these caps and of the wads used in the muzzle-loading guns of those days formed the staple of the firm's business up to about the middle of the century.¹ After this, the breech-loading gun was introduced, and the firm then added the manufacture of the cartridges used in such guns. With the progressive development of all the various forms of the cartridge, the firm has always been prominently associated, and to-day it occupies a leading position among manufacturers of sporting ammunition of all kinds.

Within the last eight or ten years, the MANUFACTURE OF EXPLOSIVES of various kinds has been commenced at certain spots on the marshes round our coast—selected because they are remote from all dwelling-houses, yet comparatively near the metropolis, to which easy access may be had by water.

About 1894, Kynoch & Co. Limited began manufacturing at Kynocktown in Corringham. Shortly afterwards, the Miners' Safety Explosives Company Limited began to manufacture explosives for blasting purposes in the adjoining parish of Stanford-le-Hope.

IRON-FOUNDING.—The earliest Essex foundry is shown on a map of Colchester published in 1803.² It was on the north side of the High Street, near the present Cups Hotel. It belonged to a Mr. Charles Wallis and employed forty or fifty hands.³ It was taken over later by the firm of Thomas Catchpool & Son,⁴ also of the High Street, which became subsequently Catchpool, Stannard, & Stanford. It has now passed into the hands of Stanford & Co., whose specialties are portable and stationary engines of small power for agricultural purposes, threshing machines, elevators, and the like.

The second in point of age is, in all probability, that of Messrs. E. H. Bentall & Co., of Heybridge, which was started in 1808 at Goldhanger by Mr. William Bentall.

¹ The merits of the firm's caps and wads were alluded to several times by Tom Hood in his poems.

² In *The Beauties of Engl. and Wales*, v.

³ In 1784, Joseph Wallis was described (*Bailey's Directory*, p. 797) as an 'ironmonger.' By 1793, his son Joseph had joined him (*Univ. Brit. Directory*, ii, 525).

⁴ In 1793, Thomas Catchpool, of the High Street, was described (*Univ. Brit. Directory*, iii, 522) as an 'iron-monger.'