

Chapter 6

CHEMICAL AND PROCESS INDUSTRIES

Varieties of products have been made in Surrey, including paper, soap, essential oils, wax, paints and varnishes, linoleum and notably gunpowder, for which Surrey makers held a Crown monopoly in the early seventeenth century.

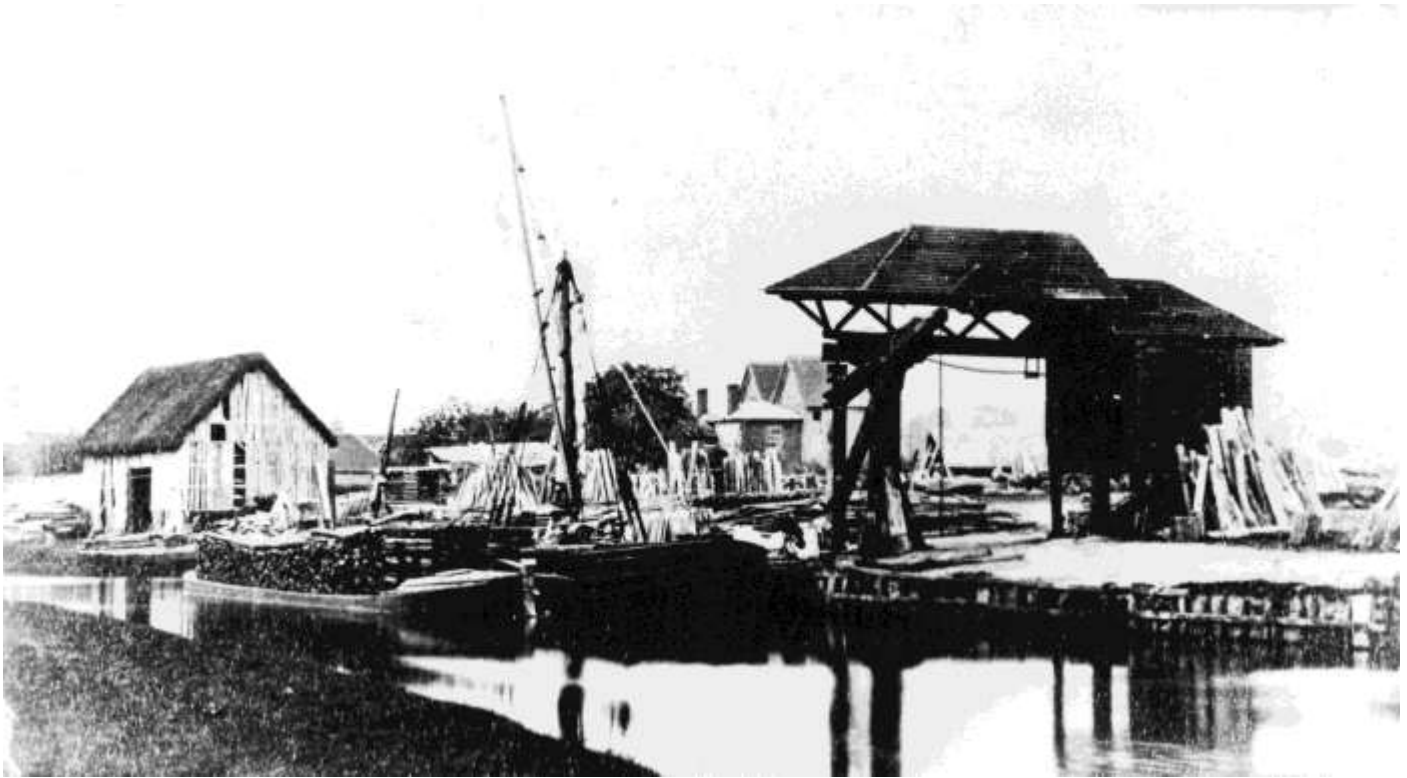
Gunpowder

Traditional black gunpowder — a mixture of saltpetre, charcoal and sulphur — had been used in England from the fourteenth century onwards and was either imported or made by hand in castles or in the field. Water-powered gunpowder mills were established by the 1540s at Rotherhithe, on the south bank of the Thames which was then part of Surrey. Powder was still being imported though, particularly through Antwerp, which was then in the Spanish Netherlands. This source of supply was vulnerable so the government determined to increase production at home. In 1561 instructions for making saltpetre from collected manure were purchased from a German captain, Gerard Honrick, and several new powder mills were set up. The Evelyn family, who had settled in Surrey, played a prominent role. They established powder mills at Tolworth, probably in 1561, and in the Tillingbourne valley and at Godstone in the 1580s. After the attack by the Spanish Armada in 1588 the government introduced a new system of contracting with manufacturers and organising the collection of saltpetre. Under James I the system became a monopoly and this lasted until the Long Parliament of 1641, on the eve of the Civil War. Throughout this period, Surrey powdermakers held the monopoly and they continued to play a major role in the industry throughout the rest of the seventeenth century.

There were other early centres of powder making in Kent and in the southern part of the Lea valley of Essex and these expanded later. During the monopoly some other licences were granted, in particular to the East India Company, which established the Chilworth gunpowder mills near Guildford in 1626, to make gunpowder for its own use. The Company operated the mills for only some ten years but their powder maker continued the business and was awarded the monopoly in place of the Evelyn family in 1636. The East India Company continued to be important to the industry because it became the chief supplier of saltpetre which it imported from India.

The Chilworth powder mills continued until 1920 but the early mills which had been established by the Evelyns and their associates had all closed by the mid-seventeenth century. However, new ones were to take their place. There was an increased demand for gunpowder in the second half of the seventeenth century during the three Dutch Wars and the wars with France which followed and many mills were converted to gunpowder from other uses such as metal working, grinding dyewoods and corn milling. Many powder mills were established, at a radius of 20 or 30 miles from London, in Surrey, Kent, Middlesex and Essex, and also at Battle in Sussex. New mills were established in Surrey at East Molesey, Wandsworth and Carshalton and the mills at Chilworth were greatly expanded.

So far, the gunpowder industry had been concentrated in south-east England. The main customer was the government, for military powder, but there was also a large market among privateers and merchant ships and, from the late seventeenth century onwards, for blasting powder for use in mines and quarries. Gunpowder was carried on merchant ships both for their own defence and for trade. It was one of the commodities exchanged in the triangular slave trade between England, West Africa and the Americas, although it was a minor one compared with the quantities of textiles and metal goods which were exported. London was the major port but first Bristol and then Liverpool developed in the eighteenth century and powder mills were established near Bristol in the 1720s and near Liverpool in the 1750s. In the second half of the eighteenth century mills were also established in the Lake District to supply mines and quarries and the Liverpool merchants. Before these developments however, gunpowder makers from south-east England had built magazines on the Mersey in order to supply the Liverpool trade. The powder makers of Chilworth and East Molesey were partners in a magazine at Liverpool in the 1730s. Although some of the earlier Surrey powder mills — Carshalton and Wandsworth — closed down after the end of the French wars in 1713, some new ones were established as private trade in gunpowder increased. Worcester Park mills were established in about 1720 on the site of the Evelyn family's mills at Tolworth and new mills were established at Ewell by 1757. However the gunpowder mills at East Molesey closed in 1779 after an explosion and the owners built a fine house on the site.



Stonebridge wharf, Shalford, on the Godalming Navigation, 1915, showing the gunpowder store (left) and treadwheel crane (right).

An insight into the day-to-day working of Chilworth powder mills in the late eighteenth century is provided by the letter book of the proprietor William Tinkler, containing copies of all the correspondence from his London office between March 1790 and March 1791. Powder was sent by barge down the Wey navigation and the Thames to a magazine at Barking Creek, from which it was distributed to customers. The letter book shows that some went by coastal ships to Scotland, much of it to one major distributor, and some by waggons carrying goods in all directions from London. Some went regularly to a mine in Shropshire, and many small orders went to customers all over the country for the shooting season.

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Chilworth's market no doubt changed in the 1790s as powder mills were established in Scotland. These were followed by new developments in Devon and Cornwall, in Wales and in the north of England. The Napoleonic wars brought a huge increase in the government's demand for gunpowder. By this time the government had its own factories, having bought mills at Faversham in Kent in 1759 during the Seven Years War, at Waltham Abbey in Essex in 1789 and at Ballincollig in County Cork in 1805.

The mills operating in Surrey in the nineteenth century were Chilworth, Ewell and Worcester Park. The proprietors of the Ewell mills, the Bridges family, were one of five firms from south-east England who

were selling powder from Liverpool in the early nineteenth century. The Worcester Park mills were closed down in the 1860s, when the district began to develop as a residential area. The Ewell mills closed in 1875, the year of a new Explosives Act which introduced new standards of safety and probably made it uneconomic for them to continue.

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The rest of the history of gunpowder production in Surrey concerns Chilworth. For a brief period after 1885 the Chilworth mills became the most up-to-date in the country, when they were taken over by a German company, Vereinigte Rheinisch-Westphälische Pulverfabriken, to manufacture a new form of gunpowder which was nearly smokeless and was in demand for use with large guns. It was made by using brown charcoal made from straw instead of the conventional black charcoal made from wood. By this time however, high explosives such as ballistite and cordite, which were made from nitrocellulose and nitroglycerine, were being developed and in 1892 a new true smokeless powder factory was built at Chilworth, adjacent to the old gunpowder works. There is no evidence of plant for the production of nitrocellulose and nitroglycerine at Chilworth. These ingredients appear to have been brought in, only the processes of combining and extruding them, with acetone as a solvent, being carried out on the site.

A second cordite factory was built at Chilworth by the Admiralty during the First World War. After the war,



Remains of a range of steam-powered gunpowder incorporating mills at Chilworth, built in 1885.

the entire explosives industry in the country was rationalised in a series of mergers involving Nobel Industries. This led in 1926 to the formation of ICI. Chilworth was one of many gunpowder mills which closed down in about 1920.

Gunpowder, or black powder as it came to be called to distinguish it from modern products, is still used for fuses, fireworks and blasting in slate quarries, where it is less apt than modern explosives to shatter the rock, for firing blank cartridges, for example in historical re-enactments, and for firing antique weapons. It continued to be made until the 1930s at Faversham in Kent and in the Lake District and survived at the ICI works in Ayrshire until 1977. Since then supplies have been imported.

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Chilworth is the only gunpowder site in Surrey with substantial remains. These are extensive, because gunpowder manufacture involved several separate processes: preparing and mixing the saltpetre, charcoal and sulphur; incorporating the ingredients, pressing the resulting 'mill-cake'; granulating, dusting, glazing and drying the powder and finally packing it in barrels to be sent to the magazine. Many of the processes were water-powered so the buildings were strung out along the valley of the Tillingbourne, and were widely-spaced to minimize the damage from any explosions. The remains are in a ruinous state and many features are hidden for much of the year by

vegetation. The most striking feature is the range of six incorporating mills, built in 1885, which formerly housed sets of iron edge runners turning on bedstones, under which the ingredients were crushed and ground together. There are also numerous stone edge runners from an earlier phase, lying on the ground and erected along the path, and derelict waterwheel pits and watercourses. There are remains of engine beds, from the steam engines which replaced some of the waterwheels in the nineteenth century, traces of sleepers from the works tramway and the remains of a swing bridge which allowed the passage of punts along the mill stream.

One of the markets for gunpowder was in the fireworks industry, which consisted in the nineteenth century of a considerable number of firms in London, particularly east London and districts south of the Thames. Those in what was then Surrey included Drewett's, Darby's and Madam Cotton's in Lambeth, Brock's at Sutton and Paine's at Mitcham.

Schermuly Pistol Rocket Apparatus

Another industry related to the manufacture of explosives, and one which also used gunpowder in some of its products, was the SPRA (Schermuly Pistol Rocket Apparatus) Works at Newdigate. William Schermuly, who was British, of Dutch Huguenot descent, was a former merchant seaman who, concerned with safety

at sea, formed a company in 1897 to manufacture the world's first viable ship's line-thrower to his own design. In 1921 he patented a greatly improved model which was pistol-launched and registered his new SPRA Company in 1926. The factory was at Cheam, where it became surrounded by suburban housing developments too close for safety. In 1933 therefore, by which time William had died and his son Conrad was running the business, the firm moved to rural Surrey. They expanded during the Second World War to produce a variety of specialised products, including target indicator bombs and illuminating flares, and continued to design and produce marine and aeronautical distress equipment. There was a corresponding reduction after the war and a further decrease in the workforce with the introduction of automated processes. At the peak of wartime production there were some 1,400 employees but by 1973, when the company was taken over by the Wilkinson Sword Group and amalgamated with Pains-Wessex, there were only 350. The Newdigate works closed in 1981 and production moved to Pains-Wessex's factory at Salisbury.

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Papermaking

The techniques of making paper were developed originally in China and India and reached Europe through the Arab world and Spain. The first British paper mill was established at Hertford in about 1488 but was short-lived and it took another century before a successful papermaking operation was commenced at Dartford in Kent. Many paper mills then opened in the Home Counties and according to John Aubrey, writing in the 1660s, the first in Surrey started in the reign of James I (1603-25) in the neighbourhood of Godalming. However, the earliest Surrey paper mill for which documentary information is available was established at Stoke, near Guildford, shortly before 1635. The number gradually increased and, in all, 24 paper mill sites are known in the modern county.

Traditionally paper was made from fermented rags, beaten in water to form a pulp, known as stuff, which was placed in a vat. The papermaker, called the vatman, then dipped his mould, which was a rectangular wooden frame supporting a fine wire mesh, into the vat and lifted it out covered with a layer of very wet paper. A colleague, called the coucher, then placed this wet sheet of paper on a piece of felt and covered it with another felt. This operation was repeated until a multiple sandwich containing 144 sheets of paper, known as a post, was constructed. This was then placed in a press to remove most of the water and the sheets of paper were hung up to dry on ropes in a shuttered loft.

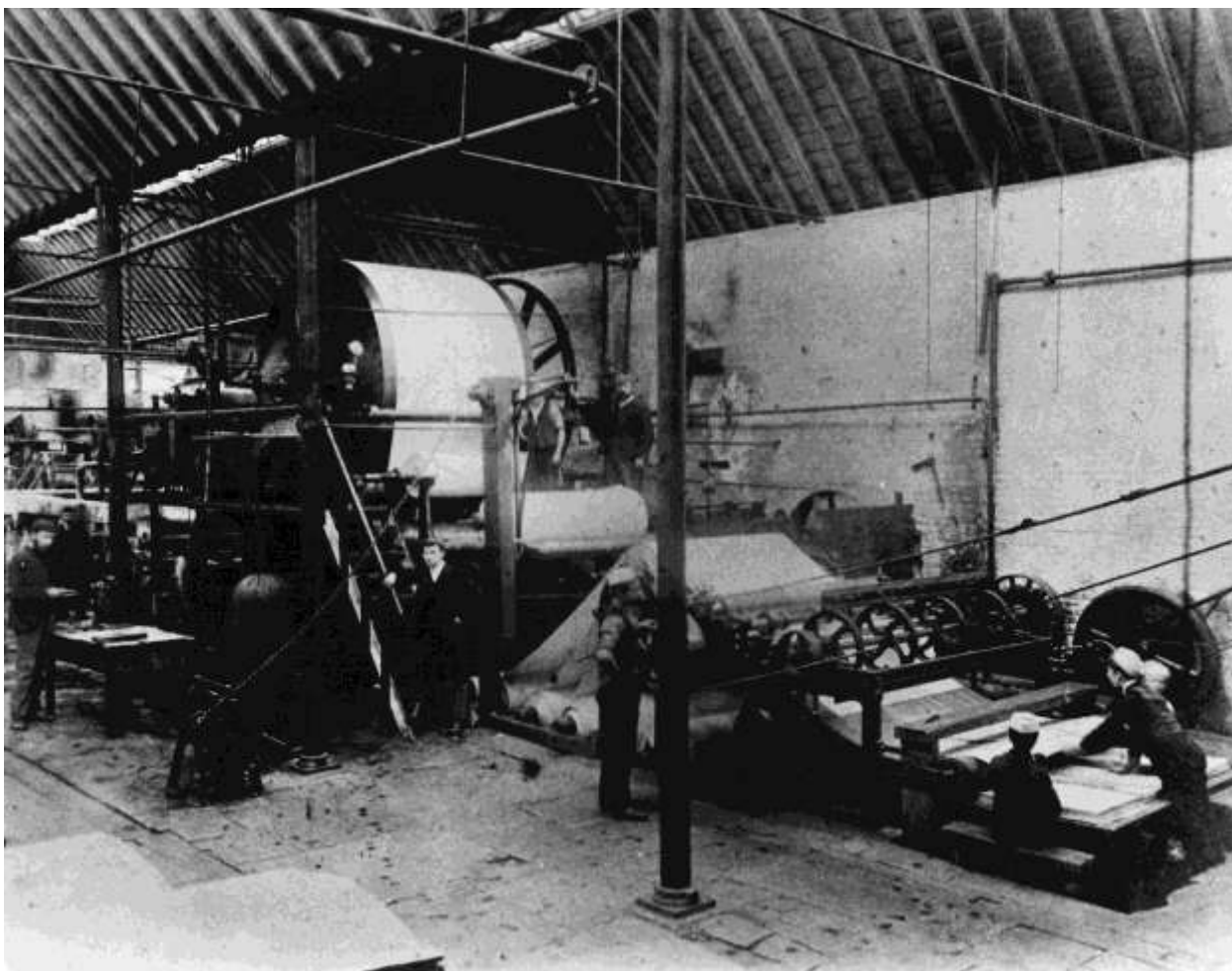
When dry, the paper was pressed again and parcelled into reams containing 480 sheets. Crucial factors in the manufacture of paper were the availability of good quality rags, clean water to make the stuff, water power to drive the beating engines, skilled craftsmen and a nearby market for the finished paper. Sites some 15 to 30 miles from London tended to satisfy these requirements.

At the end of the eighteenth century there were several major developments in papermaking techniques. First, the discovery of chlorine enabled coloured stuff to be bleached so that there was less dependence on clean water. Second, steam engines were introduced to power the beating engines so that water power was no longer necessary. Finally the papermaking machine was invented and this enabled continuous rolls of paper, rather than individual sheets, to be made. These developments resulted in large mills being built nearer to London. Some of the Surrey mills were able to expand to meet the challenge and two new mills, Esher and Woking, were established. However many of the other mills were forced to close.

In the 1860s rags started to be replaced by new raw materials, esparto grass and wood pulp. These came from overseas and the major, paper-making firms built new large mills on the coast, especially in Kent, which had a long papermaking tradition. The remaining Surrey mills tried to specialise but the number declined and the last mill, Catteshall at Godalming, closed in 1928.

Much is known about Surrey papermaking families, many of whom were active for several generations. A good example is the Simmons family who started to make paper at Sickle Mill, Haslemere, in 1735 and later acquired the neighbouring Pitfold Mill and New Mill. For 115 years four generations of the family worked these mills, which finally closed for papermaking in 1870. James Simmons III, who kept a diary from 1831 until shortly before he died in 1868, recorded the day-to-day operation of the mill. He discussed the difficulties of obtaining rags and selling paper and described accidents, including one in which a young apprentice lost an arm. He also anguished over major decisions, such as belatedly acquiring a second-hand papermaking machine in 1840 and installing a new steam engine in 1853-54.

Ewell paper mill was operated from 1733 to 1795 by William Jubb senior, who died young in 1739, by his widow Sarah, her second husband William Wells and finally by William Jubb junior. This mill was insured with the Hand-in-Hand Company and a new policy was taken out regularly every seven years. The insurance registers therefore provide a fascinating account of the development of the mill over this period.



Working paper mill c. 1892, showing a cutting machine (right) and papermaking machine in the background.

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At Catteshall, the Sweetapple family were at first corn-millers with a tenant papermaker. They were Quakers and the 'Sufferings Books' kept by the Society of Friends reveal that when they refused to pay their military and church taxes, some of their property, including reams of paper, was confiscated. Like many other papermakers they became bankrupt and themselves became tenants of the mill, before becoming bankrupt a second time.

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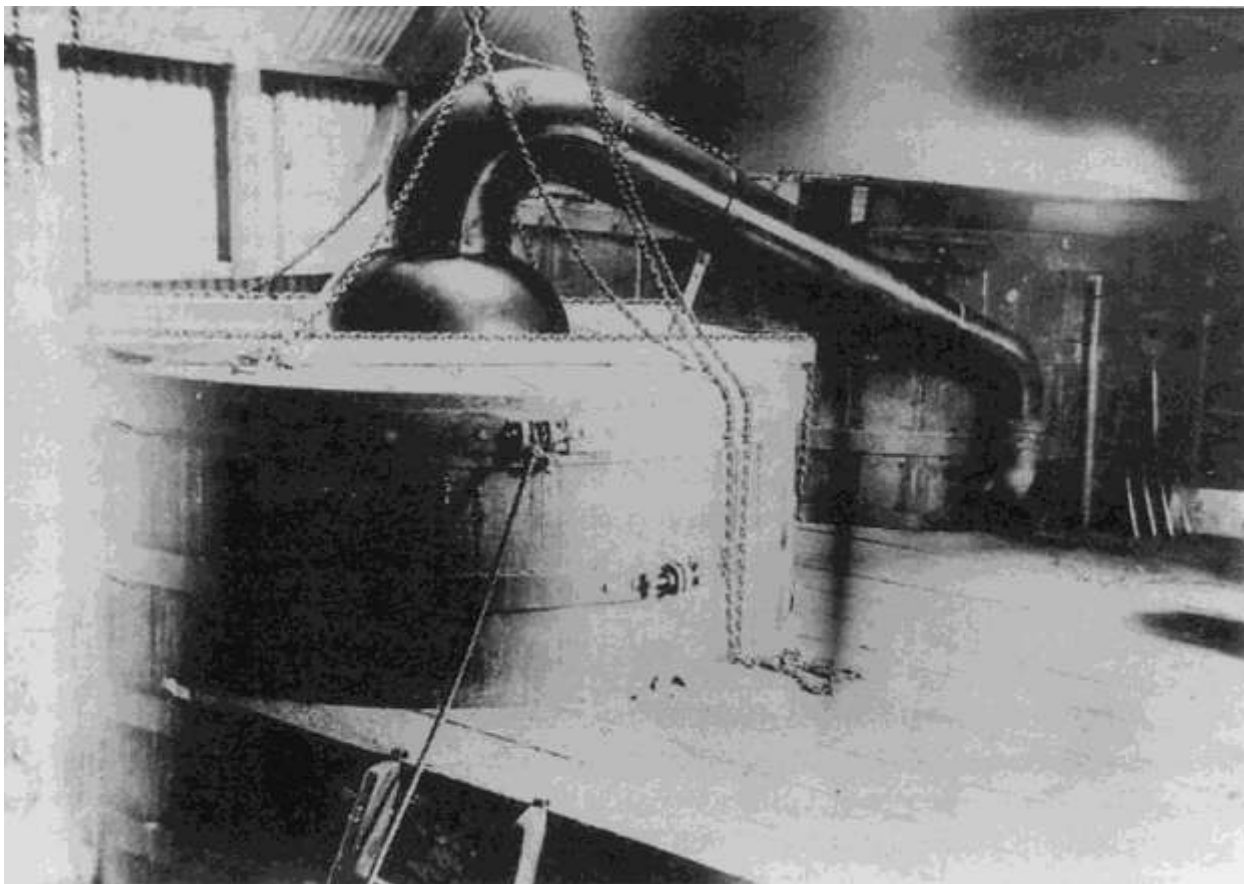
The Ball family, who were papermakers at Stoke, Chilworth, Albury Park and Postford mills, specialised in making banknote paper and in 1794 even made paper for forged assignats, paper currency issued in France. The French royal family hoped that the forgeries would help to undermine the Revolutionary government.

A few of the buildings which housed these paper mills survive more-or-less intact. The best example is Sickle Mill in Haslemere which largely retains its 18th century form. Good Victorian examples are Catteshall Mill, Woking Mill and a small building at Stoke Mill. Fortunately however many of the early mills were picturesque and artists have left us with useful representa-

tions. We are less fortunate with surviving equipment. The only well-identified mould is one used by James Simmons III at Sickle Mill in 1812 and the only surviving part of a papermaking machine is a cylinder from Chilworth, now used as a heavy roller by the neighbouring Blackheath Cricket Club. However many examples of sheets of paper made in Surrey mills have been recognised from the watermarks they contain. These were produced from wire motifs fixed to the mould or one of the rolls on the papermaking machine. More Surrey watermarks are continually being found and readers are encouraged to note them when they are studying historic documents and to report their discoveries to the Surrey Industrial History Group.

Essential oils

'Although the cultivation of medicinal plants is carried on in various parts of England, yet more land is employed in this way in Surrey than in any other county'. This quotation, from *The Pharmaceutical Journal and Transactions* of 1850-51, refers of course to historic Surrey and most of the essential oil industry was carried on in the area around Mitcham which is now in Greater London.



Essential-oil still at Westcott, Dorking. *Katherine Lane Collection.*

In the past, herbs and other plants were vital raw material for chemists and druggists as well as for perfumiers. Lavender had been grown in Mitcham from the fourteenth century and for much of the nineteenth century the herbal industry was of paramount importance to the district. Large areas were taken up by physic gardens where herbs such as lavender, wormwood, chamomile, aniseed, rhubarb, liquorice and peppermint were cultivated and there were many distilleries where lavender and other oils were manufactured. Perhaps the most well-known firm growing and distilling herbs was Potter and Moore, which was established in Mitcham in 1749 and continued for over 200 years. Mitcham mints were also renowned, the oil being obtained from the distillation of locally-grown peppermint.

As the value of land in South London rose and other industries came into the area, the growing of herbs moved further out, to Carshalton, Wallington, North Cheam and Beddington, but much of the distillation continued to be carried out at Mitcham until the middle of the twentieth century. In the area covered by the present book, there were many examples of herb growing and essential oil extraction, although they never reached the size of the operations nearer London.

The growing of mint is recorded in local names, such as Mint Farm and Mint Road at Banstead and Mint

Lane and 'The Mint' public house at Margery near Reigate. Lavender and mint were grown and distilled by W J Machell of Drift Bridge Farm until the middle of the twentieth century.

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The Reigate sewage farm at Earlswood had three or four acres of peppermint in 1911 which was sent to Mitcham to be distilled. The Woodhouse estate at Holmbury St Mary was built during the 1920s on the site of lavender fields and a distillery owned by the Lomax family.

An essential oil distillery operated from the mid-nineteenth century until its closure around 1905 in Pырford Road, West Byfleet. The road names Lavender Park Road and Rosemount Avenue are reminders of the plants grown to produce the lavender oil and rose water. In Westfield, Woking, a liquorice factory was operated by Messrs Woodward & Co in an old cottage in Highlands Lane, now known as Walnut Tree Cottage.

In Shere, lavender, chamomile and mint were grown by B Colebrook and Sons at The Flower Farm. The herbs were distilled at High House, Shere from 1925 until 1939 when the land was needed for food crops. A pre-war advertisement states that Colebrooks made lavender perfume and violet perfume with the brand name 'Essira', which is the Domesday name for Shere.

Mint and lavender were grown at Highlands Farm, Leatherhead, and taken to Mitcham for distillation, although there are also reports of lavender from Carshalton being sent to Leatherhead to be distilled.

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Nonsuch Court Farm, in what is now Nonsuch Court Avenue in Ewell, was rented by Mr Edward Martin, who grew peppermint and lavender and distilled them on the farm. Peppermint was also grown on Warren Farm, south-east of Nonsuch Park and this was probably also distilled at Nonsuch Court Farm.

In about 1893 plants were taken from Nonsuch to start the industry at Westcott, near Dorking. Here the farms consisted of Milton Farm, Westcott Hill Farm, Florence Farm and Squires Farm, with a few acres near the sewage works. These farms were leased from Mr Robert Barclay of Bury Hill House to Henry Herbert Chalke and James Kent who combined the growing of herbal crops with general farming. A description of the Westcott operation was written down by Mr S H Chalke, the son of the original partner, and extracts from his account are printed here by kind permission of his daughter, Mrs Katherine Lane:

At Westcott, both lavender and peppermint were raised from cuttings which were planted out in rows 3 feet apart. The crop was taken off from the third to about the sixth year after which the plants were dug up. The plants were planted with a dibber and the harvesting was also by hand using a small sickle known as a 'mint hook'. A handful of mint was cut and laid on the ground after which it was turned in the sun to dry for a few days before it was finally tied up in rush mats to be carted away to the distillery. Harvesting took place from about the end of July, through August until September. Much extra labour was needed for the harvest. Often children would be kept from school and itinerant workers were used on their way to Kent for the hop picking.

For the first few years the Westcott crops were taken by wagon to Mitcham but this was found to be too costly. Also the crops tended to overheat whilst being transported so that the yield of oil was less than that obtained if distillation had taken place as soon as possible after harvesting.

By 1898 the distillery at Westcott was in operation, housed in a corrugated iron building off Milton Street in a small wood marked 'Osier Plantation' on the Ordnance Survey map. The stream from Logmore was dammed to produce a pond from which the large quantities of water needed for the distillation

process could be drawn. Water from the pond flowed into a brick pit from where it was pumped to a large tank in the roof of the distillery before it was fed either into the still or condensing vat.

The mint was pitchforked on to staging at the top of the building from where it was loaded on to the first of four steel grids. These grids were put into the still using a hoist running on an RSJ above. Then the still head was hoisted on and the joints between the head and the still and the head and the condensing coil were 'luted' down with a paste consisting of whiting and linseed Meal mixed with water.

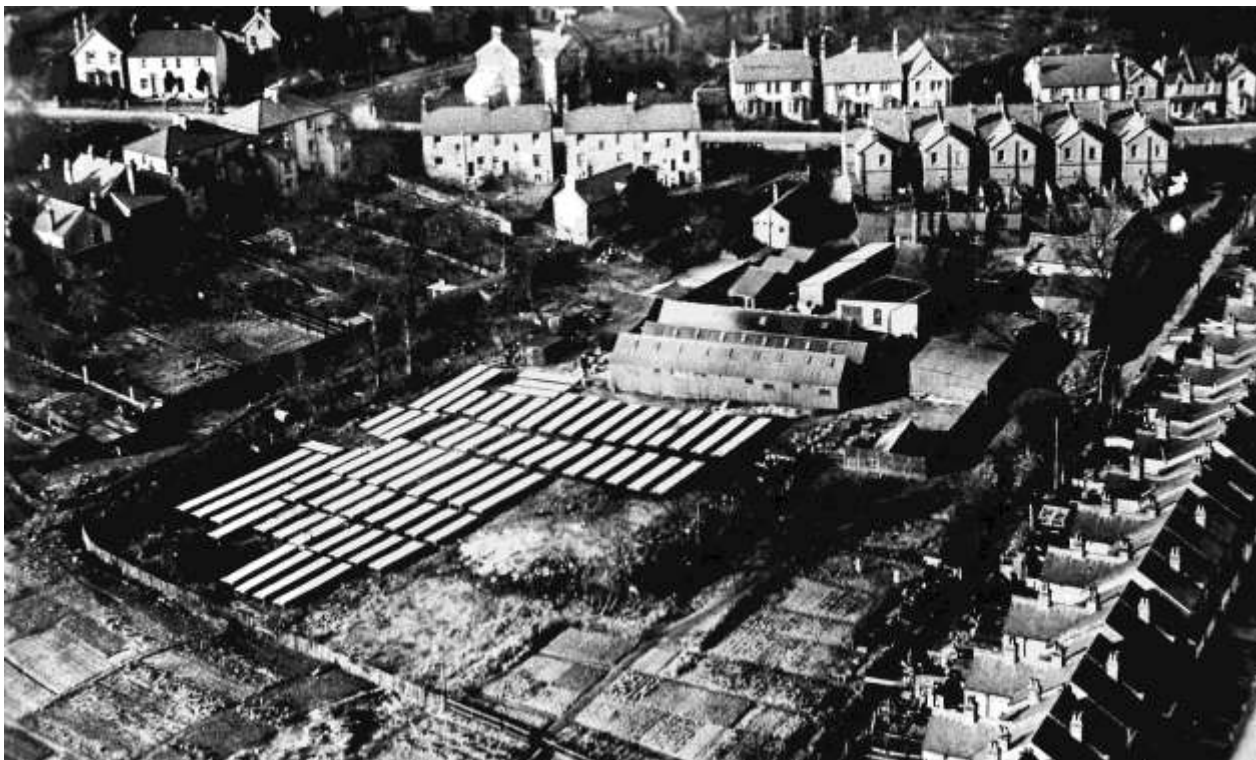
The still was then filled with hot water from the boiler to the top of the condenser and was heated by steam passing through a flat coil in its base. The steam and oil passed over the still head to be condensed in a spiral coil within the condensing vat. This coil was made of pure tin built into a vat about 11 feet (3.4 m) in diameter and 10 feet high which was kept full of cold water.

The oil and water passed into a separator made entirely from sheet copper and consisting of three compartments with copper tubes connecting the bottom of each compartment to the top of the next. The oil floated to the top of the compartments, most in the first, and from these it was filtered in a tinsplate drum 3 feet high and 2 feet diameter in which any solid matter and residual water were removed by filter paper in a cone of perforated zinc. The oil from the filter tank was drawn off through a tap into Winchester quart bottles for sale.

The distillation process took six hours after which the luting was scraped out, the grids lifted out and the spent mint carted away and ploughed into the fields with the manure.

When both partners in the firm of Kent and Chalke retired in 1907 the farms and distillery were taken over by John Jakson & Co who removed the distillery plant to their Mitcham Road, Croydon works in 1915. The growing of herbs for essential oil production in Westcott ceased altogether before the end of the First World War.

It is interesting to note that Mrs Lane still has a bottle of peppermint oil distilled at Westcott in 1907, two drops of which are used every year to produce peppermints which are eaten after the family Christmas lunch.



The British Wax Refining Company works at Redhill in the 1930s. *British Wax Refining Company.*

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Soap, tallow and wax

Soap, tallow and wax manufacture are closely related industries. Tallow, derived from animal fat, usually from sheep and cattle, has been used from time immemorial for the production of candles. These were usually prepared either by dipping or forming in moulds. Candle making was originally a cottage industry and it was not until the nineteenth century that any industrialisation occurred. Historically the best candles were prepared from beeswax. Other sources of wax are spermaceti from sperm-whale oil, lanolin from wool-fat and plant waxes, such as Carnauba wax from the wax palm *Copernicia cerifera*. In the twentieth century, high boiling fractions of natural petroleum oils have been used to yield a range of waxes. Hydrolysis of tallow and related oils with alkali produces traditional soap.

The Old Soaphouse at West Horsley, whose name probably dates from the seventeenth or eighteenth century, is a reminder that soap making was once a cottage industry. Besides the house name, evidence has been found there for the storage of chemicals, most probably potassium carbonate, an alkali to hydrolyse tallow or lanolin from the local wool industry, and soapwort (*Saponaria officinalis*) has been found growing in the district only around this particular house.

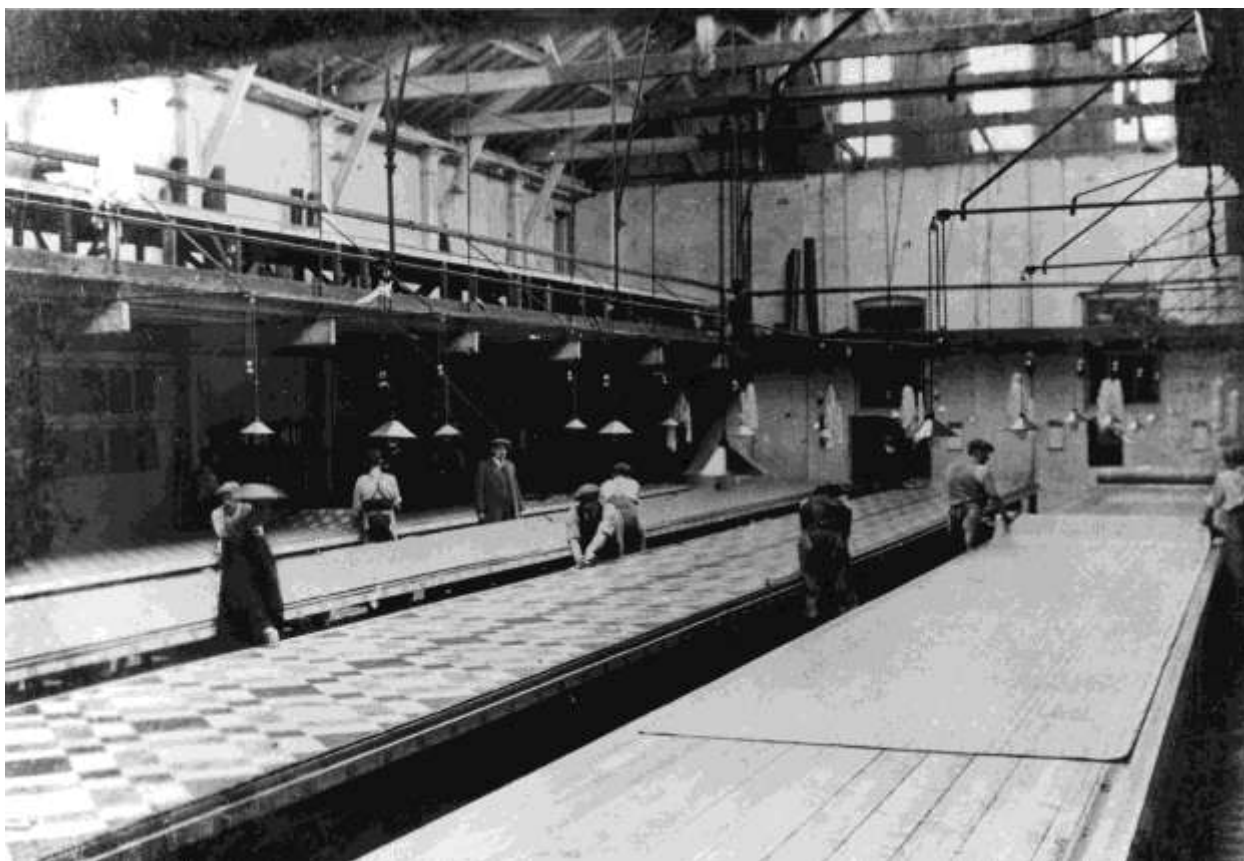
Industrial wax refining and bleaching, tallow and wax candle making and soap manufacture were carried on near the larger towns. In historic Surrey important centres of manufacture were Barnes, Battersea,

Camberwell, Croydon, Kingston upon Thames, Putney, Surbiton and West Molesey, no doubt originally to supply the demands of London. In modern Surrey, trade directories record soap manufacturing by J C Sowerbutts & Co Ltd in Woking High Street in 1891 and by the White Tulip Soap Co, Victoria Road, Horley, between 1905 and 1927. Soap was made at the Old Brown Windsor Soap Works by the Paris family at Woodhaw, Egham, but manufacture ceased and details of the process were lost when the widow of Mr Paris died in about 1851. Remains of the firm's wharf can still be seen at the Thames near The Glanty, where the M25 motorway crosses over the A30.

The modern soap and detergent industry has been represented in Surrey by the American company of Proctor & Gamble. In the 1980s this company bought up the research laboratories of Richardson Vicks at Rusham Park, Egham, which had previously been occupied by Shell Chemicals.

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W G Smith made candles in works opposite the police station in Staines from the 1860s until 9 April 1924. The exact date of the making of the last candle is well recorded because on that day the factory was destroyed by fire. During the blaze, so much molten wax ran down the road that even today wax can be found in nearby drains.



Workers trimming linoleum at the Linoleum Manufacturing Company, Staines. *Spelthorne Museum*.

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Candles were also manufactured in two factories in Dorking, perhaps linked to the tallow chandler James Letford of Mickleham, who appears in trade directories in 1858, 1887 and 1891. Another Surrey tallow chandler was Searle & Son, in the High Street, Epsom, who is recorded in directories of 1887 and 1891.

Wax refining has been undertaken in Redhill since 1914. The British Wax Refining Co started in Chapel Road but soon moved to a site in St John's Road, Earlswood, where trays of wax were spread out in the surrounding field to be bleached naturally by the sun. The factory occupied the same premises, using much of the original equipment in the purification process, until it burned down in the 1990s and moved within the district. The modern industry is based mainly on beeswax from Ethiopia, Carnauba wax from Brazil and paraffin wax from Nigeria and the Persian Gulf. The product is used in the pharmaceutical industry and for cosmetics and polishes, and much of it is exported.

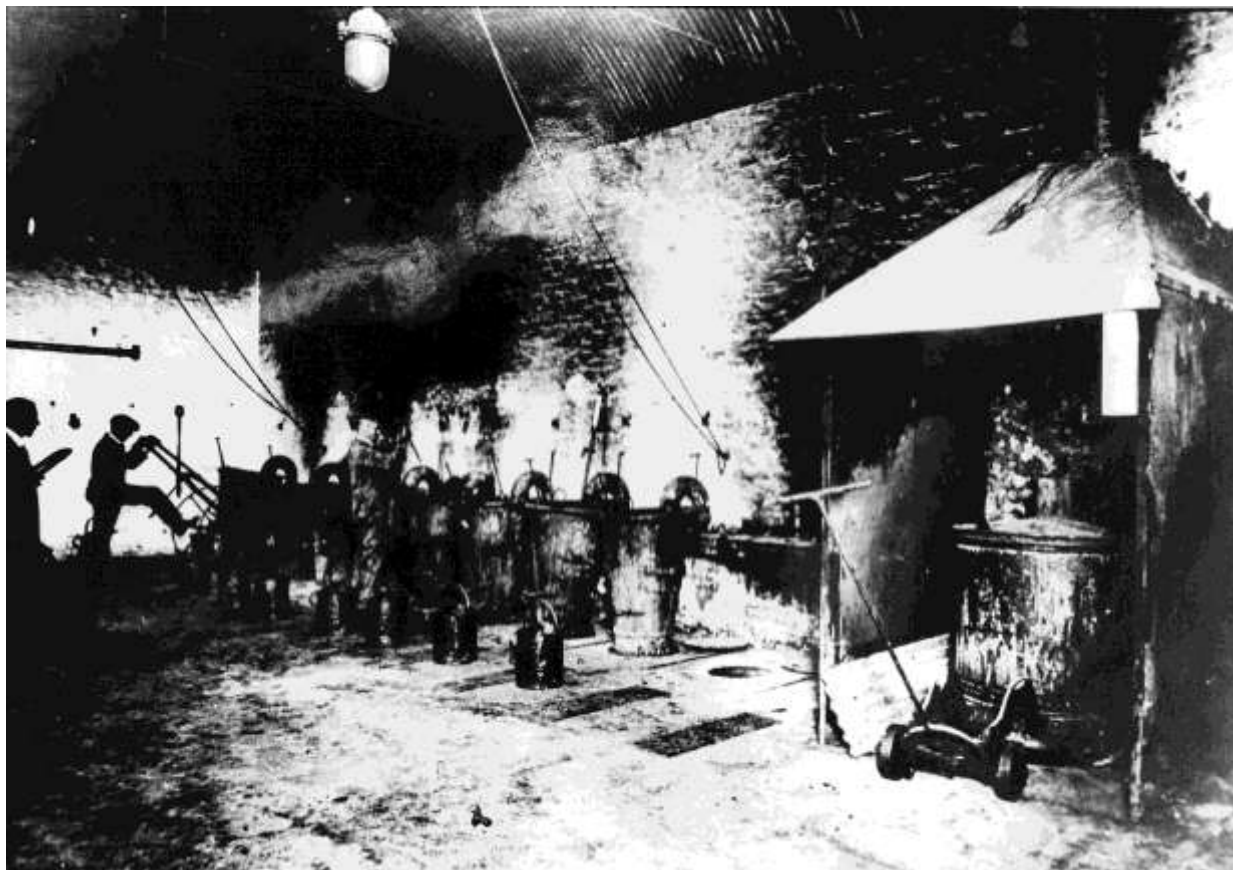
From 1960 to 1994 Johnson Wax Ltd manufactured polish at its factory in Frimley Green Road, Frimley. Its research laboratories at Milton Park, Egham, were previously occupied by the British Leather Manufacturers Research Association and had originally been the home of the De Worms family.

Floorcloth, linoleum, paint and varnish

Coated fabrics, in the form of oilcloths, were made in England in the seventeenth century and are recorded in use as floor coverings by 1722. Sail-makers' canvas, which could be made very wide, provided a good base, so the early manufacturers established themselves in seaports. Lancaster and Kirkcaldy remained major centres of floorcloth and then linoleum production in Britain. Paints, indiarubber and various mixtures — a method of 1763 used rosin tar, Spanish brown, beeswax and linseed oil — were used to impregnate and coat the fabric base and decorative designs were applied to the surface.

Several floorcloth weavers, a floorcloth starcher and a floorcloth factor are recorded in the 1841 census in Farnham, as are several canvas weavers, a sail cloth weaver and a sack weaver. The production of canvas in Farnham may have been primarily for making 'pockets' for packaging in the hop trade.

The superior product linoleum was invented by Frederick Walton, a Yorkshireman and son of an inventor and manufacturer, who patented a process of oxidising linseed oil (*linum oleum* in Latin), causing it to be



Varnish works at Mitcham. *Wandle Industrial Museum.*

come solid. A mixture of oils and rosins was processed to form linoleum cement and mixed with wood flour, ground cork and chalk, and then coloured with pigments. Walton's method used machinery to produce the designs and these went right through the thickness of the material instead of lying on the surface as in earlier floorcloths.

In 1864 Walton founded the Linoleum Manufacturing Company to exploit his invention and bought the disused Hale Mill at Staines, which had previously been occupied by a calico printing works, to set up an extensive factory which employed thousands of people. After a shaky start the business succeeded so well that 'lino' took the name of Staines across the world, as it was used in transatlantic liners. The market became so large that by 1888 there were some twenty manufacturers in Great Britain. Others included Barry, Ostlere & Co in Kirk-caldy and Williamsons of Lancaster, whose chairman Mr Williamson, later Lord Ashton, was known as the 'Lino King'.

The Staines Company enjoyed its peak from the First World War until 1930 when it became part of the Barry (Staines) group. After the Second World War the development of vinyl floorings caused a decline and the works closed in 1973. The site then became the Staines Central Trading Estate, on which many of the lino company's buildings were retained and re-occupied, but in the 1990s this is giving way to office development.

Linoleum was also produced at Addlestone, by the Addlestone Linoleum Company, and in the historic county of Surrey at Mitcham, where the industry was closely associated with the manufacture of varnish. Harlands, who were varnish and colour manufacturers in London in the early nineteenth century, established works in Mitcham by the 1840s and several other firms were attracted to the district. In 1965 there were fifteen firms making paint, varnish, polishes and synthetic resins in Mitcham but the industry declined in the 1980s.

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The Copal Varnish Company established a factory in 1875-76 on the site of the West Surrey Chemical Works at Yardmead, in what is now the borough of Runnymede. In 1886 Randall Bros of Bankside, near London Bridge, bought the site and moved their business there. Randalls had started making colours for printing inks and paints in 1855. They derived the trade name 'Paripan' from 'Paris White Japan', the name of one of their enamels, and in 1919 became a public company under the name of Paripan Ltd. Paint and varnish manufacture continued until 1962 when the company merged with Carson's Paints of Battersea. Production was later moved away and in 1973 the buildings were demolished.

Some other chemical industries

Charcoal has been mentioned in connection with fuel for the Wealden iron and glass industries and as an ingredient of gunpowder. The only known attempt in Surrey to make by-products from charcoal burning was at Rushetts Farm, Bramley, where naphtha and acetic acid were produced from up to 2,000 tons of wood each year. The 1871 census records John and George Glazier as labourers at the naphtha works. It is interesting that the census gives their place of birth as Fernhurst in Sussex, where charcoal for the Waltham Abbey gunpowder factory was made in the nineteenth century.

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Vegetable oils, such as rape and linseed, were refined at Ham Haw mill, also known as Weybridge mill and in the 1930s as Whittet's mill, which stood beside Thames Lock on the Wey Navigation. The mill had originally been a water-powered corn mill and had been used as an iron mill, paper mill and brass works before its last phase as a seed-crushing mill and vegetable oil refinery. There were many disputes with the Navigation authority about flooding and the amount of water used by the mill interfering with the operation of the lock. Then on Christmas Eve 1877 there was a disastrous fire in which the River Wey itself caught alight. By 1975 the premises were used only for the refining of vegetable oils and the recovery of solvents from other companies' waste products, which caused problems with effluents and atmospheric pollution. The mill's final industrial use was as a solvent distribution depot.

In north-west Surrey, the Jenolite company made the anti-rust compound 'Jenolite' in the small Rusham Road Factory Estate in Egham, on a site previously occupied by the American boiler maker Foster Wheeler Ltd. The buildings were demolished in 1995. The British Fine Colour Company made pigments and dry colours in Staines at a site still known as the Staines Oast House, although its use for hop-drying

ceased in 1903; in 1970 an employee celebrated 50 years with the company. Until the 1980s there was a factory boiling down bones to make glue at Town Lane, Stanwell, whose stench notoriously disturbed a royal visit to nearby Ashford Hospital in the 1940s.

In east Surrey, a Swiss company, Givaudan & Co, has manufactured synthetic aromatic chemicals and perfumes at Whyteleafe since 1950, and the Nutfield Manufacturing Company — known locally as the 'acid works' — made hydrofluoric acid and other fluorine compounds at their King's Mill works at South Nutfield, Redhill. The factory was established on the site of a former brick and tile works in 1925 by chemical manufacturers from Sheffield and operated until 1984.

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Petrochemicals

The scale of operation of petrochemicals and oil refining is so great that their pilot plants at the British Petroleum Research Centre in Sunbury and Shell Chemicals Company laboratories at Rusham Park, Egham, were far larger than the full-scale plants of other industries. The BP Research Centre was started by Dr Dunstan in a very small way during the First World War, in a dilapidated mansion called Meadhurst. It was only concerned with oil production and refining until after the Second World War by which time there were nearly 500 employees in much newer and larger premises. Petrochemicals were then produced in pilot plants and staff numbers rose to 2000. More recently the number of employees has been reduced though the site is still the main research and development centre of the company. The Shell laboratories were located at Egham for some 20 years until 1975.

Oil exploration has been carried out in the Warlingham and Godstone areas in east Surrey. Oil pipelines cross the county and a new one for Gatwick Airport is being constructed in the late 1990s.