

HISTORY OF CANMAKING

Food canning became well established as a means of preserving meat and vegetables for use on expeditions long before Queen Victoria took the throne of Great Britain in 1837, and it was in no small measure thanks to the enterprise of Bryan Donkin.

While Frenchmen Nicolas Appert and Phillipe de Girard had developed the techniques of sterilizing foods with heat in sealed containers and demonstrated them successfully in London before 1812, it was Englishman Donkin who bought Girard's 1810 patent, through Girard's British agent Peter Durand, for £1,000 and put them into manufacturing practice.

As outlined in the first part of this series, Donkin was a remarkable Northumbrian who turned his hand to a wide range of technical skills. Before the turn of the 19th century he joined John Hall as an apprentice at the Dartford Iron Works. John Gamble, who would later become involved with the canning enterprise, commissioned Hall on behalf of the Fourdrinier brothers to build a prototype of a paper drying machine and Donkin was assigned the task, the design being successful enough to be put into production. It revolutionized paper manufacturing, though the Fourdriniers died in poverty. A well-respected Fellow of the Royal Society, Donkin also worked out the methods for making iron pen nibs and designed the mercury tachometer for measuring machinery speeds. The company that bears his name still operates in Chesterfield, supplying equipment to the gas industry.

“Correspondence shows that the canned products were well regarded”

Donkin established a works at Bermondsey in South London which is almost certainly the same location that he set up Donkin and Hall in 1812 to start production of canned foods. The previous year he had made a profit of £2,212 and was not short of funds to invest in a new enterprise. By then, Nicolas Appert's book would have been translated as *'The Art of Preserving Animal and Vegetable Substances for Many Years'*, showing how foods could be 'Appertised'.

Amongst meadows and gardens less than a mile south of the River Thames, the buildings that housed what is without doubt the cradle of world's first canmaking and canning operation are described on a 1799 map as an 'engine manufactory'. Some 40 years later, Donkin and Hall's site is shown in valuation plans to have grown

Cradle of the craft

In this second part of a series commemorating the 200th anniversary of the first patent being filed for a food can, John Nutting delves into how the first metal food cans were made



A typical tin smith's shop of the early 19th century would have used techniques that were adaptable to making cans for food. Reproduced by kind permission of Crown Holdings

with about 20 buildings surrounding two courtyards, entrance to which was from a short path from Blue Anchor Road.

Records in Bryan Donkin's diaries for 1812 refer to experiments in cooking and sealing milk, soup and meats in 'white' jars

but he later concentrated on tinned iron containers. Samples of these were set to the authorities for trials with the British navy and army, and in 1813 correspondence shows that the canned products were highly regarded.

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On behalf of Lord Wellesley, later Duke of Wellington, a Culling Charles Smith writes that his Lordship found the preserved beef very good. This is one of a number of testimonials in a brochure published by Donkin & Hall in 1817, amongst which is one from Sir Joseph Banks, president of the Royal Society, who six years earlier had seen a demonstration of canned foods by Phillipe de Girard in London.

Donkin's canned products were taken on the expedition by HMS Isabella and HMS Alexander to Baffin's Bay in 1814. Commander John Ross reported that when the store of vegetables ran out the canned foods were served instead of salt provisions to prevent scurvy.

Before then foods had been preserved by drying, smoking or salting, and although some pre-cooked fish had been packed in tinned iron containers with oil or fats, sterilisation in the container was not involved. Just how much better were Donkin's products is described in the records of Otto von Kotzebue who took some canned meats on a voyage to the Northwest Passage in 1815. The Russian explorer had heard of the 'discovery lately made in England' and was delighted with the 'tin boxes' and found their contents in excellent condition whereas the other preserved foods he took went bad.

The scope of the business is indicated by lists of canned meats and vegetables delivered to the Admiralty Victualling Depot in Deptford, East London between March and December 1818.

Records for the company, by now called Donkin, Hall and Gamble, show that 46,360 pounds of canned foods worth £5,481 were sent to the depot, in cans weighing between 1 pound 6 ounces and 4 pounds and packed in 440 cases, of which a third was destined for ships voyaging to the Arctic Circle.



"Bryan Donkin was a remarkable Northumbrian who turned his hand to a wide range of technical skills"

Royalty had even tried the canned foods with satisfaction. In 1813, a letter to Donkin, Hall and Gamble from the Duke of Kent's secretary told of the 'patent beef' being approved by the Queen and Prince George, who was the Prince Regent and later George IV, and several 'distinguished personages'.

Clues to how Donkin, Hall and Gamble's factory made its cans are provided by number of examples that were saved from the stores supplied to Sir Edward Parry's third expedition in search of the Northwest Passage in 1824 and had been kept

at the Royal United Services Museum and the National Maritime Museum in London. In 1937, the cans were opened and both the materials and contents analysed, the details of which were read before the Food Group of the Society of Chemical Industry in 1938. Some of the cans were later transferred to The Science Museum in London.

Donkin, Hall and Gamble's typical four-pound can for veal measured more than six inches high and just over five inches in diameter. The body was made from a single piece of tinplate formed into a cylinder with its edges folded together into a lock seam. Solder was floated into the inside of the seam, rather than the outside, as was later the norm.

The ends were tinplate discs with raised flanges about a quarter of an inch deep, presumably formed in a manual press. The cleanliness of the bottom end seam's soldering indicated that it was fabricated in the tinsmith's shop, in contrast to the top end, which would have been attached after filling of the contents and had more crudely-applied solder.

The top end had a lifting ring attached by solder and a filler hole, 17/32-inches in diameter that was described as well-designed and made with surrounding smooth circular corrugations that were also formed with a press. Broth or gravy would have been poured through the hole, after which it was covered by a rounded cap through which a small hole was pierced.

The can was then heat processed in a boiling water bath, later with calcium chloride added to raise the temperature to 240 deg F. When steam started to issue from the hole, a blob of solder was applied to seal the can after which the processing was completed. This technique was later granted a French patent to Louis Amedée Fastier in 1839.

Secrets of a 180-year-old food can

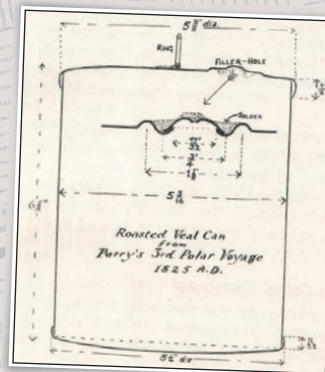
The techniques that Bryan Donkin's canmaking and canning plant used for manufacturing the first commercial food cans in the 1820s were found to be more sophisticated than expected when the examples (pictured right) were analysed in the 1930s.

Fabricated from 0.5mm tinplate with soldered flanges and seams they had to be robust to withstand the rigours of being stored in ships on expeditions lasting years.

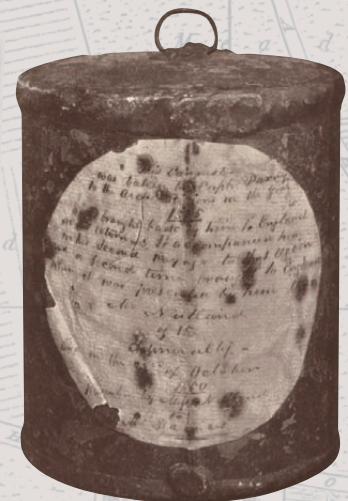
These are still stored at the Science Museum (pictured right) and the National Maritime Museum in London.



Picture: Science Museum / SSPL



Section of a Donkin can of veal (pictured right) made in 1824



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Donkin, Hall and Gamble would have had a wide choice of manufacturers from whom to choose their tinplate. The industry had grown out of what is now Germany where the 'whitening' of iron had been performed since the 14th century. Originally the iron was hammered into a wrought sheet before the application of the tin. By the end of the 16th century each year some 4,000 barrels (known as boxes) were imported into England, each containing around 450 plates and weighing two hundredweight, a total of 400 tons.

Attempts were made to make similar tinplate sheets in England in the mid-17th century, but it wasn't until 1697 that records reveal that tinplate was being manufactured using rolling. In 1730, Major John Hanbury set up the first tinplate rolling mill using the Double Welsh Mill method at Pontypool in South Wales.

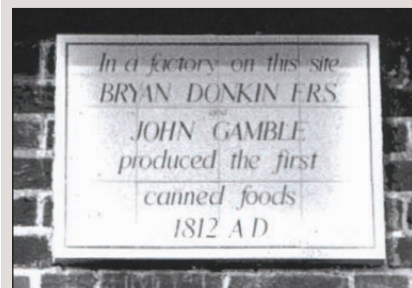
***"When steam started
to issue from the hole,
a blob of solder was
applied to seal the can"***

Almost 90 years later, when Donkin, Hall and Gamble started making cans from tinplate there were around two dozen mills, mostly in South Wales, Staffordshire and Yorkshire. A sample of Parry's veal can was examined by an expert from the International Tin Research and Development Council and was said to exhibit the characteristic laminated structure of wrought iron. Its gauge was 0.0185 inches, or slightly less than 0.5mm, and had a coating each side of tin measuring 0.00051 inches. The tin was found to be highly pure of a type of Cornish 'stream' tin from South Wales.

It didn't take long for Appert's canning techniques, and the use of tinplate cans of the type made by Donkin and Hall, to reach North America where more highly productive techniques were developed. But while many expeditions were satisfied with the canned foods, there were problems. One manufacturer – Stephen Goldner, who had factories in Houndsditch in London and at Galatz in Moldavia – opted to preserve foods in much larger cans, but the preservation was inadequate and the contents of many went bad. Some of these were found on the ill-fated Franklin expedition to the Northwest Passage in 1845.

A Royal Commission confirmed this in a report in 1852, the result of which was that the Admiralty set up its own canning plant in Deptford.

In America, where the story will continue in the next part, canned foods were then becoming widely available through retail outlets after Gail Borden introduced

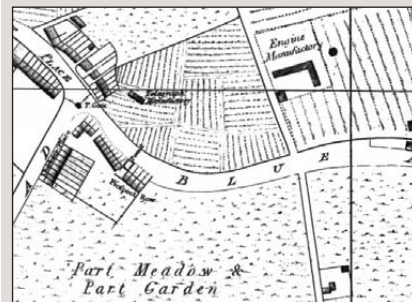


Where was the first canmaking factory located?

The site of the world's first canmaking and canning factory at Bermondsey in south London is now used by the Harris Academy, formerly the Aylwin Girls School.

A plaque (pictured above) commemorating the first production of canned foods by 'Bryan Donkin FRS and John Gamble' in 1812 was unveiled by the chairman of the London County Council Education Committee, Harold Shearman in October 1960. It was mounted on the wall of the school house just under the roof, about 20 feet from the ground.

As the map from the first decade of the 19th century shows (below), the 'Engine manufactory' in Blue Anchor Road built amongst meadows and gardens that would later house Donkin's metal packaging operations.



condensed milk using a patent for the process in 1856, setting up the New Condensed Milk Co in New York the following year.

Bryan Donkin's vision made this possible. Though a key figure in the development of canned foods, he had other plans and started work on gas turbines, expanding the company that still bears his name in Chesterfield, to manufacture a range of associated products. He died in London in 1855 aged 69 years and is buried in Nunhead cemetery, not far from the site of his former canning factory Bermondsey.

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