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Editorial and Executive Offices :
Alderbourne Manor, Gerrards Cross, Bucks.
Telephone : Fulmer (Bucks) 334

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Editor and Publisher of the *Intelligence Digest* Service : Kenneth de Courcy
Managing Editor : John de Courcy
Associate Editor, Science : James Lawrie

REPRINTED FOR THE PURPOSE OF SHOWING THE INADEQUACIES OF MARGARINE AS A HELPFUL FOOD PRODUCT, AND THAT IT IS MADE FROM REFINED, RANCID AND OTHERWISE UNFIT FOOD SOURCES. TYPICAL COUNTERFEIT FOOD– IN WHICH ITS SYNTHETIC AND COUNTERFEIT NATURE HAS BEEN SUCCESSFULLY CONCEALED.

Margarine

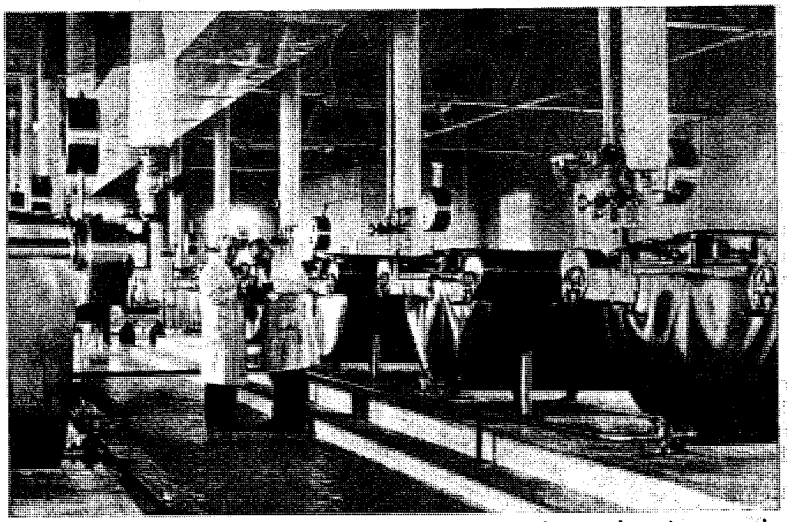
Margarine was invented in 1867 by a French scientist named Mège-Mouriés, who had been asked by the Emperor Napoleon III to produce an artificial butter, costing less and keeping better, with which to feed his armies. It was a very different product from the one we know today.

MÈGE-MOURIÉS PRODUCED a combination of beef fat, milk and water which had a remote resemblance to butter. He called it margarine from the Greek word *margarites*, meaning "pearl-like" after the appearance of his mixture. (Hence the word margarine should be pronounced with a hard "G" as in Margaret—which incidentally, has the same derivation).

Dutch Rivalry

It was left to two merchants in the small Dutch village of Oss to develop the process on a commercial basis. The beginning of the nineteenth century saw the English Industrial Revolution. The population was growing; there were more people to feed and yet fewer people to work on the land. English importers were crying out for more butter, but the Continent could not meet the demand.

In the meantime news of the French discovery had reached the two Dutch families, the Van den Berghs and the Jurgens, who saw the opportunity of supplying a butter alternative. They obtained the patents for the new margarine and in a short time established thriving margarine factories.



General view of milk processing vessels in the dairy. Milk is used to give margarine its taste and flavour.

But their problems were not yet ended. The demand for margarine grew month by month and there was soon an acute shortage of the animal fats which at that time provided the basis for margarine.

Hydrogenation

Their problem was solved by the invention of a process called hydrogenation which, in brief, could change liquid vegetable oils into hard fats and result in a more palatable product.

The discovery led to the development of hitherto untouched and limitless resources of vegetable oils, particularly in Africa.

At the outbreak of the 1914-18 war, the British Government invited the Jurgens to build a factory at Purfleet and at the same time the Van den Berghs to build a factory in Fulham.

During and after the war the popularity of margarine spread and the two families, no longer content with simply making margarine, entered the wholesale and retail markets. Their ventures prospered but competition became uneconomic and in 1927 the two families decided to merge, thus laying the foundation of the company as it is today.

One major hurdle still remained if margarine was to compete on equal terms with butter—how to introduce into margarine the essential A and D vitamins and ensure their lasting in beneficial quantities. The complicated scientific problem of vitaminisation was finally solved in 1927 at the Bromborough factory.

What is Margarine ?

What is Margarine ? Essentially it is a blend of natural vegetable oils and milk, fortified with vitamins.

From India, China, the Belgian Congo, Brazil, the USA, the Argentine, the Phillipines, Malaya, Nigeria, Indonesia and the Cameroons come the raw materials of margarine—one of Britain's largest-selling foodstuffs.

The total consumption of edible oils and fats in 1956 in Great Britain was 1.2 million tons. Of this figure, 393,000 tons was margarine compared to 347,000 tons of butter.

Its nutritional value is as high as that of butter, as the following figures published by the Ministry of Food on the 27th February, 1954, show :

	Butter per oz.	**Margarine** per oz.
Fat :	23.4 Grams	24.2 Grams
Calories :	211	218

Margarine also contains the 'sunshine' vitamins A and D. The vitamin A content is equivalent to, and the vitamin D content approximately twice that of good quality summer butter. During the winter lack of sunshine tends to cut down the vitamins, particularly D, produced by the cow.

The legal maximum of water content for both margarine and butter is 16%.

MARGARINE MANUFACTURE

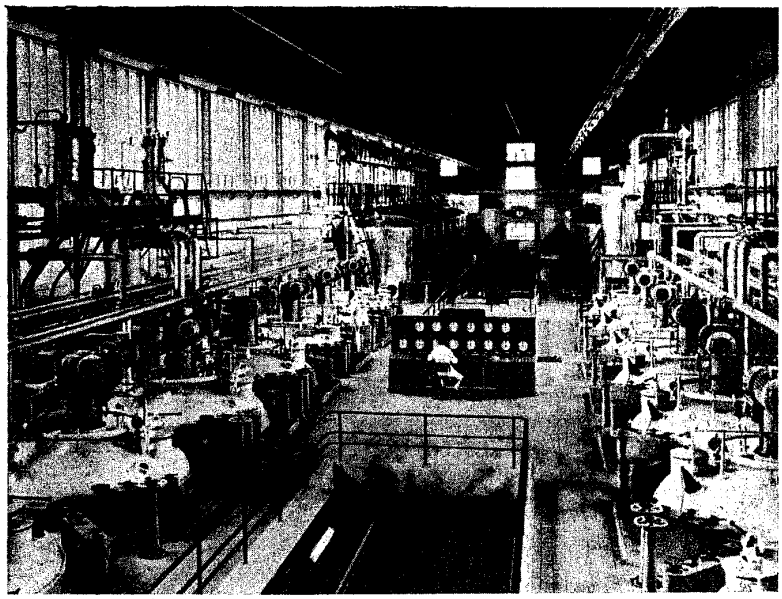
There are 32 manufacturers of margarine in Great Britain ; the two largest factories are the Stork Margarine Works at Purfleet, Essex and at Bromborough, Cheshire.

Refining the Oils

The refining process is of extreme importance in making high-quality margarine, since it removes all traces of impurities, taste and colour leaving a pure cleansed " neutral " oil. The oils arrive at the factories by sea, rail and road tankers.

The oils used are mainly vegetable. They include :

Coconut	Soya bean
Groundnut	Cottonseed



General view of the edible oils factory at the Margarine Works, Cheshire.

Palm kernel Sunflower
Palm oil Whale oil.

There are three main stages in the refining operations :

Neutralization
Bleaching and Filtering
Deodorization.

i. Neutralization

In the first stages of the neutralization process the oils are treated with alkali which changes the fatty acid present into a water soluble solution.

When this mixture is allowed to stand under controlled temperature conditions, the heavier aqueous solution settles to the bottom of the neutralizing vessel, leaving the clear oil above.

The clear oil is repeatedly washed with dilute alkali to remove traces of acid, and finally with clean water. It is then dried, a process performed under vacuum.

ii. Bleaching and Filtering

This second refining process bleaches the oil, removes colouring matter and other trace impurities.

Bleaching earth absorbs the pigments and other impurities, and the oil is separated from the earth in a filter press which retains everything but the clear colourless oil which is then ready for the next stage in refinement.

iii. Deodorization

This process removes the final traces of tastes and odours from the oil. It is carried out by steam distillation under vacuum in a vessel which looks like a large pressure cooker.

The passage of steam through the oil at high temperatures under vacuum permits the removal of the last impurities which impart taste and odour to the oil. At the end of

the process the oil is cooled under vacuum and transferred to storage tanks to await its use in the manufacture of margarine.

Milk is used in the manufacture of margarine, to provide the creamy flavour and appetizing aroma. The milk is fat-free, since the full fat content desired is contained in the oils.

Before being used, the milk is pasteurized. This is carried out by the modern " high-temperature short-time " process.

Milk is heated to a high temperature (85°C) for a brief time and then rapidly cooled. After pasteurization the milk is passed to large stainless steel tanks.

The preparation of cultures is carried out by selecting samples of fresh dairy milk which are allowed to ripen at a controlled temperature. This process is carried out continuously, and each day the best culture is selected for adding to eight-gallon stainless steel containers of pasteurized skim milk which, in turn, are allowed to ripen.

The contents of these containers are known as starters. (These are milk cultures which have been developed in sterilised milk). Flavour is the criterion.

All the milk for one day's production is innoculated with the " starters " and left to ripen. This maturing process takes about 8-10 hours. During this time, the milk is kept at a controlled temperature of 22°C in a large stainless steel tank, and is then cooled to 5°C by means of slow moving " agitators."

These agitators are shining pendulum-like tubes through which hot or cold water may be passed to adjust the temperature of the milk. The milk is then ready for use in margarine manufacture.

COMPOUNDING AND BLENDING

Each brand of margarine has its own particular recipe, and it is vital that the different kinds of oils and fats are carefully blended to the exact formula required. This is done by means of a special control panel called a Compounding Unit, in which the different ingredients are carefully weighed out, and from which they are transferred into the premixing tanks.

At the oil compounding unit skilled operators control the blending of the different oils by means of levers which are connected to the valves of the storage tanks; large dials show the weight of the oils being run into the stainless steel weighing vessels. It is at this stage that the 'sunshine' vitamins A and D are added.

A system of coloured signalling lights enables the operator to deliver the correct blend to the processing units in the order of priority.

The blending of the milk and salt is carried out by means of similar control panels at the processing units.

There are two methods of making margarine—the churn-drum process, and the quicker and more modern Votator method. In both methods the utmost care is paid to hygiene and all equipment is kept in spotless condition.

The Churn-drum Method

In this method the emulsion of edible oils, fats and milk is made in churns and is then passed over large cooling drums which are refrigerated to a low surface temperature by internal evaporation of liquid ammonia. The mixture solidifies in one rotation and is removed by means of

a scraper knife. It is then allowed to stand in containers to mature for a period, during which it regains room temperature and recovers from the shock of rapid cooling.

The margarine is then ready for kneading. It is passed through Multiplex rollers—machines that consist of three pairs of granite rollers closely spaced, one of each pair of rollers rotating at twice the speed of the other. These rollers consolidate the flakes. This mixture is then allowed a further resting period before the final blending. This consists of " working " the margarine, until the desired creamy texture and right spreading consistency is obtained by blenders working under vacuum. The margarine, after a further resting period, is then ready for packing.

The Votator Method

The Votator compresses into a matter of seconds processes which previously took many hours. The margarine is completely untouched by hand and protected from the outside atmosphere. Each Votator consists of two units—" A " and " B." Unit " A " is made up of three cooling and emulsifying cylinders. When the emulsion of fats and milk leaves the pre-mixing vessel, it enters unit " A " at a controlled temperature. Each cylinder is 46 inches by four inches in diameter, and jacketed for cooling by liquid ammonia. Inside each, a shaft carries two rows of scraper blades which bear on the inner surface of the cylinder. In this way the emulsion is quickly chilled and plasticized. Unit " B " allows the mixture to

View of the Compounding Unit at the Margarine Works, Essex.

solidify and crystallize and gives the desired texture in the finished product.

Ingenious packing-machines automatically mould and wrap the margarine in half-pound packets which leave the machines at the rate of about 90 a minute. The packets are automatically packed into fibre-board containers, each of which holds 24 or 48 packets. These are sealed automatically ready for dispatch.

Quality Control

At every stage in the manufacture of margarine, samples are taken and analysed. This laboratory control ensures that the balance is correct to the finest degree. At the end of the production line the finished product is examined and the moisture content checked. Not only the product itself and all the ingredients used in its manufacture, but even the atmosphere of the buildings in which it is made, are subject to constant bacteriological scrutiny. Scrupulous hygiene is essential and great attention is paid to detail so as to ensure that both the equipment used and the staff conform to the highest standards of cleanliness.

The rising standards of living, not only in Britain but in other well-developed countries, coupled with the need of raising this standard in the undeveloped countries of the world, is likely to make the world's standards of nutrition more and more dependent on the margarine industry.

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