

HOW LEMON OIL IS MADE.

BY FRANK N. BAUSKETT.

We all know that the flavoring extracts used in this country are of domestic manufacture, and that the two principal flavors are vanilla and lemon, but few have a knowledge of what actually constitutes these extracts. To quote from the standards laid down by the United States Department of Agriculture, a flavoring extract "is a solution in ethyl alcohol of proper strength of the sapid and odorous principles derived from an aromatic plant, or parts of the plant, with or without its coloring matter, and conforms in name to the plant used in its preparation." Peach, strawberry, pineapple, and some other flavoring extracts are always artificial, it being impossible to make an acceptable extract from the fruit itself, and therefore cannot be, in accordance with the United States standard, termed flavoring extracts. However, very little flavoring extract is used outside of vanilla and lemon, as at least ninety-five per cent of the extracts manufactured are of these two varieties. The government through the Agricultural Department has delved deeply into the methods of the manufacture of flavoring extracts, but the story as to how the lemon oil is made from which the extract is manufactured is the more interesting.

The oil of the lemon is the essential oil secreted by cells lying near the outer surface of the rind, and the world's supply of this oil comes from the island of Sicily in the Mediterranean Sea. This island is the greatest lemon-producing region in the world, and all parts of the world receive their supply from that island. The oil for making the extract is produced as a by-product of the crop from the culled lemons—those which for any reason will not stand shipment.

For obtaining the lemon oil, there are three processes, all of which are extremely crude. There are two processes known as the sponge methods, and one known as the machine method. In the sponge methods the lemons are cut in pieces by children and women, the cheapest form of labor. The work is carried on with great rapidity, the knife being started through the rind and the fruit cut in two and thrown into storage tubs by one motion of the arm. The tubs containing the halved lemons are dumped into shallow troughs, where the pulp is separated from the skins. For this work older girls and women are employed, and so expert do they become, that in the twinkling of the eye a spoon-shaped instrument is inserted between the pulp and rind, and with one twisting motion the pulp is scooped cleanly from the rind and deposited in the trough. The rinds are thrown into baskets to be conveyed to the spongers. However, before the sponging process is begun, the baskets of rinds

shaped, into which the lemon rind is inserted with one hand, the other being used to press the sponge, the weight of the whole body being thrown into the motion. The lemon skin is then turned partly over and the pressure renewed. Each half rind is handled separately, receiving three or four pressings. It requires about two thousand of these half rinds to produce one pound of oil, the exact quantity depending upon the size, ripeness, and freshness of the lemons. The green fruits produce more oil than the ripe. A good workman can squeeze out two or three pounds of oil a day, for which he receives about fifty cents. This oil is worth in quantities about one dollar a pound. But for making lemon extract, but a small

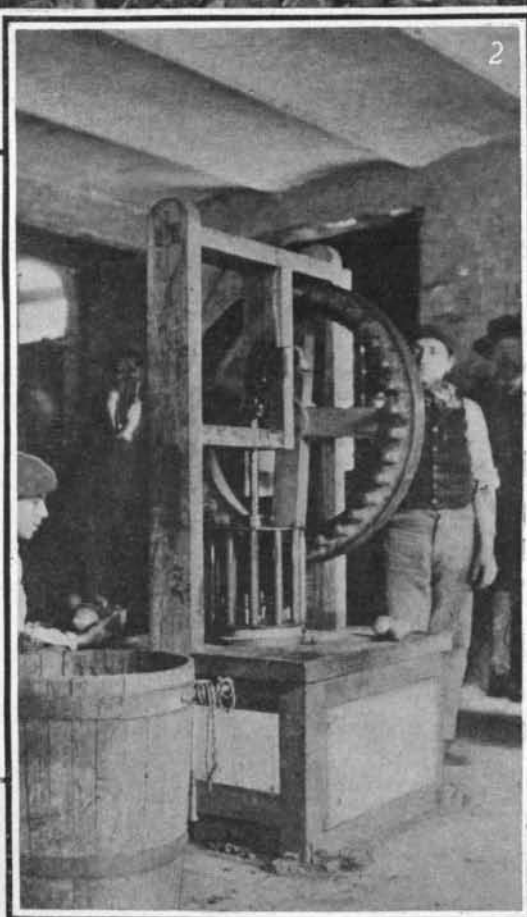
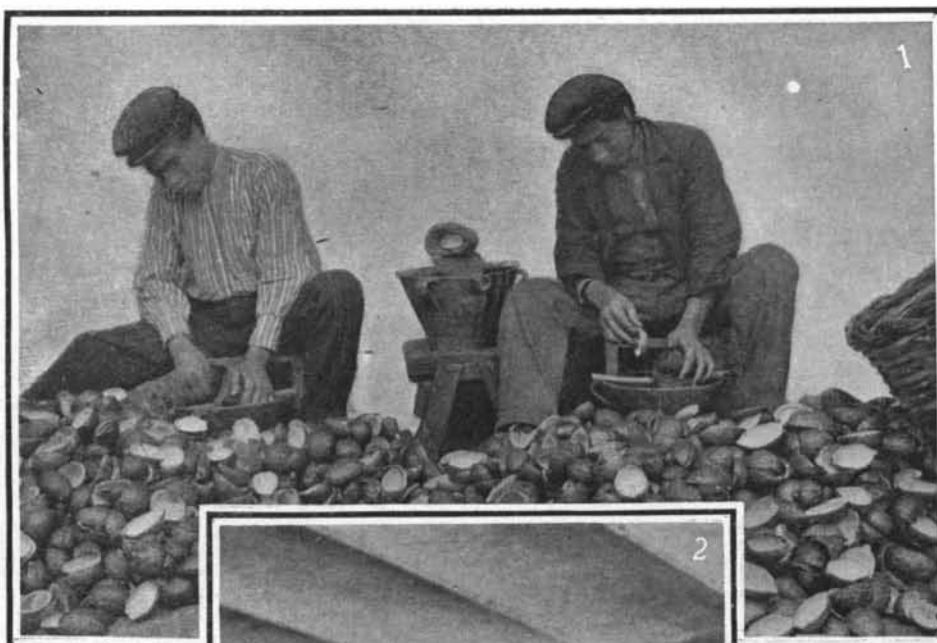
oil by the same means, and finally filtered through felt bags. The residue left in these bags is collected for several days, when the bags are placed under a hand press and freed from the last traces of oil. What is known as the three-piece method differs from the one just described mainly in the preparation of the skins before pressing. The rind of the fruit is pared off in three slices, leaving the greater part of the pulp with some little skin at the ends. This paring, as a rule, is done by boys or men, and the skins are washed and soaked as in the two-piece process. Much more pulp is left adhering to the skins in the three-piece method, and naturally more juice is mingled with the oil than by the other method. The claim is made, however, that oil made in this way filters more rapidly and remains clear longer.

The use of machines in producing lemon oil is confined to the Province of Calabria in Italy. But the oil manufactured in this way forms but a small percentage of the total product. It has, however, a deeper color than the oil pressed out by hand, and is used to deepen the color of the latter product. The machine for extracting lemon oil is about as crude as the hand process. The fruit fed to this machine must be of uniform size and in small quantities. The lemons are placed in a receptacle between the grinding disks, the lower of which is stationary, while the upper one is turned by an arrangement of wooden cogs against the side flywheel. The pressure exerted by the weight of the upper disk is partly compensated

for by the arm at the rear, which is also used to raise this part of the machine, so that the fruit may be placed in position and the pulp removed. A bell rings after a certain number of revolutions, and the machine is stopped to remove the squeezed rinds and to reload the receptacle. Indeed, this machine method of oil extraction is no faster than the sponge processes followed by the inhabitants of the island of Sicily.

Sand Lime Brick.

According to the U. S. Geological Survey, the sand-lime brick industry is a comparatively new one in the United States, having had its beginning in Michigan City, Ind., in 1901. Its progress was slow at first, the value of the production in 1903 being only \$155,040. From that time the value increased each year until 1907, when the maximum of \$1,225,769 was reached. In common with other building materials there was a decrease in 1908 in the production of sand-lime brick to \$961,226. The number of plants reporting



1. Two-piece method of extracting the oil. 2. A Calabrian lemon-oil machine. 3. Interior of Sicilian lemon-oil factory. 4. Removing the pulp of the fruit.

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are immersed in water for four or five hours. The work of extracting the oil is done entirely by men, as the task is quite a laborious one. These workers sit upon low stools, the skins being dumped upon the floor near them, and a basket for the exhausted skins set in a convenient place. A small earthenware bowl is placed on the floor between the workman's knees. This bowl has at one side a lip, directly beneath which is a concave depression, which serves to hold back the residue when the oil is poured from it. Across the top of the bowl is placed a round stick about one inch in diameter, notched to fit the widest part of the vessel. Across this stick is hung a flat sponge surmounted by another thicker one, and finally a third, which is cup-

portion is required. The method of manufacture is simple. The oil is dissolved in strong alcohol in the proportion of five parts oil and ninety-five parts alcohol; it is then filtered and bottled. An idea of the small proportion of the oil required may be had when it is considered that five barrels of the oil and ninety-five barrels of alcohol would make just one hundred barrels of pure lemon extract.

By the two-piece method only a small quantity of water is expressed with the oil, and the process of separation is very simple, the bowl being tilted forward until the oil can be blown from the surface over its edge into another receptacle. The water and residue remaining are separated from the traces of

made a rapid growth from 16 in 1903 to 94 in 1907, with a slight decrease in 1908 (to 87).

Common, front, and fancy brick were manufactured from sand and lime in 1908. The average price per 1,000 for common brick was \$6.63, as against \$6.61 in 1907, and \$6.71 in 1906; for front brick the price was \$12.16, against \$10.96 in 1907, and \$10.42 in 1906. In 1908 common brick composed 83.57 per cent of the value of all bricks, and front brick 15.37 per cent.

Thirty States reported both in 1907 and 1908, Alabama dropping out of the list in 1908 and Montana appearing. Of the individual States Michigan, as in 1907, was the leading State in 1908, reporting bricks valued at \$138,809. Florida was second in both years.