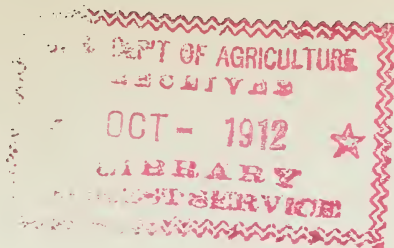


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PEANUT BUTTER.

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PEANUT BUTTER.

INTRODUCTION.

The growing popularity of peanut butter as a food has led to many inquiries regarding the methods employed in its manufacture. Peanut butter is in reality a very simple preparation, consisting merely of fresh-roasted peanuts ground finely and salted to suit the taste. Several large factories and a large number of smaller ones are now devoted to the manufacture of this product with which to supply the rapidly increasing demand. Some of the larger factories are almost models in their construction, equipment, and management, while many of the smaller establishments, which have no elaborate equipment, are turning out an excellent product.

Peanut butter was first manufactured and offered for sale as a food for invalids, but the article was soon adopted by many persons who for one reason or another, such as a preference for vegetable foods only, objected to the use of ordinary dairy butter. It soon outgrew this condition of limited use, and its development on a commercial scale has been as a general food product. It was never intended that this product should be used as a substitute for or a competitor of butter, but as a luncheon delicacy and to add variety to the diet. Peanut butter is a wholesome and nutritious food product and has become a popular article upon our markets. Last year one manufacturer used over 130 cars of shelled peanuts in the production of 6,000,000 small jars of this food. Other manufacturers used large quantities, the total consumption of peanuts for the manufacture of peanut butter alone amounting during the year 1911 to approximately 1,000 cars of shelled goods, or 1,000,000 bushels.

In order to produce high-class peanut butter the manufacturer must employ the best of materials. On the other hand, the use of the best stock obtainable will be of little avail unless the work of converting it into a salable product is conducted in a sanitary manner.

The peanut-butter factory should be arranged and conducted along the same general lines of cleanliness as any model food-packing plant. Peanut butter should never be prepared in a room or building attached or adjacent to a peanut-cleaning establishment, as the

dust incident to the cleaning of peanuts injures the butter. For this reason it is not practicable for the peanut cleaners to manufacture peanut butter, or for the peanut-butter makers to operate cleaning establishments in the same building. Should both lines of business be handled by the same firms, the factories should be sufficiently separated to insure absolute cleanliness in the butter plant.

THE STOCK.

As the peanuts come from the farms they contain considerable dirt, stones, and trash. Before they are ready for the market they must be cleaned and graded and the shelling stock separated from that sold in the shell. There are two distinct types of peanut grown in this country, the Virginia, or Jumbo, type, including the varieties known as Virginia Bunch, Virginia Runner, and North Carolina (or Wilmington), and the Spanish type, including the true Spanish, Georgia Red, Tennessee Red, and Valencia. Three grades of Virginia and Spanish shelled goods are produced, these being known as No. 1, No. 2, and No. 3. In each case the No. 1 grade consists of the unbroken or whole kernels, the No. 2 of the split kernels, and the No. 3 of the finely broken and badly shriveled kernels commonly spoken of as "pegs."

The Valencia is a comparatively new variety in the American trade, but it seems to be well adapted for use in the manufacture of peanut butter. As a rule the red varieties are not considered desirable for peanut-butter stock and if used must be blanched very thoroughly in order to get a clear product free from particles of the red skins.

Among the Virginia, or Jumbo, peanuts there is always a small percentage of the pods that have become damaged in the field by the weather. Usually this mildewing or discoloring of the pods does not affect the kernels, and this class, together with the pods that become broken in handling, is used for shelling purposes. In the case of the Spanish and Valencia varieties the greater portion is shelled. By this method the best grade of the Spanish and Valencia and the cheaper grades of the Virginia type of peanuts are commonly employed for the production of peanut butter.

In the manufacture of high-grade peanut butter only the No. 1 and No. 2 grades of each class are employed. An inferior-grade butter is made from third-grade goods, also from screenings, but the product is unfit for human food and its manufacture should be discontinued.

Peanut butter having the proper consistency contains about 41 or 42 per cent of fat, this being the natural oil of the peanut. The Virginia, or Jumbo, type contains about the proper proportion of fat, but several manufacturers are adding some Spanish peanuts to

give the product the desired smoothness. Peanut butter made entirely of Spanish peanuts is very smooth but contains too much oil. It is possible by the use of an oil press to remove 8 or 10 per cent of the oil from the cleaned Spanish meats before grinding them, thus reducing the oil content to about the proper proportion.

The shelled goods as received from the cleaning factory require considerable hand picking and additional cleaning to render the peanuts fit for grinding.

FACTORY AND EQUIPMENT.

The model peanut-butter factory consists of a four or five story building equipped with elevators, light, and power, with a railroad siding located at the rear of the factory for convenience and economy in handling materials. In the smaller factories the entire equipment is often placed on one floor. Here, however, a greater portion of the work must be done by hand, and it is impossible to take advantage of a gravity system of delivering the goods from one machine to another.

The equipment of a peanut-butter factory consists of roasters, blanchers, picking tables, grinders, bottle-filling, capping, and labeling machines, together with suitable facilities for the storage of raw materials and for packing and shipping the finished product.

The arrangement of the equipment of the various factories differs, but the ideal would have the roasters and stock of raw materials located on the top floor, the blanchers and picking tables on the third floor, the grinders and bottling machinery on the second floor, and the packing and shipping departments on the ground floor.

ROASTING.

The roasting machinery is built especially for the purpose, but is similar to that used for the roasting of coffee, cocoa, and products of that class. The same equipment may be used for roasting both shelled and unshelled peanuts. As an accessory to the roaster it is desirable to have a carrier or truck, the hopper of which has a perforated bottom for receiving and cooling the roasted nuts. Figure 1 shows the roasting and cooling plant in one of the leading peanut-butter factories.

In some factories artificial gas or natural gas is employed for heating the roasters. In others a hard coal or coke fire is employed. The temperature of the roasters will vary with the class of goods that is being handled. For shelled goods this should be about 320° F. For peanuts in the shell the temperature may be carried considerably higher without danger of scorching. As a rule about 30 or 35 minutes are required to roast a batch. The stage of roasting, how-

ever, must be determined by the judgment and experience of the operator.

In the model factories the peanuts are elevated to a hopper over the roasting machine and are fed by gravity through a chute into the end of the roasting drum. When the roasting is completed the drum is dumped directly into the portable cooler having a perforated bottom. This is then wheeled to an opening in a suction blast pipe, and cold air is pulled downward through the roasted peanuts in order to cool them quickly.

The quality and flavor of peanut butter depend largely upon the care exercised in roasting. Some markets prefer a "high" roast,



FIG. 1.—A roasting and cooling equipment in a model peanut-butter factory.

while others want a very "mild" roast. If the roasting process is carried too far the butter will have a dark-brown color and a burned or bitter taste due to the carbonizing of the fats and cell tissue.

Where peanuts are grown large quantities are eaten raw. While no careful digestion experiments have been reported with raw and roasted nuts, there is a belief, borne out by data collected by the Department of Agriculture in its nutrition studies, that the raw and medium roasted nuts are less likely to cause digestive disturbance than those that are parched or overroasted. However, as with other foods, individuals will be found who can digest the raw product without trouble and to whom the roasted ones are not so wholesome,

and vice versa. Peanuts that are given a mild roast seem to be generally considered more palatable and wholesome than those that are overroasted. On the other hand, if the roasting is too light the peanut butter is lacking in flavor and color and does not have good keeping qualities.

After roasting and cooling, the peanuts are ready for blanching and are dumped directly from the cooler into a chute, from which they are fed into the blanching machine on the floor below.

BLANCHING.

The term "blanching" is applied to the process of removing the outer red skins and the germs, or hearts, of the nuts. This is accom-

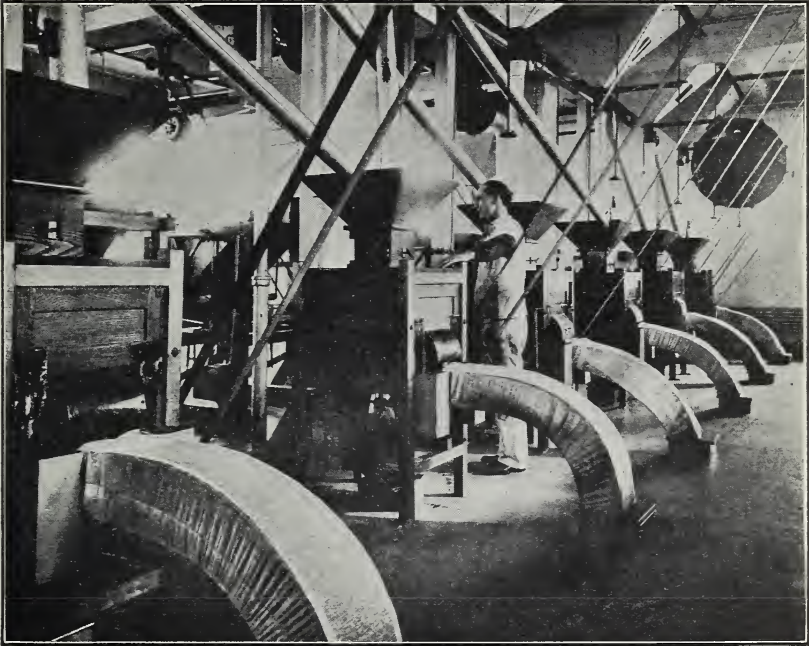


FIG. 2.—A type of blanching machine in common use.

plished by means of blanching machines consisting of a set of brushes revolving against a corrugated plate. The peanuts, after passing between the brushes and the plate, are carried over screens and in front of a fan in order to separate the skins and germs from the clean meats. Figure 2 shows the type of blanching machine in common use.

The work of hand picking the stock is usually done after the roasting and blanching. This makes possible the removal of any meats that are discolored or in any way inferior. The tables for hand picking the peanuts are similar to those employed in the

bean-cleaning factories and consist either of a broad canvas belt, as illustrated in figure 3, or of a long and narrow belt, such as is used in the regular peanut-cleaning factories.

In some factories a mechanical stoner is employed to take out any small pebbles or bits of flint rock that may have escaped the process in the cleaning factory. These stoning devices all work upon the gravity principle; the peanuts, being lighter than the stones, are blown upward, and the stones fall into a receptacle. (Fig. 4.)

The shrinkage or loss in manufacture varies with the season and with the quality of the raw materials. This is sometimes as low as 13

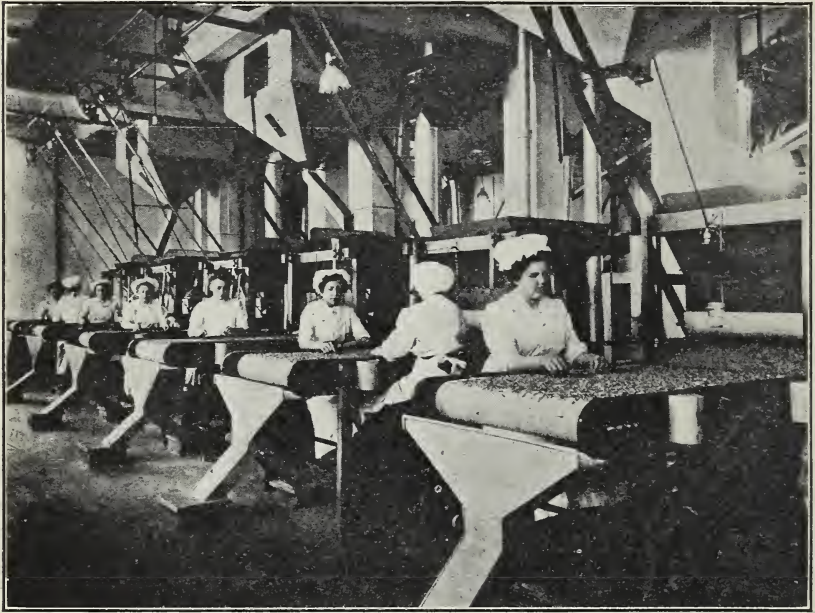


FIG. 3.—Picking tables in a model peanut-butter factory.

or as high as 18 per cent, averaging about 15 per cent of the original weight of the goods. Taking 100 pounds of No. 1 shelled peanuts, the loss in roasting will be about 5 pounds, in blanching about 9 pounds, and in hand picking 1 pound to $1\frac{1}{2}$ pounds. At seasons of the year when the moisture content of the meats is high the loss in roasting may be as great as 8 pounds.

The working cost also varies with factory equipment and the quality of the goods, the main difference being in the hand picking. The larger and more perfectly equipped factories can be operated more economically than the smaller plants. The working cost can be safely estimated at 2 cents a pound, exclusive of bottles or other containers.

BLENDING.

From the stoner the peanuts are carried by an elevator or fed through a chute to the supply hoppers above the grinders. In case two grades or kinds of peanuts are used, the blending usually is done as the peanuts are fed into the hopper above the grinder. In

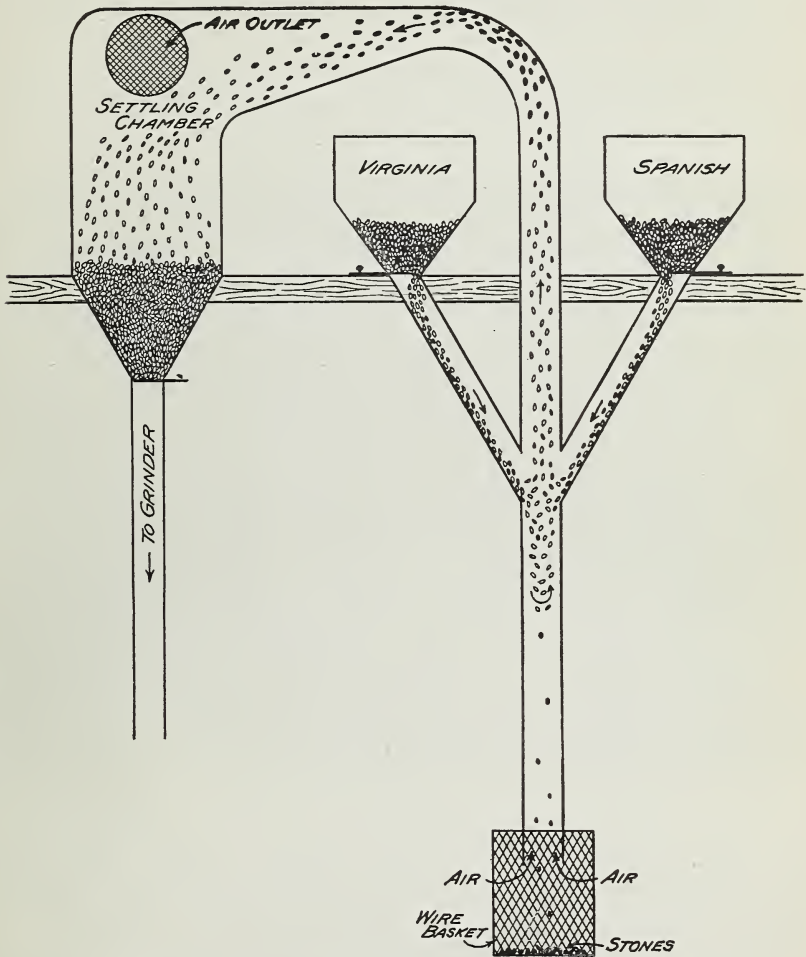


FIG. 4.—Sketch showing device for removing stones from peanut meats.

one or two factories, however, this is accomplished in the stoning device, two streams being fed side by side and blended by the air blast which lifts the peanuts away from the small stones. A common method is to blend Spanish and Virginia peanuts in equal quantities, and the uniformity of the product depends largely upon the completeness of the blend.

The manufacturers who are producing the finest grades of peanut butter are employing more than one variety in its composition. When made entirely of Virginia peanuts, the product is lacking in smoothness, and the addition of some Spanish stock greatly improves its consistency. Peanut butter composed entirely of Spanish peanuts is very smooth, but does not possess as fine a flavor as that made from a blend of equal parts of the Virginia and Spanish varieties.

A variety of peanut known as "Java" is frequently imported and is used to a limited extent for the manufacture of peanut butter. This variety makes a very smooth product, but as the nuts have a tendency to become strong and rancid they can be used only when strictly fresh.

GRINDING.

The manufacture of peanut butter in quantities requires the use of special grinding machinery. While peanut butter can be made for home use with the aid of an ordinary meat grinder, machines of this class do not grind finely enough for commercial work. Peanut butter requires to be ground to a fine granular form rather than to a pasty consistency. The oil in the meats is contained in minute capsules or cells, and it is desirable to have these cells broken apart rather than crushed and the oil liberated. For this reason worn or smooth grinding plates do not give good results when run closely together, owing to the rubbing or smoothing of the pulp between them. When ground to a paste it lacks proper consistency and does not hold up well.

The grinding produces considerable heat, and care is necessary to prevent scorching. One or two factories are equipped with grinders in which the working parts are surrounded by a water jacket similar to that around the cylinder of a gasoline engine. By this means a circulation of water through the jacket controls the temperature of the burrs. By connecting the jacket to both hot and cold water pipes and with the use of a thermometer similar to those employed in heating systems, the operator, by means of conveniently arranged valves, can absolutely control the temperature of the grinder.

Figure 5 shows a large motor-driven grinder which is equipped with a cooling device. This grinder requires a 30-horsepower motor to operate it and will grind 21 pounds of meats a minute. Most factories are, however, equipped with smaller grinders of the type shown in figure 6. The smaller machines do not have so great a tendency to become overheated as do the larger ones, but in all cases where some method of cooling is not provided it will be necessary to run the machines at a moderate speed or allow them to cool occasionally.

Before grinding the peanut meats, from $1\frac{1}{2}$ to 3 per cent in weight of the best grade of dairy salt is added. Frequently this salt is weighed and mixed with the peanuts before they are placed in the hopper of the grinder. Most of the larger grinders are fitted with a small auxiliary hopper, from which the salt is fed into the grinder with the peanuts by means of a worm or gear. The greatest difficulty lies in securing a uniform distribution of the salt particles through the butter.

Many persons prefer peanut butter without the addition of salt. For this reason some of the manufacturers are putting their product upon the market either without the addition of salt or only slightly

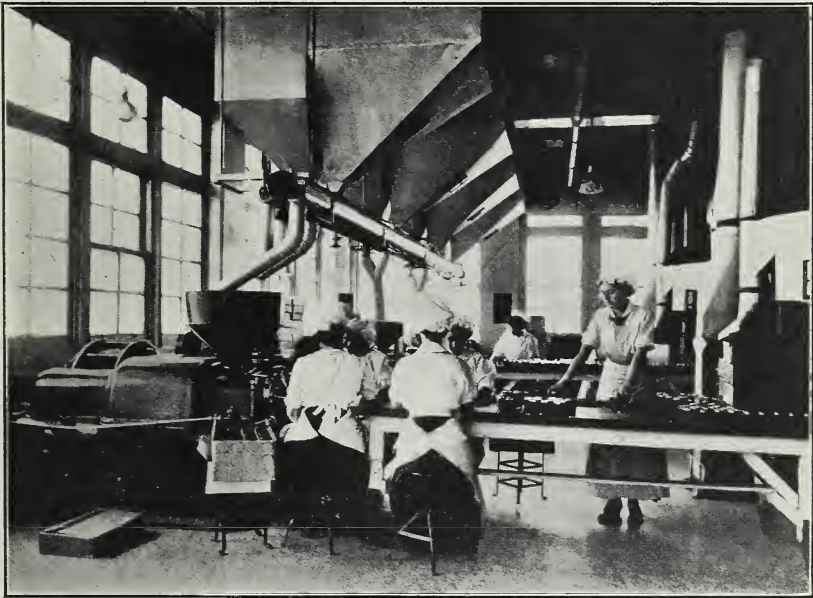


FIG. 5.—A grinding and bottling outfit.

salted. The matter of salting is one to be determined entirely by market requirements, although the addition of a small quantity of salt increases the keeping qualities. In order to complete the mixing process the product is sometimes run through a set of rolls or through a mixing machine after grinding.

BOTTLING AND PACKING.

The bottles or other containers are filled either directly from a spout on the grinding machine or from a separate filling machine. The transfer from the grinder to the filling machine should be by means of a closed conveyer, rather than by open pails or tubs.

Another method would be to have the grinder upon a raised platform, discharging directly into the filling machine. The separate filling machine has the advantage of mixing the mass more thoroughly than when the filling is done directly from the grinder. In either case the containers, especially those of the smaller sizes, should be filled from a spout, the bottle being placed over the spout and filled from the bottom, thus avoiding the formation of air bubbles.

Peanut butter is placed upon the market in several styles of small containers, including bottles, glass jars, and tin cans, and in pails, tubs, and barrels, from which it may be sold by the pound. The three sizes of small glass jars in most common use contain 6 ounces,

10 ounces, or 1 pound each. The usual retail prices of these are 10, 15, and 25 cents, respectively. Bulk goods which are packed in pails, tubs, or barrels are sold at prices ranging from 10 to 20 cents a pound.

It should be borne in mind that a rubber packing is not suited to the sealing of jars containing peanut butter, as the oil present will dissolve some of the rubber. Either



FIG. 6.—A small grinder commonly used in peanut-butter factories.

a ring of paper or a thread of rubberlike compound spun upon the inside of the cap forms a better seal than rubber. The vacuum process of extracting the residual air from the jars is now in common use in packing establishments.

The pails and tubs used for handling peanut butter in bulk are provided with either metal or wooden covers, and these are fastened on with wire, strips of metal, or by nailing, no attempt being made to make the majority of these receptacles air-tight.

Where peanut butter is packed in small glass jars, these are inclosed in boxes or pasteboard cartons, usually two dozen bottles to a package. The sealed package glass jar is undoubtedly the most satisfactory and cleanly method of handling the butter. It is important

that the glass jars used be clear and white, in order that they may present an attractive appearance when placed upon the market. The use of jars that are composed of glass of a greenish tint will give the best peanut butter an inferior appearance. Bulk goods are generally handled by dealers who sell large quantities, and a pail or tub is quickly emptied. The principal objection to the sale of bulk goods is the fact that the pails or tubs are frequently left uncovered in the stores and the contents exposed to dust. Manufacturers of bulk goods should provide suitable tight-fitting covers having a knob or handhold upon the top of the cover. The type of tin can with an inside-fitting cover shown in figure 7 is especially adapted for the handling of peanut butter in bulk.

Dealers who handle peanut butter in tubs or pails should also bear in mind that the oil in the butter has a tendency to rise to the top and the heavier particles to settle to the bottom. In order that the product may be uniform throughout, it is desirable to use a wooden paddle and to stir it frequently from the bottom of the pail or tub. Dealers and consumers frequently complain of the oil that rises to the top of peanut butter in the small jars. If this happens it is only necessary, upon opening the jar, to mix the oil thoroughly with the remainder of the contents in order to restore it to the original consistency.



FIG. 7.—A type of tin can suited for handling peanut butter in bulk.

SUMMARY.

Peanut butter is rapidly growing in popularity as a wholesome and nutritious food.

While large and well-equipped factories are being used for the manufacture of this butter, a clean and wholesome product can also be made on a small scale, provided good materials are employed and the work is conducted in a sanitary manner.

A peanut-butter factory should not be conducted in conjunction with a peanut-cleaning establishment because of the dust resulting from the cleaning process.

Only the better grades of shelled peanuts should be employed. The use of screenings and other low-grade materials in the manufacture of peanut butter should be prohibited.

The small glass jar is the most desirable type of package for the sale of peanut butter. When the butter is handled in bulk and sold by the pound, great care should be taken to keep the containers covered in order to protect the contents from dust.

Approved:

JAMES WILSON,

Secretary of Agriculture.

WASHINGTON, D. C., *May 11, 1912.*

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