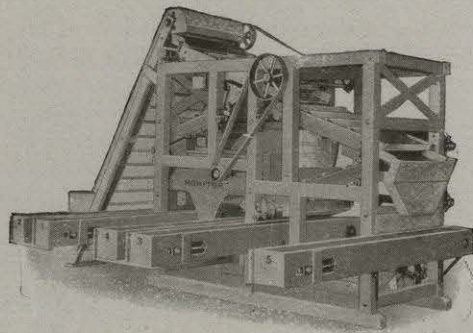


diameter. They are taken to the factory as promptly as possible and snipped. Some varieties have been developed which are practically stringless when young and fresh. The string becomes much more pronounced on standing and in mature pods. The beans are graded by special machines, the grades being determined by the thickness. The long beans and coarse beans are run through a cutter to obtain the proper length. The beans are blanched to make them tender, and are filled into the cans by a shaking machine, after which brine is added, and they are processed.



Machine for grading beans according to size.

#### Wax Beans

Wax beans are handled in the same way as the string beans, but more attention is paid to sorting as the presence of spots becomes very objectionable.

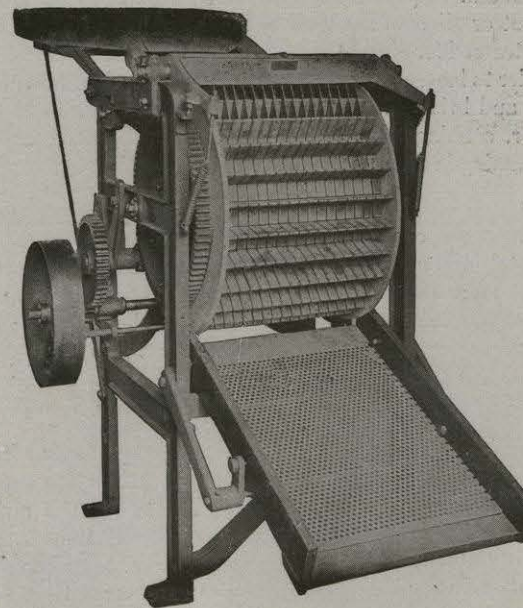
#### Lima Beans

There are two varieties of lima beans, the long vine, or pole variety, and the bush variety; the former is grown extensively, in southern California, and the latter in the eastern states. The former is used mostly as a dry bean and the latter for canning green. For canning, the crop is harvested when the majority of the beans are in prime condition, the vines being pulled or cut and hauled to the

factory and the beans shelled in a pea viner. The beans are then run over a grader having holes of 20, 30, 31, and 32 thirty-seconds of an inch in diameter. The very large ones may become rather starchy and have the appearance of soaked beans. The beans are blanched, filled into cans, and brine added. In sections where corn and lima beans mature together, this variety is preferred for use in succotash.

#### Soaked Lima Beans

The California lima bean is sometimes soaked and canned. When the beans are cut early and carefully dried, they make an excellent product and are preferred by some persons to the green. They are also used in place of



Machine for cutting fruits and vegetables into exact lengths.



the green in succotash, but the fact that soaking is done must be declared upon the label. If the soaking be done in cold water, it is usually for a period of 12 to 16 hours, if in warm water, about 4 hours. A longer blanch is required than for the green beans.

#### Beets

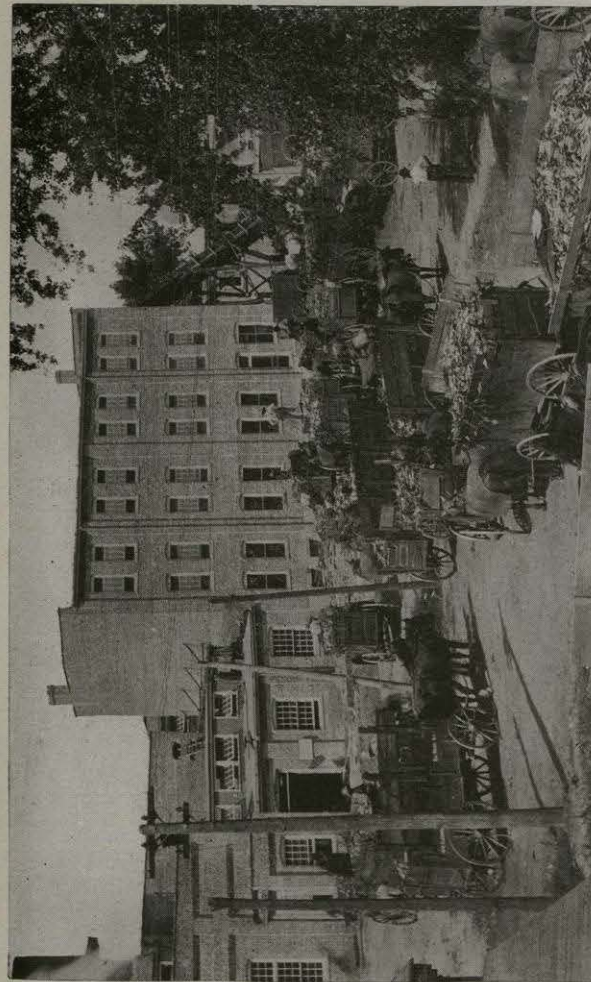
Beets used for canning should be of a uniform deep red color throughout, those having red and white layers are unsuitable. Beets are usually grown so as to mature late in the season in order that they may have the advantage of developing while it is cool and also that they remain small. They are graded for size into those less than 1 inch in diameter; from 1 to 1½ inches; from 1½ to 2 inches; and those above 2 inches. Those above 2 inches are cut or sliced. The washed beets are placed in a retort and steamed for about twenty minutes at 220° F. (104.5 C.) in order to loosen the skin. They are then peeled, filled into cans, and brine added. If the beets are thin skinned and tender, cooking them in boiling water will suffice instead of steaming in the retort.

#### Carrots

Carrots are canned principally for use in soup stock, or for hotels and restaurants. Those used for canning should be not more than 1 inch in diameter. They are washed, scraped carefully, rewashed, and cut to the length of the can and packed like sweet potatoes, or cut into small slices or dice, and the interspaces filled with brine.

#### Corn

Corn is one of the three large staple canned foods. It is packed in Maine and from New York to Minnesota and as far south as Maryland and Missouri. The greatest center of production is in Illinois. Sweet corn only is used, but some of the varieties are so large and coarse that when only a small quantity is present it has been suspected to be field corn. There are two types, the long peg-like grain known as shoe-peg, and the large broad grain arranged in rows. The



Corn arriving at a factory; 1,000,000 ears per day are used in packing 240,000 cans.



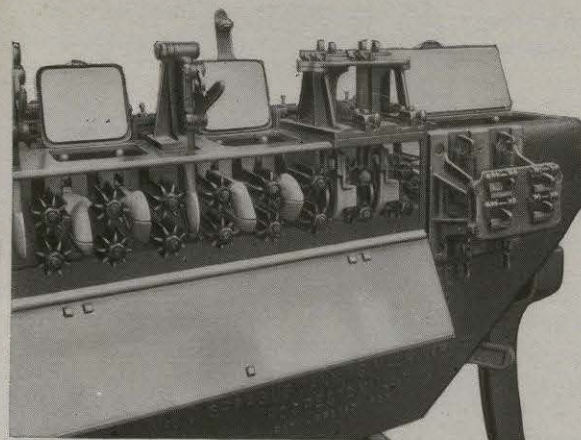


Corn-husking machine; eliminates the drudgery of husking by hand.

former is the smaller yielder, but owing to the compact arrangement of the kernels on the cob and the relatively small end exposed to harden, there is less tough hull on the grain. There is not much difference in sweetness if both are cut at the right time.

The corn is grown in large tracts the same as field corn. When it reaches the proper stage of maturity, it is snapped from the stalk and loaded on wagons. At the factory it is dumped on a conveyor which carries it to the different hoppers of the husking machines, or distributes it to the huskers. After the husking, the corn is inspected as it passes along a belt, and the extra-hard and the very soft and defective ears are held out. The ears pass through a silking machine to remove adherent silk and bits of husk, then under sprays of water, and finally are ready for the cutter. The corn is fed into a machine which has semi-circular knives so mounted that they will open and close

to fit the size of the cob and will remove the kernels from all sides. Immediately behind the cutters are the scrapers which remove the small tips adherent to the cob. Different procedures are followed in cutting. In what is known as the Maryland style, the kernel is cut very close to the cob and no scraping done. This gives a canned corn with nearly whole grain, each kernel being separate in the brine. In the so-called cream corn or Maine style, the grains may or may not be cut close to the cob, but are scraped to remove the



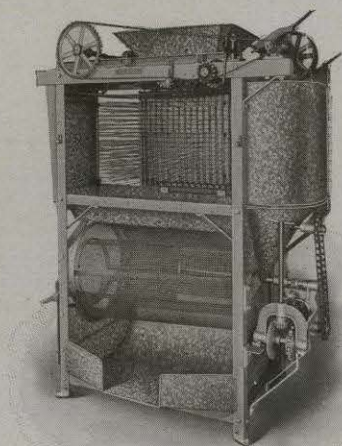
The cutters in a corn cutting machine.

adherent portion. This gives a creamy consistency and is thick or thin depending upon the water added and the condition of the starch in the grain. In order to get a very fine consistency, the cutting may be done in such a manner that the outer end of the grain is cut off first and then the lower by what is known as double cutting or recutting. In a style known as hull-less corn, the ends of the kernels are slit and the contents squeezed out. A final method is to pass the corn through a cyclone, removing all the hull, thus producing a fine green meal mush, kornlet. While it



is but natural that the corn should be cut close to the cob, especially in the Maine style, there may be a disadvantage, especially with that which is a little old or has been allowed to stand after gathering in the field, as the chaff from the cob acquires a very noticeable bitterness.

After the corn is cut, it is run through a cleaner which removes bits of cob, husk, and silk. It is then passed to the mixer and the proper amount of water, bearing sugar and



Silking and cleaning machine, combs the corn to remove bits of silk, husk, or cob.

salt in solution, is thoroughly stirred through the mass. It is then run into the cooker and filler. Though the process seems rather long and complicated, these steps are all accomplished without hand-work, except that of feeding the husker and cutter; they follow in such rapid succession that from the time the ear goes into the husker until the corn is in the can, sealed, and ready for the retort, may not be more than fifteen minutes.

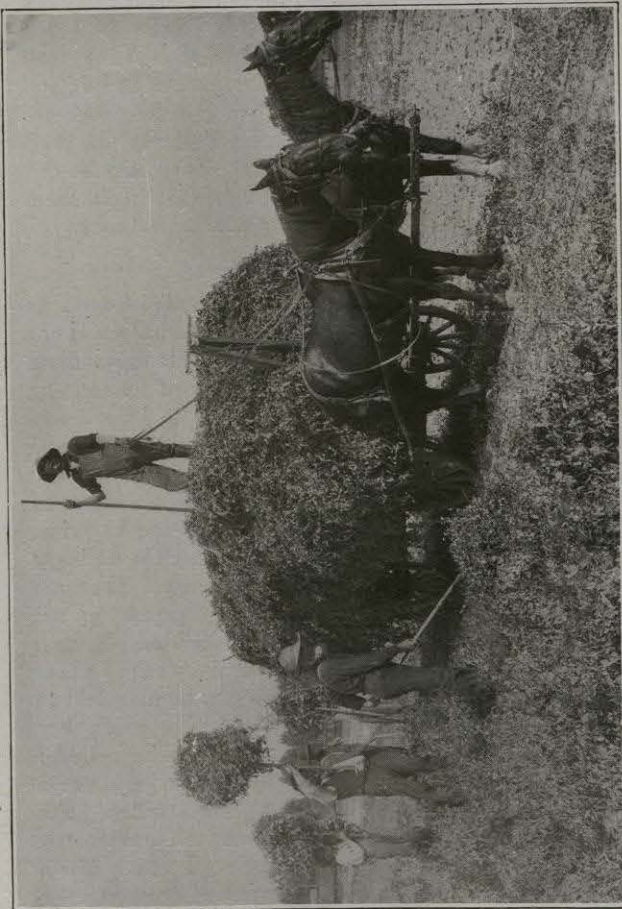
#### Okra

Okra is a constituent of nearly all gumbos and is used extensively in southern cookery, though it is not generally known in the North. The packing is largely in gallon cans for stock for the soup manufacturer, though the small can is coming into use for home consumption as its character becomes better known. The young tender pods are washed, the stem end cut off, the remainder of the pods filled into the cans, and brine added. They may be cut transversely into short lengths as it is not easy to cut them after canning. They are processed the same as beans.

#### Peas

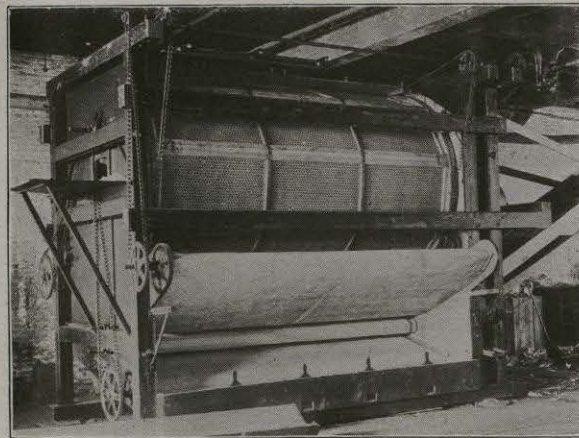
The growing of peas in fields of hundreds of acres as compared with the little plot in the kitchen garden is not in greater contrast than that in the methods of handling in the factory and kitchen. Peas are grown for canning from New York south to Maryland, west to Illinois and Wisconsin, and in a few places in Colorado, Utah, and California. There are two types; the smooth and the sweet wrinkled. The peas are harvested in June, July, and August. When the majority of the peas are in prime condition, the whole plant is cut with either the ordinary mowing machine or a special pea harvester. They are loaded on wagons the same as hay and at the factory are fed into a machine known as a viner which threshes them out of the pods and makes the separation as clean as wheat from straw. The peas are run through a fanning mill to blow out bits of stems, leaves, and pods, after which they are washed under jets of water in a large wire cylinder known as a squirrel cage, and are then passed through a sizer to separate them into five sizes. The standard holes are 18, 20, 22, and 26 sixty-fourths of an inch in diameter, and the peas are known as petit pois, extra sifted, sifted, early June, and marrow fat, in the same order respectively, the marrow fat peas passing over the screen. With very large sweet wrinkled peas one more screen may be used, 28 sixty-fourths of an inch, and those which remain above





Peas are handled by wagon loads.

are known as telephone. The terms "petit pois," "extra fins," and "fins" were originally from the French and refer to the size of the pea and not to the variety. In addition to sizing, which is practically standard in all pea canneries, there are some canners who grade all or part of the sizes for quality. The peas do not mature alike, the lower pods are always somewhat more advanced than the topmost, and some plants are always more advanced than others

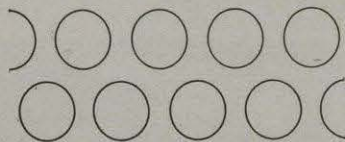


Pea viner; shells as many peas in a day as 200 or more persons and with less bruising and no touching by hand.

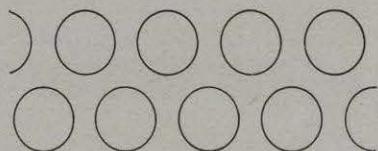
in the same field. It happens that old peas are heavier than the young and that an approximate separation can be made by floating the peas first in a weak salt brine, and then in a stronger one. Those which float in the first brine will be tender, those which float on the second brine somewhat harder, and those which go to the bottom are very hard. Automatic machinery has been devised to do this work easily and with considerable accuracy. The prod-



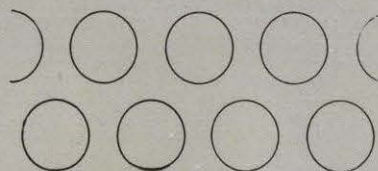
uct of a load of peas may be divided into from five to fifteen grades upon size and quality. Some peas are packed ungraded, and the proportion thus packed is increasing. The percentage of the different grades varies with the variety, the rapidity with which the crop matures, and the state of maturity. The small size, petit pois, is always the least abundant and the early June the most abundant.



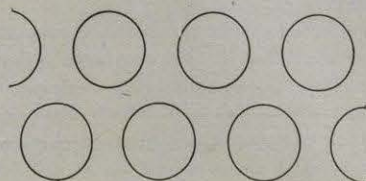
Screen for petit pois



Screen for extra sifted peas



Screen for sifted peas

Screen for early June peas; Marrow-fat peas  
remain above this screen

The very small ones bring the highest price, though the sifted pea probably has the best balanced pea flavor of the graded sizes, and the ungraded is probably the best of all.

The peas are blanched according to their age and size. The very young tender peas need scarcely be more than dipped into boiling water, one and one-half to two minutes being ample, while the very old hard ones may need twenty minutes. The time should be sufficient to make all peas tender, otherwise they will remain hard in processing. The blanching is usually done in a continuous manner, the machine being built to take the raw peas at one end of the cooker, and deliver them at the other ready for the can. The mechanism is usually a tank containing hot water and within which is a drum containing a screw devised to carry the peas through in a determined time. The water is constantly renewed and the temperature maintained by means of controllers. The peas are filled into cans by machines which deliver exact quantities and then add the necessary hot brine. They are processed in a retort

#### Chilis

The long green sweet chili pepper raised in southern California and known as California chili is highly esteemed by Mexicans and those who like the Mexican or so-called Spanish style of cookery. These chilis are not strongly pungent and are canned both green and ripe, but preferably in the green condition. The Mexican chili is not canned. The chilis are picked when full grown but before any tint of red develops. They must be handled very rapidly from the field to the factory. The first operation is to either roast the pods or drop them into hot oil to loosen the skin from the fleshy portion. As soon as they are cool enough to handle, the outer skin is stripped, the stem picked off, and the seeds may or may not be pressed out. The fleshy portion is left as nearly whole as possible. It is washed, then folded upon itself, put into cans, and a small quantity of brine added.



**Pimienta**

For a time the canned pimienta came from Spain, but a domestic product equal in every respect is now on the market. The pimienta is a fleshy sweet pepper from 3 to 4 inches long and about  $2\frac{1}{2}$  inches across at the base. They are not very pungent. Unlike the chilis, the pimienta is canned when well colored, the method being essentially the same.

**Pumpkins**

Pumpkins are generally grown as a catch crop in the corn field but, when raised for canning purposes, as a special crop in open fields. It is necessary that the pumpkins color and ripen evenly all over, a condition which is hindered by the shading of the corn stalks. The harvesting takes place late in the fall after other crops are out of the way. The pumpkins are washed, cut in large slices, a couple of inches or more in width, placed in crates and steamed in the retort until soft. They are then run through a cyclone which removes the shell and fiber leaving a smooth even pulp. This is cooked to the proper consistency, filled into cans and processed. A small quantity of pumpkin is spiced when packed. The effect of cooking the spice in at the time of canning is better than making the addition at the time of using, but as the amount and character of the spicing is so largely a matter of taste, most packers prefer to omit this detail.

**Rhubarb**

Rhubarb is grown as a field crop for canning purposes. It is planted upon very rich soil in order to secure a luxuriant growth of leaf stalk. The harvesting is done from May until August. The leaf stalk is broken at the level of the ground and then trimmed at both upper and lower ends. At the factory the stalks are washed and cut transversely into regular lengths of about  $\frac{3}{4}$  of an inch. The cans are filled tightly and water or syrup added. As sugar is necessary in using, it is better that this be added at the time of canning. Rhubarb should be canned in glass.

**Spinach**

Spinach, though a comparatively recent addition to the list of canned vegetables, is growing in popularity. The plants are grown in drill rows, or the seed sown broadcast. There are two crops: an early spring crop, in May, and a late fall crop, in October. The plants are cut when the leaves are crisp and tender, usually before they have reached a height of 10 inches. At the factory the leaves are separated from the stems and the yellow leaves and coarse parts discarded. Next comes the very important operation of washing. This must be of the most thorough character, as the plants are low, and usually grown upon a light sandy loam and are prone to carry more or less grit. Heavy sprays of water are used and the spinach passed through the washer in small quantities at a time so that clumps cannot form and thus prevent the exposure of every leaf. The blanching is carried on for about three minutes, after which the leaves are filled into cans, brine added, and processed.

**Squash**

This is treated the same as pumpkin.

**Sweet Potatoes**

Sweet potatoes are a perishable product as compared with the white potato. They bruise easily, start decay, and discolor at the points where rootlets emerge. They will not keep well under the same conditions as the white potato, so that canning is a desirable method of preserving them. The potatoes are canned as soon as possible after digging as there is a large increase in waste in skin and on discoloration upon standing. The potatoes are sorted according to their size, those under 1 inch in diameter in one grade, and those above 1 inch in another, and then may be peeled by subjecting them to steaming in a retort or to lye-peeling. The smaller-sized potatoes are given a steaming, varying from  $220^{\circ}$  to  $240^{\circ}$  F. ( $104^{\circ}$  to  $116^{\circ}$  C.) from eight to fifteen minutes, depending upon their condition; the larger potatoes are steamed a little longer, the



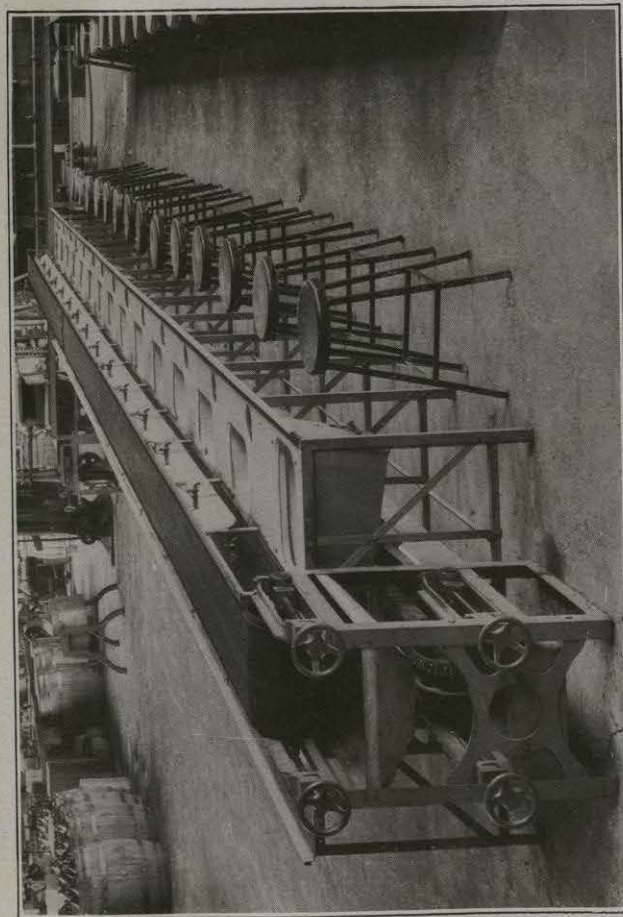
steaming being continued until the skin will slip easily, and the potato be about half-cooked. The skins are pinched off as soon as the potatoes are cool enough to be handled, and the potatoes are then packed into the cans as quickly as possible. For a fancy pack the potatoes are layered more or less, but for a standard pack the cans are stuffed. The pack should be tight to avoid any air space as the presence of air will cause more or less discoloration. The exhaust should be very hot as the heat penetrates slowly and should be continued for a longer time than for any other vegetable. They are processed for about three hours in boiling water, as there is loss of color on processing at higher temperatures.

#### Tomatoes

The needs of a boarding school are reputed to be responsible for the first effort to pack tomatoes. Success attended the first experiment and from it has grown an industry of very large proportions. The tomato and the sundry products made from it head the list of canned vegetables. The plant is grown over a very large part of the country and the fruit is so easily canned that packing is done in the home, and in the small cannery as well as in the large one where hundreds of tons of fruit are used each day. The great growing centers are Maryland, Delaware, New Jersey, Virginia, southern Ohio, Indiana, western New York, and central California.

The crop is field grown and yields from 2 to 20 tons of fruit per acre. The varieties chosen should preferably have a good, clean, red color, produce fruit of moderate size, be smooth, and ripen evenly all over. Fruit of excessive size does not fill into the can well, that which is wrinkled is difficult to peel, and that which fails to ripen at the base produces excessive waste. The average waste on packing is about 50 per cent.

The harvesting is done when the fruit is fully ripe upon the vine. The fruit is collected in shallow crates, brought to the factory at once, and the packing done in the shortest

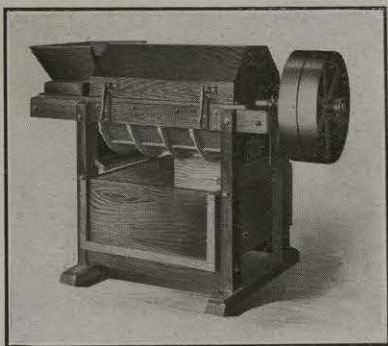


A tomato peeling table.



possible time. The tomato is a delicate fruit and will not keep for more than a few days after picking if vine-ripened, and unless vine-ripened, it does not develop its characteristic flavor.

The first operation at the factory is hand-sorting the tomatoes as they pass over a belt to the washer. All defective fruit and that which will not can without undue waste or labor in preparation is culled out, and from the latter the sound stock can be used for pulp or purée. The washing should be most thorough, preferably first by



Pulping machine, capable of straining a thousand or more gallons of tomato juice per hour.

dumping into water and then under strong sprays to cause the removal of dirt. The tomatoes are then scalded in steam or hot water and are ready for the peelers. The steam or water is kept very hot in order to blister the skin before the heat has time to penetrate into the fruit. The scalded fruit is handled usually in shallow pans, the skins are stripped from the blossom end toward the stem, and the core removed with the minimum of cutting of the seed cells. The cans are filled either by hand or machine, the former method being used chiefly upon fancy goods.

A solid pack of tomatoes means that the cans are filled with whole tomatoes or large pieces and no water or juice added. Tomatoes are also packed by filling the can with whole fruit and adding juice to fill the inter-spaces. A third class of packers use part whole fruit and part purée, but must make the declaration "tomatoes and purée," upon the label. Tomatoes are also packed in combination with beans, chilis, corn, and okra.

The small, irregular, and over-sized stock can best be made directly into purée or soup. The tomatoes are washed, scalded, run through a cyclone which separates the skins, cores, seeds, etc., and is concentrated to from one-half to one-third the original volume, and then run through a finishing machine to remove every trace of roughness or fiber, when it is ready for the can. In many respects this is the ideal method as it requires the minimum of hand labor, reduces the volume of handling in cans and in freight, and is ready for immediate use for the making of soups, etc. In the use of canned tomatoes in the kitchen the first operation is nearly always that of running the fruit through a colander and this operation as well as the concentration can be done best by special machinery.

#### Turnips

Canned turnips are used almost exclusively in hotels, though there is no good reason why they should not come into more general use. They are of good quality, inexpensive, and convenient for preparation. The seed is sown to produce a crop late in the fall when the weather is cool. They are harvested when of small size, preferably less than 1½ inches in diameter and are sweet and tender. They are washed and scraped, filled into the cans with brine, and processed.

### MARINE PRODUCTS

#### Clams

A very few soft clams are canned on the eastern coast, but the demand for the fresh ones has made the price almost prohibitive for packing. The process consists in



washing the clams, then dipping them into hot water or steaming them until the shells open, removing the clam, cutting off the foot, and filling into the cans. The inter-spaces are filled with a salt brine.

#### Clam Chowder

This is an exceedingly variable product depending upon the proportion and the ingredients used. The usual ingredients are a small bit of pickled pork, potatoes, onions, clams, milk, and seasoning. As this is in reality a heavy stew, it admits of very wide latitude in preparation. In most cases the milk is omitted, and it is expected that it will be added when ready to serve.

#### Minced Razor Clams

The largest clam industry is now located upon the western coast in Washington and Oregon. The razor clam which is large and somewhat cylindrical in shape is found in considerable quantities on the beach. They are caught immediately after the tide goes out, before they get into their burrows. They are not dug like the eastern clam as they go down too deep.

The clams are first washed under sprays of water to remove the loose sand, and are then passed upon an endless belt which conveys them through hot water to loosen them from the shell. As they come away from the scald, they are run over a shaker which detaches the greater portion of the shells. They are sprayed with cold water to cool them for handling. The clam is opened, the back is cut out, and they are again sprayed. An operator then takes a pair of scissors, splits the clam, cuts off the tip of the foot, removes whatever sand may be in the foot, and then removes the stomach. After another washing, the clam is run through a cutting machine where it is divided into small pieces or minced, filled into cans, and brine added.

#### Crabs

The packing of crabs is almost exclusively confined to the Virginia coast, as the supply in other waters is little

more than that demanded for the fresh trade. The principal catch is from April until October. The crabs are placed in large iron crates and dipped into boiling water or run into a steam box for about twenty-five minutes. When cool, they are stripped; that is, the shell, viscera, and smaller claws are removed. The meat is then picked out of the bodies. A centrifugal is sometimes employed, also compressed air, but these have not superseded the older method. The meat is filled into the cans and then processed. For a particularly fancy article only the large white pieces are used. The darker colored meat is just as good though not so attractive in appearance.

#### Oysters

Oysters are canned along Chesapeake Bay, around Savannah, Georgia, and on the Gulf Coast. Their use as a canned food has diminished since the introduction of improved methods of shipment by refrigeration. This has not only improved the quality of the fresh oysters, but greatly lengthened the period of consumption.

The oyster is taken from the reefs in deep water by dredges, and in shallow water by tongs. The dredge is a kind of iron scoop that is dragged along on the reef by the boat, and when filled, is raised to the deck by means of a windlass. The dredge, when loaded, will hold about a half-barrel. The tongs are much like a pair of large garden rakes hinged so that the teeth come together when closed. They can be used only in shallow water.

When a load of oysters has been secured, they are taken to the factory and unloaded into iron cars, which are made the proper size to fit inside the steam box. The hose is turned on the oysters, and they are given a thorough washing. The car is then run into the steam box, and subjected to a temperature of about 236° F. (113° C.) for five minutes. This kills and partly cooks the oyster, and causes the shell to loosen so that the removal, shucking, as it is called, is an easy matter. The shucked oysters are washed and filled into the cans by weight. A weak brine is added

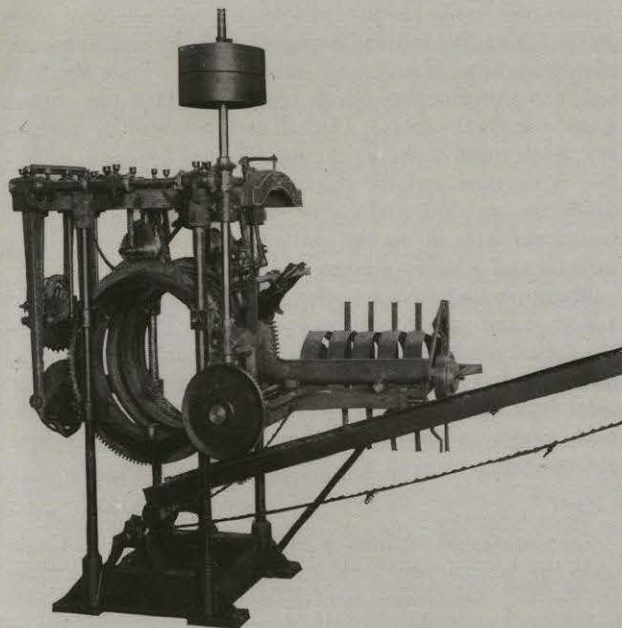


to complete the fill. The so-called oyster juice is nothing more than this brine with such extractives as come from the oysters in processing.

### Salmon

The salmon is pre-eminently the sea-food in cans in this country, the value of the pack being equal to nearly all other sea-foods combined. This great packing industry extends north from the Columbia river, along the Alaska coast. There are four varieties of fish used extensively, known by different names in the different localities; they are the Chinook, or King Alaska; the blue back, or sock-eye; silver sides; and the humpback. Trade preference is for the salmon with the very reddish color, but for real flavor the paler color may be better, the meat not being so dry, and containing more oil. Under the present method of branding, one cannot be certain of the variety or grade from the label.

Salmon are caught as they are leaving the sea to go up the rivers to spawn. Various methods are used for catching, from the small gill-net, requiring one attendant, to the enormous traps capable of corralling thousands of fish at a time. A trap represents the most efficient method of catching and is built by driving piles about 15 feet apart in the river or channel through which the fish will pass. The piles start at the shore and extend out and up stream at an angle for about one-fourth of a mile. Heavy wire netting is strung on these posts and at the upper end a square is constructed of the same piling and wire, which is known as the pot. An opening is left in the pot next to the line of the net which directs the fish into this enclosure. Connected with this pot is a smaller one about 12 feet square known as the spiller. The fish in the pot are directed into the smaller square through a wire tunnel, a wire net or brail lies on the floor and, when the fish are trapped, the brail can be raised by power, and thus dump tons of fish at a single haul into the boat alongside. The brail is dropped and the operation repeated until the trap



The iron chink. The most wonderful machine in the cannery.



is emptied. When the rivers are shallow, large nets or seines are used and dragged ashore by teams.

The dressing of the fish, or butchering as it is called, is nearly all done by machinery. The heads and tails are cut off by saws and then the fish is fed into the iron chink which removes the fins, splits the body open, removes the viscera and scrubs the fish, and drops it into a tank of clean water. The fish is then inspected and the cleaning completed by hand if any spot has escaped. They are next fed into the machine which cuts them into the correct lengths to fill the cans. The tall cans are filled by machinery, while most of the short cans are filled by hand. Each can is weighed and for this purpose automatic weighing machines are used, and correction made to proper weight before the cans go to the sealing machine. A very long exhaust and a heavy process are used.

Many persons have a notion that fish-canning would be a sloppy and rather unclean operation. This is far from the actual condition. The machinery is automatic and so nearly perfect that it is attended with less muss than in most fruit and vegetable canneries. Salmon canning has made greater advancement than any other line of fish or meat packing.

#### Sardines

The canning of sardines is confined to the Maine Coast upon the Atlantic and to Monterey Bay in California upon the Pacific. The Government defines a sardine to be a small herring and they are generally between 5 and 10 inches in length. The fish which reach the greater length and above are now packed in round cans and sold as herring. The sardine caught on the Pacific Coast is larger and differs from that on the Atlantic. While the sardine industry is a large one, it is conducted in much the same manner as when it originated.

The sardine is caught in weirs along the coast. A weir is a heart-shaped pen made of stakes, brush, wire, etc., and is built with one side near the shore. It has an opening

facing the direction from which the tides come in and the opening is directed inward. The fish when once impounded, tend to swim around in a circle, and the opening being directed in, tends to cause them to pass without finding a way out. The fish are caught with the rising tide. Attached to the weir is a small enclosure or pound into which the fish are directed and held for twenty-four hours to free them of feed. They are taken out of the pound with a net. At the factory the fish are washed and placed in strong brine for about two hours, or until they are "struck," *i. e.*, made firm by the salt. They are then well washed and delivered to the flaking machine. These machines place the fish in single layers on wire frames known as flakes, and are for the purpose of drying the fish. The flakes are racked on special trucks and run into a steam chamber for about twelve minutes and then into a dryer for about twenty minutes. The time depends upon the fatness of the fish and the temperature.

The fish are then ready for the packing table. Here the head is taken off and as much of the body as may be necessary in order to make the fish fit the can. The large fish are eviscerated but not the small ones. The cans used are either the quarter-pound or three-quarter pound flat. The can receives the proper amount of cotton-seed oil, olive oil, mustard, tomato, or sauce, before the fish are packed. The fish are carefully layered with the silvery portion of their bellies up so as to make a good appearance.

On the Pacific Coast, the sardine is caught at night, by means of nets. The factory practice differs from that in the East in that the fish are decapitated and eviscerated before going into pickle. The flaking is done by hand, the fish being arranged in wire baskets, after which they are placed for a time in the driers. The fish are fried in hot oil the day before they are packed. The oval can only is used.

#### Shad Roe

The shad roe is packed as a by-product in the handling of shad. The quantity available is not large, but owing to