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APRIL, 1930.

BULLETIN No. 2.

MASSEY AGRICULTURAL COLLEGE
(UNIVERSITY OF NEW ZEALAND)
PALMERSTON NORTH

THE PACKING OF BUTTER FOR EXPORT

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PALMERSTON NORTH, N.Z.
PUBLISHED BY THE COLLEGE

THE PACKING OF BUTTER FOR EXPORT

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In the early days of the dairy industry in New Zealand, the container generally used for the export or storage of butter was a keg, or tub, the former being barrel-shaped, and the latter, as the name denotes, similar to a wooden tub. Probably the greater portion of the World's butter to-day is still marketed in the same style of package.

At that time, practically all butter was made on the farms, and either heavily salted and packed on the farm, or sold to a buyer—usually a grocer—in pats or rolls. The buyer, if in a big way of business, milled the various qualities and added more salt.

This "salted" butter was then held in ordinary storage for winter use, or exported to Australia or London. It is worth noting that one of the objects of the Middle Island Dairy Association, formed on 23rd April, 1890, was to seek new markets on account of the duties imposed on New Zealand dairy produce by Australia at that time.

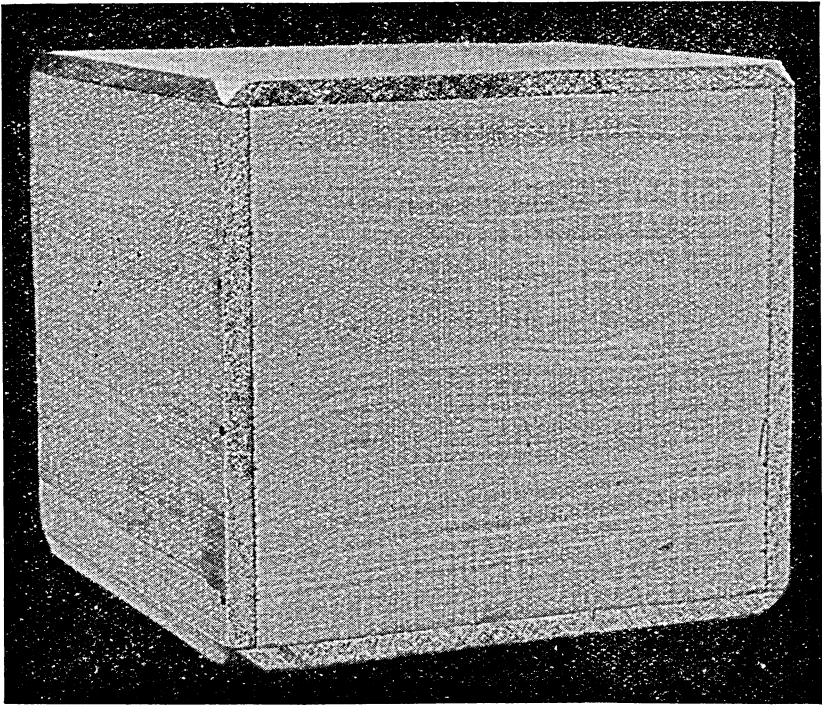
The timbers most favoured for making kegs were tawa or kahikatea, which were prepared for packing by scalding and soaking with brine. A layer of salt was placed in the bottom of the keg, and after being filled with butter, another layer of salt was sprinkled on the top. Or perhaps the head was placed in position, the keg hooped up, a salt brine poured in, and a cork was pushed into the bung hole.

As a butter package, the keg had some serious drawbacks; the greatest being the waste of space when shipped to overseas markets, their unsuitability for stacking, and the difficulty of securing supplies of suitable timber which would not produce mould. Many methods of treating the timber were tried prior to the introduction of vegetable parchment, Pond's patent box being one. This box was treated with a preparation of shellac inside to prevent mould and wood taint. About 1890, vegetable parchment became available, and since that time it has been used exclusively in New Zealand.

Those countries which still retain the keg now use parchment as a liner. From the time that parchment was introduced, boxes have been practically the general container for butter in New Zealand, the oblong shape being generally favoured, except in the Auckland Province, where the cube box (Fig. 1) was used. In

1918 it was decided to make the use of the oblong box compulsory in order to establish it in the minds of buyers as the characteristic New Zealand package, and the only cube boxes used to-day are for special orders for Australia. The cube box being in general use in Australia the requirements of the trade sometimes demand that butter shall be packed in boxes of that shape in order to suit the cutting machines used.

This type of box is also used in Canada for packing butter for export, the regulations also requiring that all boxes shall be waxed.



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FIG. 1. THE CUBE BOX.

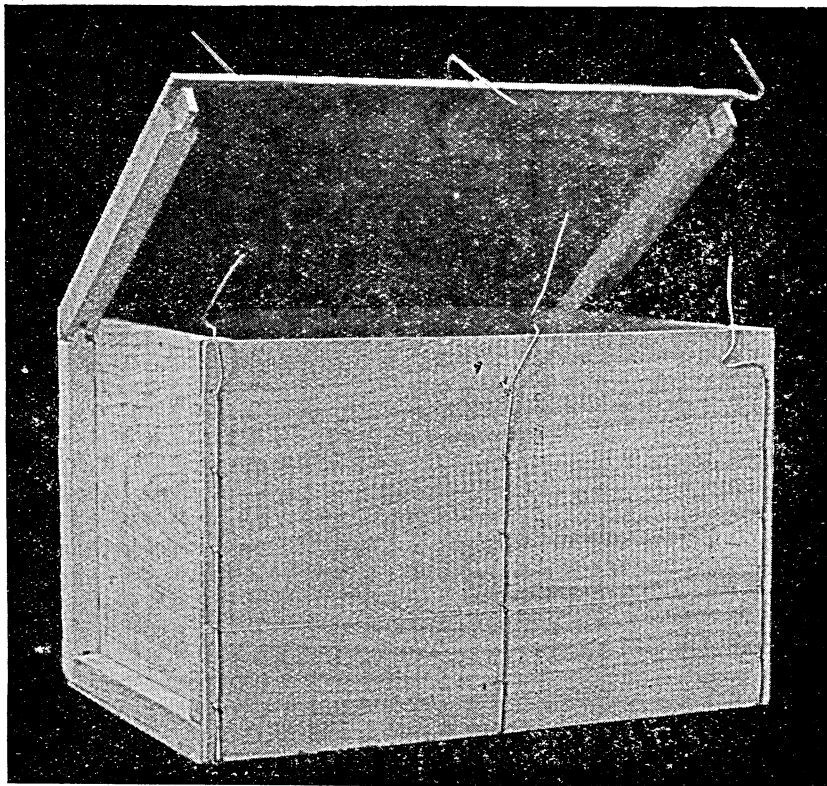
Photo

Measurements: $12\frac{1}{2}$ in. x $12\frac{1}{2}$ in. x $11\frac{3}{8}$ in. deep, inside.
Ends and sides, $\frac{3}{8}$ -in. Tops and bottoms, $\frac{1}{2}$ -in.

Boxes as made when first adopted as a general package were much heavier than those in use to-day. The box used in 1895, as quoted in a publication of that date, had $\frac{3}{4}$ -in. ends and $\frac{5}{8}$ -in. sides. They were carefully finished by sand-papering on a revolving drum, and the lids were for a time screwed on, while hand holes were cut in the ends. Many types of boxes have been used from time to time, some being hollowed to allow the passage of cold air when stacked, but later day developments have all been in the direction of economising in the amount of timber used. The

standard box, as required by regulation to-day, must have $\frac{5}{8}$ -in. ends and $\frac{1}{2}$ -in. sides, tops and bottoms, unless it is made of silver beech, when the ends also may be of $\frac{1}{2}$ -in. timber.

The "Saranac" box (Fig. 2) is the one commonly used in Australia, and more recently in New Zealand. This box is made



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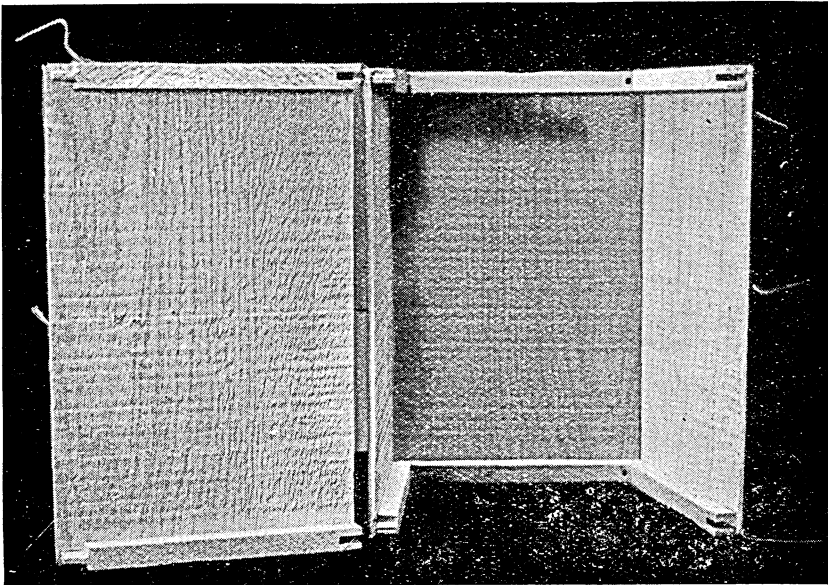
FIG. 2. THE "SARANAC" BOX.

Photo

up from a "mat" (Fig. 3), the sides, tops and bottoms being stapled to the three wires, one at each end and one in the middle, the staples for the last-named having the points turned over. The timber is very light, and to give the necessary strength, cleats are fastened at the ends. These cleats are held by the staples which fasten the wire, pass through the timber and into the cleat. The cleats are mortised and tenoned and are on the outside of the finished box, leaving a plain inner surface when the ends are nailed on to the inner side of the cleats. To assemble the box, the mat is folded over, and the end stapled or nailed to the cleats, and after filling, the wires are twisted and the ends covered with light metal tubing to prevent injury to those handling them. The wire and

staples must be galvanised, otherwise boxes held in stock or store may be found to have the wires rusted through.

So far as handling goes, this box has some advantages, and being of light timber it can be produced at a comparatively low cost. It is doubtful whether it will stand the handling as will the standard box, and it has the disadvantage that, depending as it does on the tension of the wires to keep the edges closed, it frequently happens that the tension is released sufficiently to allow dirt to get in on to the parchment lining.



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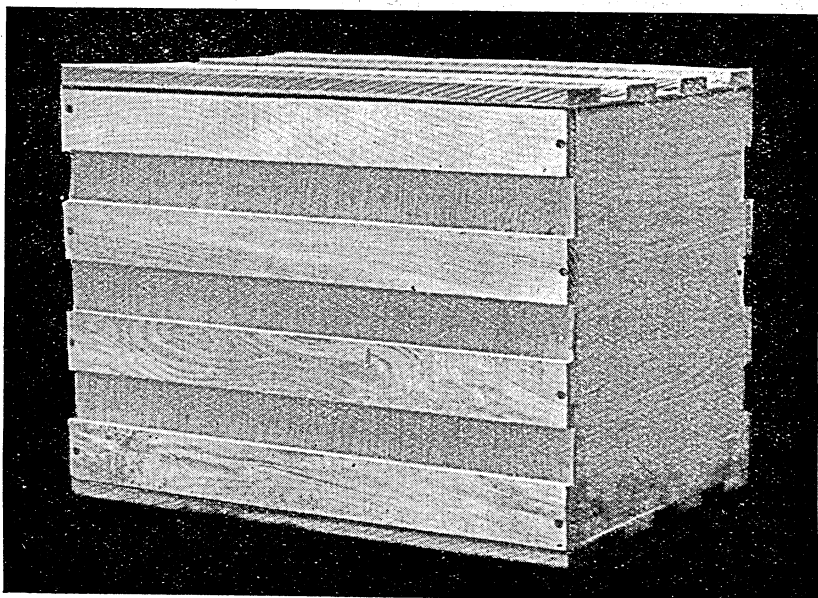
FIG. 3. THE "MAT" FROM WHICH THE "SARANAC" BOX IS MADE UP.

Many factories have been using a box having features common to the standard and "Saranac" box. This is constructed the same as the former, but has $\frac{5}{8}$ -in. ends and $\frac{3}{8}$ -in. sides, tops and bottoms. The top and bottom are not nailed to the sides, and must therefore be of less than full width, as they are held with one strap or two wires, the narrow top and bottom allowing the tension to compress the sides. It must be remembered that bands or wires which are tight when put on in the factory do not necessarily remain so when subjected to the strain of handling, and the low temperature during transit. Half inch ends are not allowed unless the box is made of silver beech.

Experiments have shown that the annealed bindings usually supplied for this purpose are not suitable, as they stretch too easily and release the tension on which the box, in the absence of nails, depends for its strength. This box is allowed only provided the

wires or straps are of approved guage and are not annealed. Experience has also shown that $\frac{3}{8}$ -in. is the lightest timber which can be used for sides, tops and bottoms without danger of its being punctured should the corner of another box fall on to it with any force.

The "Coombs" box (Fig. 4) more recently put on the market, is of still another type. The ends are $\frac{5}{8}$ -in., but the sides, tops and bottoms are made of white pine veneer, strengthened by battens glued on the outside—one batten on each edge longitudinally,



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FIG. 4. THE "COOMBS" BOX.

and two in between. Through these battens the box is nailed, and being on the edge of each piece of timber, the strength of the corners is ensured. The battens may be of timber other than white pine, and short pieces can be used up in their manufacture, thus reducing the cost. If the battens come off, as sometimes happens, the light veneer underneath is liable to twist and open up, exposing the butter to dirt. It is also claimed that the spaces between the battens allows the circulation of cold air during storage, and that the spacing battens used on shipboard are not required. Shooks of timber for this class of box must not be allowed to get damp or they are liable to twist.

The accumulated evidence from overseas markets goes to show that the standard New Zealand box fills the requirements of the

trade better than any container so far brought out, and it is doubtful whether the small saving made by the use of cheaper boxes is not false economy.

This box is made of $\frac{1}{2}$ -in. sides, tops and bottoms, and $\frac{3}{4}$ -in. ends, and measures $15\frac{1}{4}$ in. x $10\frac{1}{4}$ in. x $11\frac{1}{4}$ in. inside, the sides and tops thus being interchangeable timbers.

It is generally accepted that a better timber than kahikatea or white pine for the manufacture of butter boxes has yet to be found. It is clean in appearance, does not soil readily, is light, strong and easily worked, and most important of all, it is, when thoroughly dry, free from any marked wood taint.

Experiments have been conducted from time to time with other timbers, including tawa, poplar, beech, *pinus insignis*, Fiji pine, and others, but none has proved so satisfactory, though some might be used if the necessity arose. They must be available in fairly large areas of one variety if production costs are to be kept down to a minimum.

In 1924 the only serious attempt to find a substitute for New Zealand timber was made. In September of that year the first shipment of box timber of "*picea excelsa*," a white pine from Northern Europe, was landed, and since then a considerable quantity of the butter shipped has been packed in these boxes. Complaints of wood taint have been received from time to time, largely due to inferior quality timber, much of which has not been up to the standard of the samples submitted to buyers, and contains resin pockets and knots which cause the flavour to be imparted to the butter. Waxing on a small scale has been tried to overcome this defect, but the results were not satisfactory, as the butter, after fourteen weeks' storage, showed wood taint. The wax does not seem to adhere to this timber so readily when done by hand as it does to New Zealand pine. Waxing with a hot roller would probably cause it to hold better.

Possibly some of the blame for wood taint is due to inferior quality or too light parchment paper, as one box in this experiment was found to have the taint at one end and not at the other, two different brands of parchment having been used. Numbers of factories have found that no complaints were received when an extra thickness or a heavier parchment was used. A lining made of a light weight cardboard, waxed on one side and placed between the parchment and the wood has also been used with success to overcome this defect in the imported timber.

The "Swedish" box, as it is known, has several defects other than wood taint. It is generally made up of several pieces of timber, some of the joints being simply tongued and grooved and glued. When received at the factory, many of these joints have "started," and if in the ends, the strength of the box is very much reduced. Lock-jointed and glued timber is very much better, as the dove-tailed joint will hold even if the glue gives. The timber

soils readily, and cement-coated or spagged nails must be used, as ordinary nails will not hold in the end grain. The timber also splits very easily, and consequently the percentage of breakages is high.

Small shipments of spruce have been imported for butter box making from time to time, but no great use has been made of this timber. The remarks made in regard to the "Swedish" timber apply also to spruce.

Waxing.—So far as present knowledge goes, the waxing of butter box timber is not so efficient as a means of preventing wood taint as a good quality of heavy parchment. As a preventative of mould, resulting from only partially seasoned timber, it is a useful help, provided it is applied at the right time. If timber which is being made up into shooks at a mill is not perfectly dry it is little use waxing it. The pieces being packed tightly together with a waxed side to a plain side, mould will develop in transit and during storage. When the boxes are made up and lined ready for filling, the mould on the wax will develop when it comes in contact with the moist parchment.

In the Spring of 1916, when supplies of dry timber were scarce, this was carefully tried out and it was found that waxed boxes apparently free from mould when made up, developed it when packed. Even boxes which were lightly scrubbed with a brine solution containing formalin twenty-four hours before using showed mould at fourteen days. In this case the trouble was got over by using double parchment, which had been soaked for twenty-four hours in brine before using. The boxes were also scrubbed with the brine.

Under circumstances which made the use of green timber compulsory, waxing has been proved to be a reliable safeguard if the wax was applied after the boxes were made up. Should there be any doubt about the timber being dry, this precaution should always be taken.

Waxing is usually done in a box factory by running the boards through rollers, one of which is heated, and is revolving in wax. By this method the wax is evenly spread, a minimum quantity is used, and the pressure of the rollers forces the wax into the wood. The extra cost was 1d. per box, but few boxes are waxed to-day, as it has been found that if the timber is thoroughly dry it is unnecessary, and if green it must be done in the butter factory just before packing.

Hand waxing is more expensive and difficult, but is equally effective. A greater quantity of wax is used, and it does not adhere to the box so well. Should it be necessary, place a quantity of paraffin wax in a vessel and heat in a tub of boiling water or over a primus stove. Heat the boxes over a steam jet until thoroughly hot and dry, and brush the wax on with a white-wash brush or paint brush. There are hand waxing plants available, but in an emergency the foregoing plan will serve.

Brands.—One of the first things requiring attention on the formation of a dairy company is the application to the Director of the Dairy Division for his approval of the brand which it is intended to use, and the allotment of a registered number. The number is included in the National Brand, which came into force in November, 1926, with the factory brand immediately above it.

Creamery butter and full cream cheese must be branded by impress brand in black or other approved dark colour, and milled butter, whey butter, dairy butter and dairy cheese in red.

The impress brand was brought from Australia about 1895, and was rapidly adopted by factories. Most of the branding is done in the box factories, but small printing machines are obtainable which are quite satisfactory, and are installed in some butter factories. A fire brand was used at one time, but was too slow and unsatisfactory. It is a wise precaution for every factory to have a stencil brand for use in emergency, as many have found themselves compelled to use one at times.

It is well to note in this connection that while any number of factories under one ownership may use the same brands, each factory must have its own registered number. Also, that the National Brand can be used only on finest or first grade creamery butter, and on full cream factory cheese and standardised factory cheese.

Box Making.—Possibly the greater quantity of butter made in New Zealand is packed in boxes made up in a box factory, most of which are machine-nailed. Of the balance, a large number are also machine-nailed in the butter factories themselves, and in some cases even the lids are machine-nailed. The minority are hand-nailed in the factory, and certain points must be watched if the best results are to be got. Well cut timber requires practically no trimming. It is a wise precaution to match corners at the top of the box, and if necessary, trimming can be done at the bottom, to make the desired true face. In nailing on the bottom, true to one end and nail, then true to the opposite end, thus squaring the box; nail the second end, and then the sides. Five nails at each end are sufficient to fasten the sides, and three at each end and three at each side of the bottom. Nails $1\frac{1}{4}$ -in. x 13 gauge, cement-coated, are quite large enough. A nail driven with one blow of the hammer will not hold so well as the same nail driven with several lighter blows. If driven on the skew it will hold much better than if driven straight. If doubtful on this point make up two boxes, one with straight and one with skew nails, and try to take them to pieces again. Regulation 51 (h) requires that only cement-coated nails shall be used. The driving heats the cement, which is of a resinous nature, and causes the nail to grip. Any difficulty in getting the cement-coated nails to feed into the nailing machine may be overcome by dusting them with powdered soapstone, procurable from an oil and colour merchant.

As sides without a joint are seldom procurable nowadays, care must be taken to see that the joints do not come opposite one another. Even then considerable breakages will occur unless the boxes are wired or strapped, except where the joint is dove-tailed and glued, or has three corrugated fasteners. Ends should always be in one piece.

Parchment.—The introduction of vegetable parchment as a lining for boxes helped very considerably to simplify the problem of a suitable container for butter. There are, however, wide variations in the quality of apparently good parchment.

Formerly, vegetable parchment of the best quality was made from cotton rags, but to-day cellulose is commonly used. The pulping process is the same as with ordinary paper until the "water leaf" stage is reached. It is then passed through a series of baths of strong sulphuric acid of varying strengths, which act upon the fibre of the paper in such a way that it makes it water and grease-proof. It is then washed to remove the acid, dried, and cut into sheets.

The quality of the finished parchment depends, therefore, on the quality of the raw material used, and the thoroughness of the subsequent purifying and manufacturing process.

One of the tests for quality is to soak or boil it in water or brine, treatment which will cause ordinary paper to disintegrate, and will reduce it to pulp. If burned it should leave a whiteish ash. If chewed in the mouth it should be tough and not taste excessively sweet. Some parchment contains an excess of sugar, and this favours the growth of moulds.

The prevention of the growth of mould in parchment has not, up till the present, been a serious matter in New Zealand. Several cases have occurred recently, however, chiefly in pounded butter, and is probably due as much to the condition of the factory in which the butter is made as to the treatment of the parchment.

It may be prevented by boiling the parchment in water for a few minutes before use, or by boiling in a salt solution to which three ounces of formalin per gallon have been added. The boxes are dressed with the damp parchment, from which the excess brine has been wrung out, and though there may be an odour of formalin, it does not seem to have any detrimental effect on the butter. At first sight it may seem to be a difficult job, but in actual practice it is not a serious matter, and in some respects has advantages over the dry parchment. For dressing boxes intended to hold unsalted butter, the formalin solution or boiling water only should be used, in order to avoid causing a higher colour on the outside of the butter.

Under the Dairy Regulation No. 53, it is required that parchment weighing 28-30 lb. to the ream shall be used for lining export boxes, as it has been found that light parchment is not satisfactory.

Box Dressing.—The packing of a box of butter would seem to be a very simple operation, but the number of complaints received from overseas buyers indicate that there is room for much improvement in the work.

A considerable proportion of the butter exported is cut into pats with wire cutters by the retailer, and unless the block when turned out is square at the corners and free from pockets, a lot of re-cutting is necessary, for which the conveniences to do this are not always available. Butter which comes in contact with the parchment usually has a slight woody or stored flavour, and may be a shade different in colour in comparison with the inside of the block; consequently it is a great advantage to be able to cut fifty-six pats from a box without waste. This can be done with wires which cut four layers of 14 lb. each, and only check weighing is then required. This may appear to be a small matter to the person packing the butter, but it is quite important to the one who has to deal with it at the other end.

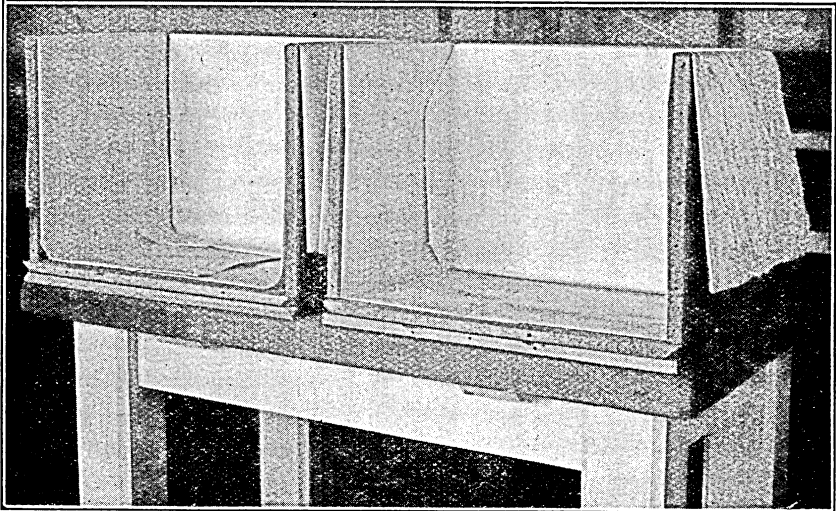
For the same reason the exact standard sized box should be used by all factories. It must be apparent that a machine which is made to cut a block of butter $15\frac{1}{2}$ in. x $10\frac{1}{2}$ in. x $11\frac{1}{2}$ in. will not cut one $14\frac{1}{2}$ in. x $10\frac{1}{2}$ in. x $11\frac{1}{2}$ in. without much waste. A certain amount of inconvenience also arises at this end of the trade in machine packing where the boxes are not uniform in size. A case has been known where a factory had three makers' boxes in use, and all of them different sizes. When the shooks get mixed in such an instance, the confusion can be imagined. Surely this is a matter where absolute standardisation is called for.

Papering the Box.—Good packing starts with the papering of the box. Unless the paper is correctly creased and tucked into the corners, the block of butter when turned out will have rounded corners. Carelessly placed end papers, for instance, will either cause a rounded end corner or the paper must break when the pressure of the machine comes on to it. The first piece of butter put into the box binds the two overlapped end papers. As the pressure comes on, the butter squeezes hard against the ends, thus locking the paper in two places. The result is as stated—a rounded end corner or a broken paper.

The aims in dressing a butter box are to have a double thickness of paper covering the butter at every point; to have no surplus paper at any part of the box; to have an overlap at every joint; to have a neat, attractive appearance when the box is opened up and the butter turned out; to have a dressing which will allow of the butter being inspected by the grader or buyer, either at top or bottom, without lifting more than one piece of paper, and, finally, to have a block of butter, which, when stripped, will have square corners and be free from pockets.

The Cross-over Method.—(Fig. 5a). Taking 20in. x 30in. as the standard sheet of parchment, and remembering that the stand-

ard box is 15½in. long x 10½in. wide and 11¼in. deep, inside measurements, it will be seen that a plain fold and cross-over method of dressing does not allow sufficient paper to completely cover the butter. It can be accepted that there is only one way to fold the end papers, and that gives a double sheet, 30in. long x 10in. wide. One can also agree that it is the best practice to put these sheets



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FIG. 5. TWO METHODS OF PAPERING A BUTTER-BOX.

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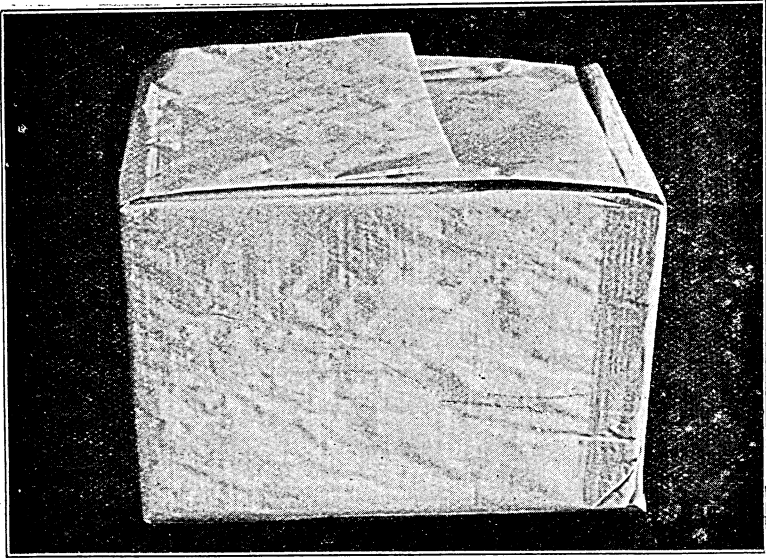
(a) On left: The cross-over method. Note the rounded corners and uncovered wood on back corner at weakest part of box.

(b) On right: The envelope method. Square corners; no tucking required; no exposed wood.

in first. To allow a lap of 2in. in the bottom, crease the end papers by folding at 9½in. from one end. A number of sheets can be folded at one time, and if a block of wood is used to impress the crease it will be found that the paper sits closely into the corners of the box. If this is not done, a rounded corner will result, as previously explained, especially with machine packing, where the papers are prevented by the clamps from slipping down. When folded over on the top of the butter it will be found that there is about the same amount of lap there.

The paper being now folded the opposite way gives a double sheet, 20in. x 15in., which, if placed in the side in the same manner as the end, cannot possibly be made to completely cover the butter at the corners and provide a lap as shown in Fig 5a. At tops and bottoms, however, there will be an unnecessary lap of over four inches, giving four thicknesses of parchment over nearly the whole of the butter. To overcome the lack of lap in the corners it is a practice to fold short, thereby getting a sheet 20in. x 16in., which gives a short lap in the corner. Since two inches of a

sheet folded in this manner must be single, it follows that a portion of the butter in two corners must be covered with only one thickness of the paper (Fig. 6). When the box is opened up, these two methods give a most untidy package, and at least two sheets must be lifted in order to examine the butter. The only thing that can be said in favour of the cross-over method is that it is quick.



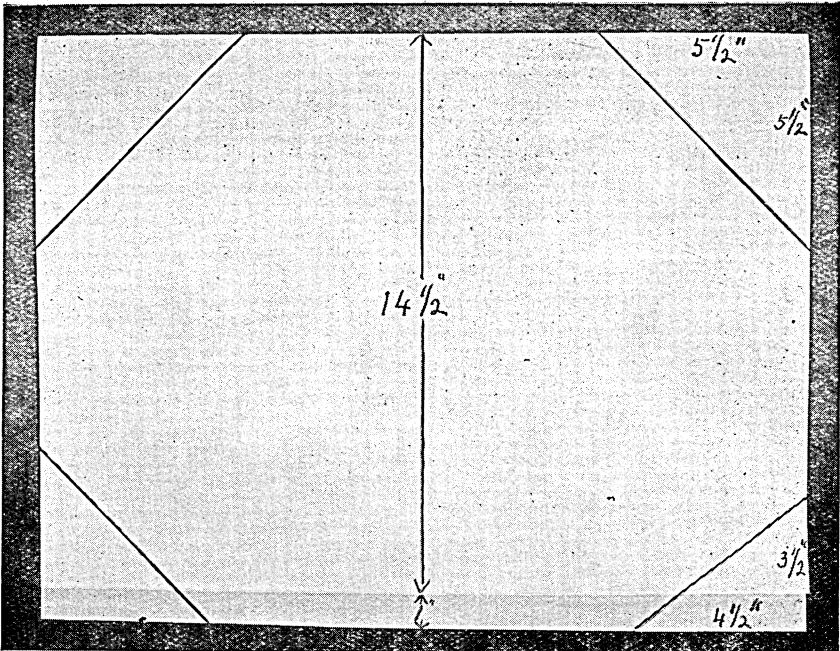
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FIG. 6. BLOCK TURNED OUT OF BOX BADLY DRESSED BY CROSS-OVER METHOD
Note single parchment corners, and loose ends, giving an untidy appearance.

The Envelope Method.—By placing the 20in. x 15in. sheet in the box in the opposite way, over two inches of lap can be obtained in the corners, $\frac{3}{4}$ -in. in the bottoms, and 3in. at the top (Fig. 5b). There are many variations of this method, but it is undoubtedly superior to the cross-over method, however it may be done. Probably the most common practice is to fold over the corners at the top of the sheet and tuck the bottom corners. Neat tucking is seldom seen, however, and the result is an untidy bunch of crumpled paper, which is very unsightly when turned out. To save the time in folding the corners, and the necessity for tucking, it is better to cut both these corners off, and if the sheet is folded unevenly in the first place, as shown in Fig. 7, there will be more lap available at the bottom and sufficient at the top for the packing machine clamp to grip. The short side of the folded sheet is placed against the butter in this case. The longer side will then overlap it, and also adhere to the butter, leaving no loose ends (Fig. 8).

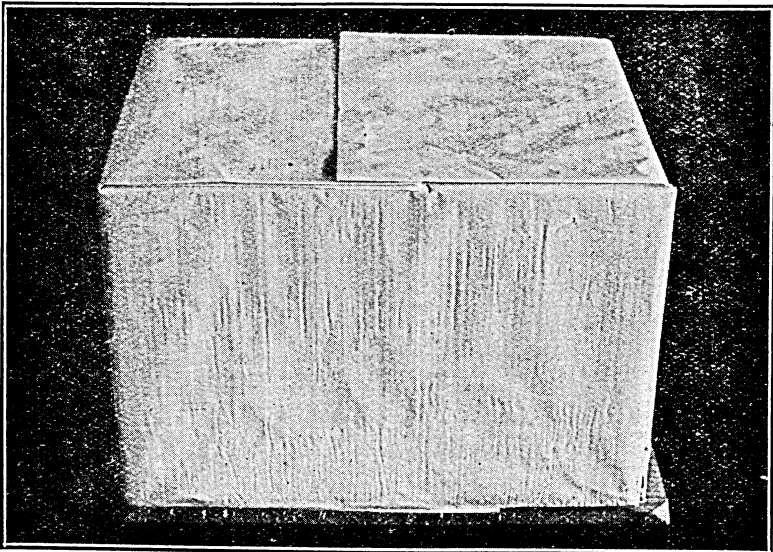
Boxes dressed in this way will conform to the requirements previously stated, and when the butter is turned out the whole



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Photo

FIG. 7. SHOWING ARRANGEMENT OF PAPER FOR ENVELOPE METHOD.
Side papers folded short. Corners to be cut off on lines drawn in diagram.

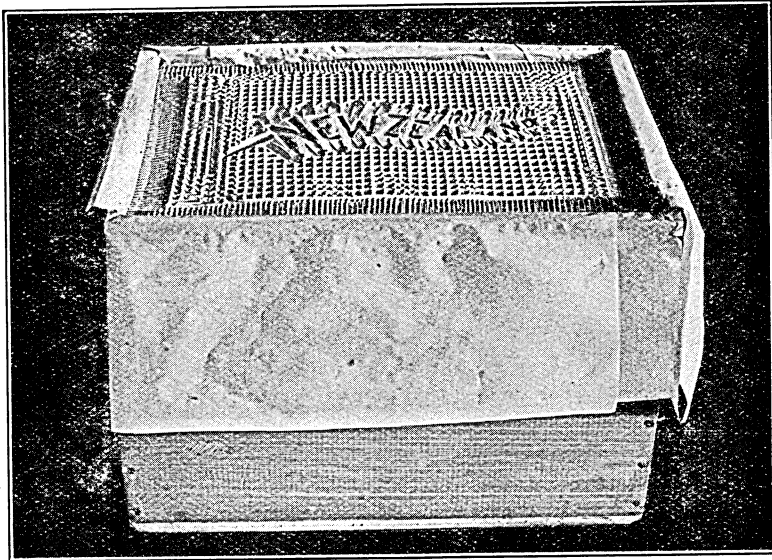


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Photo

FIG. 8. BLOCK TURNED OUT OF BOX WELL DRESSED BY ENVELOPE METHOD.
Note double parchment over all surfaces, and no loose ends.

of the paper will be adhering to it, and present no difficulty if the box has to be put back on to the block of butter, as there will be no loose ends. The measurements may require to be adjusted to suit boxes to a certain size. The cutting of such an amount of parchment entails much waste, but this is justified by the time saved and the neat result attained. Too much paper always makes



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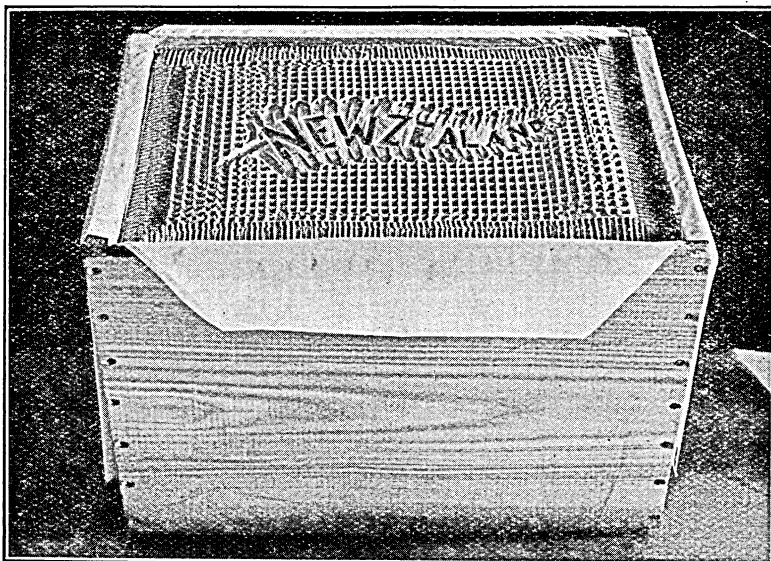
FIG. 9. BADLY-DRESSED BOX (CROSS-OVER METHOD), SHOWING A POOR FINISH

a poorer parcel than just enough, and there is no reason why parchment for butter packing should not be cut by the makers into the shape required, and so save the labour of all folding. The cube box was dressed with a 12in. x 48in. sheet, and if double parchment was required, one sheet was put round the four sides on its edge, and no cutting or folding was required.

The best method to follow if cutting the sheets in this manner is to make a wooden guage the size of the folded sheets. Stack the sheets on a bench and place the guage on top, then cut off the corners with a sharp knife, or with a hammer and a broad sharp chisel. Finished boxes dressed by these two methods are shown in Figs. 9 and 10.

One of the earliest methods of dressing butter boxes was to have envelopes made which just fitted the box, and from the packer's point of view they were very satisfactory. The drawbacks were the expense and the difficulty of finding a paste that would not develop mould. It was also found that two thicknesses of parchment gave better results. These envelopes may again come into use with the packing machines now on the market—which mould the block of butter in the same way as a pounder shapes pats.

The general care of parchment in factories leaves room for a good deal of improvement, and should receive more attention, even if only as a safeguard against butter-moulds. The cover should be left on the opened ream while it is being used, and if mould trouble occurs, soak the parchment in brine-formalin solution.



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FIG 10. WELL-FINISHED BOX, CORRECTLY PAPERED BY THE ENVELOPE METHOD.

Weighing.—Butter which has been churned at a low temperature and has been lying on a table long enough to set, presents no little difficulty in cutting it into pieces of convenient size for packing. Much labour can be saved by cutting with a wire across the rolls in lengths to suit the box. This can be done either on the table or by laying the wires across the unloading truck before it is run into the churn. The old method of weighing the empty box, filling it with butter, and then re-weighing, is now seldom seen. Experience has shown that more accurate weights are obtained by weighing the butter before packing.

A careful man at the scales is a valuable employee, and the check weighing from some factories would be a revelation to others not so fortunate. Although scales of a very old type which have seen over twenty years' service are in use to-day in some factories, no fault can be found with their weights.

Provided two correct 56 lb. weights are available, or even one in some cases, any scale can be adjusted to weigh off 56 lb. of any commodity correctly, even if they are incorrect at other weights. Having adjusted the scale, it is then only a matter of care to keep

the weights right. Admitting that the amount at stake warrants the provision of the best of appliances, expensive appliances do not ensure correct work unless care is taken in using them. The man doing the work counts for more than an elaborate scale.

Many mistakes in weighing are the result of butter sticking to the scale platform. This can be avoided by covering the platform with a damp sheet of parchment.

Packing the Butter.—Where large numbers of boxes are being packed by hand—an unusual case, nowadays—a solid bench with a clamp and wedges will save a lot of trouble and get over the very serious objection of putting the ends in first when hand-ramming, as it will hold the side papers in position and leave both hands free to handle the rammer.

The greatest mistake in packing, either by hand or machine, is putting too much butter into the box at a time. The misguided efforts of packers to put 56 lb. of butter into a box in one piece indicate that they have not a grasp of their work. The butter should be divided into at least three pieces, and be roughly moulded to the shape of the box. Ram carefully round the sides, especially the first piece, paying special attention to the corners. If the first piece is not rammed solid, no amount of ramming of the second piece will make it so.

Machine packers have now come into almost general use, largely as the result of the firm body generally aimed at by New Zealand butter-manufacturers. They save a lot of hard work, and if used intelligently, make a better job than average hand-packing. As at present constructed, they leave considerable room for improvement in their design.

The greatest weakness of the machines is the want of provision for easy adjustment of the thrust. Everyone who has handled butter knows that, in common with other substances, its volume varies with its temperature. The packer should therefore be adjustable to allow of the thrust being set to suit the condition of the butter. Except in those factories which pack for city sale, where the pounding is done with wire cutters, the pressure on the machine is generally too light, and consequently pockets are left in the butter. Butter in the condition in which it is packed—that is before it sets—has considerable elasticity and allows quite a margin for the pressure which may be exerted on it. As at present constructed, the only way to increase the pressure is to remove the head and place a piece of board between the wood and the casting. If the board is placed under the box, it raises the latter too high, and the hoppers will be out of alignment and will not fit down into the box while the head will jam as it comes down.

A little experimental work will show the pressure necessary to ensure good packing. A box-lid may be cut to fit the hopper, and placed on top of the butter in the hopper, after which the packer is set in motion. The butter is then turned out on to a

table to see whether it is well packed. If not, a thicker piece of wood may be tried.

As with hand packing, it is a mistake to put the butter into the hopper in one piece. It should be cut into at least three pieces, and care should be taken that the last piece is the largest and presents a smooth surface to the head of the packer. This will give a good finish, requiring very little smoothing off by hand. Care should also be taken that all the butter belonging to the box goes into it.

The Benhil Butter Moulder, which has recently come into use, introduces a new method. Its construction is similar to that of the pounding-machine by the same makers. In a box, the front portion of which is covered, there are two spindles. On the spindles are mounted two spiral flanges, one a right spiral and the other a left. The butter is placed in the open portion of the box, and the action of the flanges forces it out through the opening in the front of the box on to rollers, where it is cut off with wires in the same way as pound pats are cut. The rollers are then lowered to the level of a second section of rollers on the scales on to which the butter is conveyed. Here the weight is adjusted and the butter passed on to a third section of rollers, where the parchment, already suitably cut, is placed on the block of butter—the sides first and then the ends. The block is slightly smaller than the box, which is now slipped on to it, turned over, and finished in the usual way. The size of the block can be adjusted and the machine controlled in the same manner as a pounding machine. Provided the butter is in proper condition, the block as turned out is square on the corners and free from pockets, and with ordinary care the weights should be correct.

Finishing.—Assuming that the box is always opened at the top (which is not always the case, and therefore, the bottom is equally important), the impression given by the appearance of the package when the lid is lifted will always be favourable—or the reverse—and have a bearing on the attitude of the buyer. A slovenly finish will incline the buyer to assume that the same carelessness has been displayed in manufacturing the butter and that the quality corresponds. Corners not filled, or an uneven surface on the butter, will indicate to him that the butter will not cut-up well.

Having filled and rammed the box, smooth off with a trimmer, not with a pat, and roll with the National Brand roller. Wipe the top edge of the box with a damp cloth to remove any pieces of butter, and fold over the side papers, then the end papers. By following this order an end paper may be lifted to examine the butter without disturbing the rest of the covering.

Place the lid on the box and true it at one end and nail. True to the other end and nail, thus squaring the box; then nail the sides. Three nails in each end and two in each side are sufficient. In a large factory, a nailing machine will be worth its cost, and save a man,

As stated, $\frac{3}{8}$ -in. boxes should have no nails in the sides. Careless nailing is quite a serious defect, as lids and bottoms with an overhang may be wrenched off while being handled. Nails driven into the butter will cause rust marks, and if sticking out of the wood may tear someone's hands.

Marking.—After the lid is nailed down, or after the whole churning is packed, each box must be marked with the number of the churning and the day of the month in letters not less than three-quarters of an inch high. These marks are for the purpose of enabling the grader to have the one box from each churning required for grading picked out on arrival at the grading stores. Care must therefore be taken to alter the stamp between churnings, or some boxes from the next churning may be wrongly marked. Should either churning be graded second, the number of boxes so marked will not be correct. It is a good plan to tally each churning as it is packed, enter the number of boxes on the manufacturing sheet, then alter the stamp and take an impression of the new marking on the sheet opposite the space in which the number of boxes from the next churning will be entered. This ensures that the stamp is changed before a start is made to pack the next churning. By this means, a correct tally of the day's make will be kept, which will simplify the preparation of advice notes for the grader and the agents to whom the butter is being consigned.

For the purpose of grading, one box of butter is taken from each churning, and from these a number equal to four per cent. of the consignment is weighed. Thus each box weighed is from a different churning, and gives a good indication of the accuracy of the weighing in the factory. These check weighings are marked on the grade note, and should be carefully noted when it is received. Any serious irregularity is remarked on, and if very bad, a covering letter is also sent drawing attention to it, whether under or over weight.

Each box of butter must be branded with the net weight of the contents, usually 56 lb., but should the box be so marked and contain less or more than the weight stated, the grader has the power to refuse permission for such boxes to be exported, and may prosecute the owner for attempting to do so, or require that they be re-conditioned.

For convenience of handling, all butter, when weighed, includes parchment. The weight of the parchment paper is deducted and the net weight is recorded on the grade note. The custom in Great Britain is to weigh net, that is, without the parchment, and the block of butter must bring the beam down past level. In other words, it must more than balance the 56 lb. weight on the opposite side of the scale. Should the scale just balance level, the first box is taken as full weight, but the next one to just balance is recorded as four ounces short. Should the butter be two ounces

short, it is recorded as 55 lb. 8 oz., since nothing less than a quarter of a pound is recognised. Should the butter weigh 56 lb. 4 oz., on the other hand, no credit is given, as no overweight is recognised.

In order to ensure correct weight in Great Britain, and allow for shrinkage en route, a little more than net weight must be allowed. Before the advent of the combined churn and worker, the margin allowed was 56 lb. 12 oz., including parchment. With the circular butter-worker it was almost impossible to make butter which did not show free moisture, especially before the refrigerator came to be looked upon as one of the necessary units in factory equipment. It was no uncommon thing to see moisture running out of the boxes, hence the comparatively high allowance for shrinkage.

Present day methods of butter-making have overcome this defect, and check weighing of the same boxes made in New Zealand and Great Britain have shown that well made butter does not lose more than one ounce per box in transit.

During the currency of the commandeer, 56 lb. 6 oz. was accepted as full weight, but it is probable that at that time the average weight of the parchment used was considerably less than it is to-day.

Since the use of foreign timber and of lighter New Zealand kahikatea became common, it has been thought wise to insist on the use of a heavy parchment, weighing 28-30lb. to the ream, and four sheets of this quality weigh almost four ounces. Weighings of the four sheets which have been made after they have been stripped from the butter have shown that the weight has been as high as seven ounces, the extra weight consisting of moisture absorbed from the butter and butter adhering to the parchment.

To ensure that the buyer shall receive 56 lb. net it has been found necessary to adopt 56 lb. 2 oz. as the net weight which must be allowed; net weights are now being shown on grade notes.

As a check on the work being done in the factory, it is good practice to turn out a few boxes at intervals, and note the packing, check the weights, etc., and generally keep informed of the condition of the butter as it reaches the buyer.

Regulations.—Regulations dealing with the packing of butter for export may be found on page 17 of the General Regulations under the Dairy Industry Act, Clause 41, etc., and are, briefly, as follow:—

41. (1) Churning numbers and dates to be placed on both of the box with a rubber stamp or stencil. Letters to be not less than three-quarters of an inch, nor more than one inch in height.

(2) Milled butter ditto, the number indicating each milling.

42. (1) Registered brand to be used.

(a) Brand to be impressed.

(b) Brand to be the one applicable as shown in forms 5-10, pages 29, 30, 31.

43. Net weight to be marked on both ends of the box.
44. Brands of milled butter, whey butter, dairy butter, dairy cheese to be red in colour. Other dairy produce, some other dark colour.
45. Both ends of boxes and crates containing first or finest grade creamery butter and full cream or standardised cheese to be branded with the National Brand.
46. Other grades of this class of produce must have National Brand cancelled.
47. National Brand to be used in conjunction with other marks and brands.
48. National Brand shall be dark in colour.
49. Design of National Brand, Schedule 11, page 32.
50. It shall not be lawful—
- (a) For the owner to place his brand on any produce except that manufactured by him.
 - (b) For the owner to allow any other person to place his brand on any produce except that manufactured by him.
 - (c) For the owner of an unregistered dairy to use any of the terms New Zealand, Creamery, Factory, Dairy, Whey, to brand his produce.
 - (d) and (e) For the owner of a registered dairy to use any word or term to describe his produce except the brand as approved.
51. Standard Export Butter Boxes:—
- (a) 15 $\frac{1}{8}$ in. x 10 $\frac{1}{4}$ in. x 11 $\frac{1}{4}$ in., with sides, tops and bottoms $\frac{1}{2}$ -in.
 - (b) 15 $\frac{1}{8}$ in. x 10 $\frac{3}{8}$ in. x 10 $\frac{7}{8}$ in., with sides, tops and bottoms less than $\frac{1}{2}$ -in.
 - (c) Ends, except "Saranac" boxes, $\frac{1}{2}$ -in. silver beech, all other timbers $\frac{5}{8}$ -in.
 - (d) Outside measurements and binding as approved.
 - (e) All timber single pieces or glued and lock-jointed instead of gluing, three corrugated fasteners 1in. x $\frac{3}{8}$ -in. may be used.
 - (f) Timber dressed outside, fine sawn inside.
 - (g) Timber must be dry and sound, free from knots and resin pockets.
 - (h) Only cement-coated nails may be used.
 - (i) Boxes must be kept clean.
53. Two thicknesses of 28-30 lb. parchment, free from loading, with glucose or other soluble matter must be used.

Photos by Staff Photographer, Department of Agriculture.
Blocks 5 to 10 lent by Government Printer,