

The Wooden Box and Crate Industry's
Recent Progress and Present All Out
Support of World War II.

by
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Objective of the Thesis.

The purpose of this report is to review the progress made by the Wooden Box and Crate industry within the past decade.

The improvements made in wooden containers by the leaders of this industry will be presented, these improvements being the base that will prove how the wooden crate and box industry has out distanced all other types of competing packaging.

The worthiness of this topic as a thesis is justified when one considers that the wooden box and crate industry is the second largest consumer of lumber in the United States, following the building and construction industry.

The manner in which the Wooden Box and Crate industry has risen to serve the country in providing the necessary containers for the war industries is also considered in this thesis.

The prime objective of the thesis is to show how the Wooden Box and Crate industry has led the container field, how it is still leading all types of packaging in the present war effort, and how the Wooden Box and Crate industry will lead the way in the container field after the war.

Western Pines and other Box Material.

When one considers wooden boxes, one first thinks of the prominent part played in this industry by the Western Pines. The Western Pine region extends westward from the Rockies to the dividing ridges of the Cascade and Sierra-Nevada mountains, and north and south from Canada to Mexico. The forest in this region are found in the mountainous and higher plateau country. This region covers more than 122 million acres containing 637 billion board feet of saw timber. This supply would last 150 years without replacement at the present rate of cutting.

Pine makes an excellent wood for boxes and crates because of its light weight and its property of strength, especially to shock resistance. It is easily worked, yet free from excessive warping. Pine can be nailed easily and is resistant to splitting. It is also able to take printing and be labeled well.

The Western Pines consist of Idaho White Pine, Ponderosa Pine, and Sugar Pine. These species provide the raw material for the boxes and crates in shook form which are used all over the United States for the numerous varieties of fruit and vegetables. The present day transportation facilities make it possible to deliver car-load shipments to Middle-western and Eastern states within a few days.

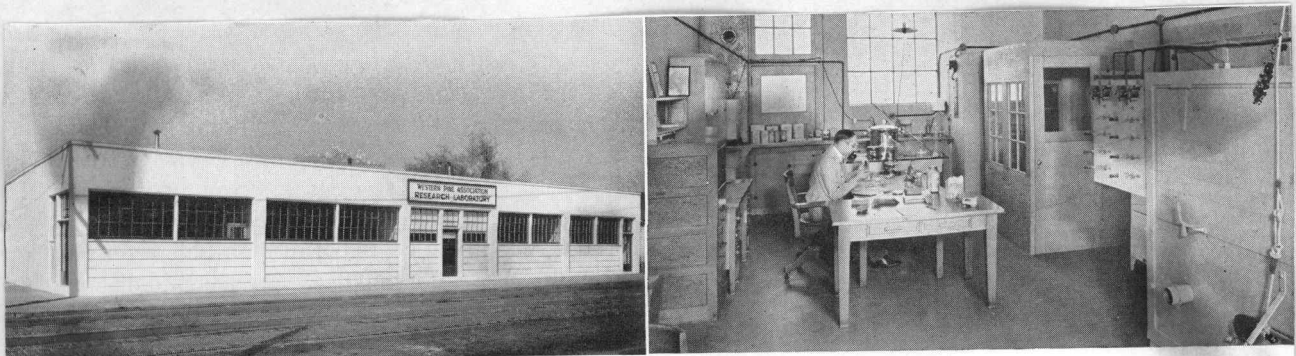
Growers and shippers of quality produce effect savings and increased returns by the use of wood boxes and crates

because of the savings on handling, storage, and minimized bruising of produce. The increased returns are the result of better condition and appearance of produce upon delivery to the buyer.

One of the institutions which greatly aids the use of Western Pines is the Research Laboratory of the Western Pine Association pictured below.

Continual experiments and tests are conducted to perfect the uses of Western Pines by this institution.

Research Laboratory of the Western Pine Association



Research Laboratory of the Western Pine Association which constantly is working to improve the quality and serviceability of Ponderosa Pine.

Plywood Container.

Wooden boxes are keeping right up with all forms of competition by combining wood and paper or wood and steel in their construction. Interior packing or floating through the use of sponge rubber or fibreboard is another method used by wooden boxes to provide a container equally as good, if not better, than those of competitors. Another development is the perfecting of high speed box and crate assembly equipment which still further opens up the market for nailed wooden boxes and crates.

The field of plywood containers is one that will greatly aid the wooden box industry. By being able to use plywood as thin as 3/30 of an inch it is possible for plywood to compete with fibre boxes upon a weight comparison. Plywood boxes can also be made sturdy enough to be used in exporting five-ton tractors.

Substituting the strength of wire for the strength of wood box manufacturers have developed the all-bound box. This provides for the re-inforcing of all faces on the all-bound box. This allows sufficient strength for carrying heavy loads in light-weight boxes.

The future of the new plywood shipping container appears to be good as judged by the acceptance of these containers for freight shipments in box cars and by truckers.

Plywood has found its widest use in the larger containers for packaging refrigerators, stoves, radios, furniture and dry goods. It is also being used for export shipments

of foods and meat as it can withstand rough handling and also affords protection against insects and rodents.

Barrels and drums made of plywood are being used to pack potatoes and apples. This is due to their lightness and because they last long. This type of barrel is manufactured without the bilge and so is very easily packed for shipment or storage.

Requisites of a Shipping Container.

A shipping container to be satisfactory must protect the product for which it is designed at a minimum cost and be as light in weight as possible to assure minimum transportation charges.

Another essential factor is the abundance and reasonable cost of the wood. An excellent box material should meet the following requirements:

1. Available in quantity at reasonable price.
2. Strong for its weight and resilient.
3. Nail easily without splitting.
4. Easily manufactured.
5. Stay in place.
6. Light in color.
4. Mill smoothly.
8. Free from objectionable taste and odor.

Crating material should meet the same requirements except that strength will have to be given more consideration.

The fact that nearly 15% of the total annual lumber

production is used in the manufacture of sawed wooden containers is not so significant that much of the lumber used in making these containers is an unavoidable "byproduct" in the form of low grade lumber not suitable for commercial purposes. In this manner the wooden box and crate industry have great conservation aspects on the lumber industry. This utilization of waste products also helps to reduce the price of the higher grades of lumber by absorbing a portion of the cost.



**STANDARD
GRADING RULES**

for

PINE BOX SHOOK

Effective February 1st, 1937

For

Western Area

**Published by
NATIONAL WOODEN BOX
ASSOCIATION
Pacific Division
San Francisco, Calif.**

FIRST REPRINT 3-1-38

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First reprint
March 1, 1938
(corrected to date)

Adopted as exclusive Box Shook Grading Rules authority by Pacific Division, National Wooden Box Association, Jan. 12, 1938.

Standard Grading Rules for Pine Box Shook Effective February 1st, 1937

INTRODUCTION

The following rules for the grading of pine shook were adopted by the Pacific Division of the National Wooden Box Association upon recommendation of its Grading Rules and Specifications Committee, November 19, 1936.

The purpose of grading rules for box shook is to maintain uniform standards among shook manufacturers, and to serve as a guide to buyers by establishing the standard of quality to be looked for in each commodity used.

It is assumed in establishing these rules that all shook will be dry and properly manufactured; that is, accurately and squarely cut to exact sizes within the limits of toleration provided for in the specifications, smoothly and uniformly resawn, and special work when ordered, such as printing, beveling and hand-holing be clearly and neatly done. Also, that all shook will be tied in tight bundles and when shipped in freight cars, be evenly loaded in clean cars.

GENERAL GRADING INSTRUCTIONS

(a) Box shook is manufactured and graded specifically for the purpose intended. The appearance of shook has been carefully considered in writing these rules. STAIN. Stain does not damage the strength of the wood. Black stain is only permissible in market lug shook.

(b) The term defect includes knots, checks, dry rot, pitch, mill rough and cross-grain. This term is somewhat misleading as applied to shook for the reason that such defects as are allowable, if properly placed, do not affect the quality of the piece for the purpose intended.

(c) Red Knots $\frac{1}{2}$ " or less in diameter, shall not be considered a defect in any shook, provided they do not interfere with nailing; therefore, in such items as call for Clear stock, it is understood that a Red Knot $\frac{1}{2}$ " or less in diameter is permissible.

(d) The following is a list of DEFECTS commonly found in box lumber:

- (1) **KNOTS.** There are three kinds of Knots—Red Knots, Black Ring or Loose Knots, and Spike Knots.
- A. **Red Knots**—The Red Knot is firmly embedded in the wood and does not necessarily weaken the piece.
- B. **Black Ring Knot**—The Black Ring or Loose Knot is one which is apt to fall out during the course of manufacture.
- C. **Spike Knot**—The Spike Knot is one which runs crosswise of the grain, and is one of the most serious defects found in shook.
- (2) **CHECK.** A Check is a slight break in the texture of the wood and if not placed carefully, is a serious defect.
- (3) **DRY ROT.** Dry Rot or Dead Wood is the first stage of decay, and wood of this type is lacking in strength and can be used only in parts of a box which do not carry excessive strain.
- (4) **CROSS-GRAIN.** In speaking of Cross-grain, we mean the grain which runs through the thickness of the piece instead of lengthwise. This is a very serious defect, as a piece of this type will not stand any strain whatever.
- (5) **PITCH AND PITCH POCKETS.** Pitch is a mass formation of sap and is one of the hardest defects to place when manufacturing shook.
- (6) **MILL ROUGH, BARK AND WANE.** These are manufacturing defects and should not appear in well-manufactured shook.

(e) In the following rules no defects which weaken the piece or knots not well placed away from nailing edges are permissible. These rules are for standard specifications of shook in each class, since it is not practical to list every specification. Therefore, the size of knots shall increase or decrease in proportion to the size or width of the piece.

(f) Box shook is divided into two general groups which may be termed "Fruit and Vegetable" and "Industrial" shook.

(g) For convenience in grading shook, the fruit and vegetable commodities have been divided into individual classifications:

APPLE—CALIFORNIA

Not to exceed 15% of shook may contain stain.

Ends $9\frac{3}{4}$ " in width. May contain:

No. 1. One red knot 2" in diameter and one black ring knot $1\frac{1}{2}$ " in diameter,

or

No. 2. One red knot 3" in diameter,

or

No. 3. Any number of small red knots smaller in size than the smallest of those described above.

Sides $9\frac{3}{4}$ " in width. May contain:

No. 1. One red knot 3" in diameter,

or

No. 2. One red knot 2" in diameter and two black ring knots 1" in diameter,

or

No. 3. One red edge knot not to exceed 3" across face,

or

No. 4. Three black ring knots 1" in diameter, and two $\frac{3}{4}$ " in diameter.

Tops and Bottoms $5\frac{1}{4}$ " in width. May contain:

No. 1. One red knot 2" in diameter,

or

No. 2. Two black ring knots 1" in diameter.

APPLE—NORTHWEST

Not to exceed 15% of shook may contain stain.

Ends 10½" in width. May contain:

No. 1. One red knot 2" in diameter and one black ring knot 1½" in diameter,

or
No. 2. One red knot 3" in diameter,

or
No. 3. Any number of small red knots smaller in size than the smallest of those described above.

Sides 10½" in width. May contain:

No. 1. One red knot 3" in diameter,

or
No. 2. One red knot 2" in diameter and two black ring knots 1" in diameter,

or
No. 3. One red edge knot not to exceed 3" across face,

or
No. 4. Three black ring knots 1" in diameter, and two ¾" in diameter.

Tops and Bottoms 5¼" in width. May contain:

No. 1. One red knot 2" in diameter,

or
No. 2. Two black ring knots 1" in diameter.

ARTICHOKE

Not to exceed 15% of shook may contain stain.

Ends 9¾" in width. May contain:

No. 1. One red knot 2" in diameter and one black ring knot 1½" in diameter,

or
No. 2. One red knot 3" in diameter,

or
No. 3. Any number of small red knots smaller in size than the smallest of those described above.

Sides 9¾" in width. May contain:

No. 1. One red knot 3" in diameter,

or
No. 2. One red knot 2" in diameter and two black ring knots 1" in diameter,

or
No. 3. One red edge knot not to exceed 3" across face,

or
No. 4. Three black ring knots 1" in diameter, and two ¾" in diameter.

Bottoms 5¼" in width. May contain:

No. 1. One red knot 2" in diameter,

or
No. 2. Two black ring knots 1" in diameter.

ASPARAGUS

Ends 10½" in width. May contain:

No. 1. One red knot 2" in diameter, and one black ring knot 1½" in diameter,

or

No. 2. One red knot 3" in diameter,

or

No. 3. Any number of small red knots smaller in size than the smallest of those described above.

Sides 3¾" in width. May contain:

No. 1. One red knot 1" in diameter,

or

No. 2. One black ring knot ¾" in diameter.

Side Slats 1⅞" in width. Must be clear and free from cross-grain.

Tops. Must be clear and free from cross-grain.

Cleats. Must be clear and free from cross-grain.

Bottoms 5¾" in width. May contain:

No. 1. One red knot not to exceed 1½",

or

No. 2. One black ring knot not to exceed ¾" in diameter.

Bottoms and Centers Only. May contain stain and light pitch.

Both **ends and centers** of pyramid asparagus must have four good nailing edges.

(Attach to Page 8, Apr. 5, 1938.)

AVOCADO LUG

Ends 4¾" in width. May contain:

No. 1. One red knot 1½" in diameter,

or

No. 2. One black ring knot ¾" in diameter.

Sides 3¾" in width. May contain:

No. 1. One red knot 1" in diameter,

or

No. 2. One black ring knot ¾" in diameter.

Tops. Must be free from knots and cross-grain.

Cleats. Must be clear and free from cross-grain.

Bottoms. May contain:

No. 1. One red knot not to exceed 1½",

or

No. 2. One black ring knot not to exceed ¾" in diameter.

Bottoms Only. May contain stain and light pitch.

BASKET CRATE

Ends 4¾" in width. May contain:

No. 1. One red knot 1½" in diameter,

or

No. 2. One black ring knot ¾" in diameter.

Sides 3¾" in width. May contain:

No. 1. One red knot 1" in diameter,

or

No. 2. One black ring knot ¾" in diameter.

Side Slats 1⅞" to 2" in width. Must be free from knots and cross-grain.

Tops. Must be free from knots and cross-grain.

Cleats. Must be free from knots and cross-grain.

Bottoms 5¾" in width. May contain:

No. 1. One red knot not to exceed 1½",

or

No. 2. One black ring knot not to exceed ¾" in diameter.

Bottoms Only. May contain stain and light pitch.

BERRY

Ends $4\frac{3}{4}$ " in width. May contain:

No. 1. One red knot $1\frac{1}{2}$ " in diameter,

or

No. 2. One black ring knot $\frac{3}{4}$ " in diameter.

Sides $3\frac{3}{4}$ " in width. May contain:

No. 1. One red knot 1" in diameter,

or

No. 2. One black ring knot $\frac{3}{4}$ " in diameter.

Side Slats $1\frac{1}{4}$ " to 2" in width. Must be free from knots and cross-grain.

Tops. Must be clear and free from cross-grain.

Cleats. Must be free from cross-grain.

Bottoms $5\frac{3}{4}$ " in width. May contain:

No. 1. One red knot not to exceed $1\frac{1}{2}$ ",

or

No. 2. One black ring knot not to exceed $\frac{3}{4}$ " in diameter.

Bottoms Only. May contain stain and light pitch.

CANNERY—DOMESTIC OR EXPORT

FISH; FRUIT; HONEY

MILK; OIL; VEGETABLE

No stain permissible.

Ends $9\frac{1}{2}$ " in width. May contain:

No. 1. One red knot $2\frac{1}{2}$ " in diameter,

or

No. 2. One or two black ring knots not to exceed $\frac{3}{4}$ " in diameter,

or

No. 3. Two red knots $1\frac{1}{2}$ " in diameter.

Sides, Tops and Bottoms $9\frac{1}{2}$ " in width. May contain:

No. 1. One red knot $2\frac{1}{2}$ " in diameter,

or

No. 2. One or two black ring knots not to exceed $\frac{3}{4}$ " in diameter,

or

No. 3. One red edge knot not to exceed 3" across face.

CANTALOUPE

Not to exceed 15% of shook may contain stain.

Slats $\frac{3}{8}$ "x $1\frac{7}{8}$ ". Must be clear and free from cross-grain.

Corner Posts $1\frac{1}{4}$ "x $1\frac{7}{8}$ "x12" cut triangular. Must be clear and free from cross-grain.

Head Rails $2\frac{7}{8}$ " in width. May contain:

No. 1. One or two small knots not to exceed $\frac{3}{4}$ " in diameter,

or

No. 2. One edge knot not to exceed 2" across face or $\frac{3}{4}$ " in depth.

Head Panels $4\frac{7}{8}$ " in width. May contain:

No. 1. One red knot not to exceed $1\frac{1}{2}$ " in diameter,

or

No. 2. Two black ring knots not to exceed 1" in diameter,

or

No. 3. One edge knot 2" across face $\frac{3}{4}$ " in depth.

CHERRY

Ends. Must be clear and free from cross-grain and stain.

Sides. Must be clear and free from cross-grain and stain.

Top. Must be clear and free from cross-grain and stain.

Bottoms. Must be clear and free from cross-grain and stain.

DRIED FRUIT—BULK OR CARTON

No stain permissible.

Ends $5\frac{3}{4}$ " in width. May contain one red knot $1\frac{1}{2}$ " in diameter.

Ends $1\frac{7}{8}$ " in width. Must be clear and free from cross-grain.

Sides $5\frac{3}{4}$ " in width. May contain:

No. 1. One red knot $1\frac{1}{2}$ " in diameter,

or

No. 2. One red edge knot not to exceed $1\frac{1}{2}$ " across face.

Sides $1\frac{7}{8}$ " in width. Must be clear and free from cross-grain.

Tops and Bottoms $9\frac{3}{4}$ " in width. May contain:

No. 1. One red knot 3" in diameter,

or

No. 2. One red knot 2" in diameter and two red knots 1" in diameter,

or

No. 3. One red edge knot not to exceed $2\frac{1}{2}$ " across the face.

EMPEROR CHESTS

No stain permissible.

Ends $7\frac{3}{4}$ " in width. May contain one red knot $1\frac{1}{2}$ " in diameter.

Sides, Tops and Bottoms $7\frac{3}{4}$ " in width. May contain:

No. 1. One red knot $1\frac{1}{2}$ " in diameter,

or

No. 2. One red edge knot not to exceed $1\frac{1}{2}$ " across face.

EVAPORATED APPLE

No stain permissible.

Ends $11\frac{1}{2}$ " in width. May contain one red knot $1\frac{1}{2}$ " in diameter.

Sides, Tops and Bottoms $11\frac{3}{8}$ " in width. May contain:

No. 1. One red knot 3" in diameter,

or

No. 2. One red knot 2" in diameter and two red knots 1" in diameter,

or

No. 3. One red edge knot not to exceed $2\frac{1}{2}$ " across the face.

FIG

Ends. Must be clear and free from cross-grain.

Sides. Must be clear and free from cross-grain.

Tops. Must be clear and free from cross-grain.

Bottoms. May contain stain.

No. 1. Two black ring knots $\frac{3}{4}$ " in diameter.

or

No. 2. Two red knots $1\frac{1}{2}$ " in diameter.

LEMON

Not to exceed 15% of shook may contain stain.

Ends (No. 1) $10'' \times 13''$. May contain:

No. 1. One red knot 3" in diameter,

or

No. 2. Two black ring knots 1" in diameter.

Ends (No. 2) $10'' \times 13''$. May contain:

No. 1. One red knot $3\frac{1}{2}$ " in diameter,

or

No. 2. One red knot 2" in diameter and two black ring knots $\frac{3}{4}$ " in diameter.

Ends (No. 3) $10'' \times 13''$. May contain:

No. 1. One red knot 4" in diameter,

or

No. 2. One red edge knot not to exceed 4" across face, provided all edge knots are bundled one way,

or

No. 3. One red knot 3" in diameter, and two black ring knots $\frac{3}{4}$ " in diameter.

Note: In the case of stapled ends there can be no edge knots.

Slats $4\frac{1}{2}$ " in width. May contain:

No. 1. One red knot not to exceed 2" in diameter,

or

No. 2. Two black ring knots not to exceed $\frac{3}{4}$ " in diameter,

or

No. 3. One edge knot $2\frac{1}{2}$ " across the face, not to exceed 1" in depth.

Sides $9\frac{1}{2}$ " in width. May contain:

No. 1. One red knot 3" in diameter, or

No. 2. Two black ring knots not to exceed 1" in diameter, or

No. 3. One red edge knot not to exceed 3" across face.

LUG

5 $\frac{3}{4}$ " Market Lug.

(In complete form only with any size cleat and without cover.)

Ends 5 $\frac{3}{4}$ " in width must contain stain and/or light pitch, or

No. 1. One red knot 4" in diameter,

or

No. 2. One red edge knot 3" in diameter,

or

No. 3. Two black ring knots 1 $\frac{3}{4}$ " in diameter,

or

No. 4. One red knot 3" in diameter and two black ring knots 1" in diameter,

or

No. 5. One spike knot not to exceed 3 $\frac{1}{2}$ " across face and 4" in length.

Sides and Bottoms 5 $\frac{3}{4}$ " in width must contain stain and/or light pitch, or

No. 1. One red knot 3" in diameter,

or

No. 2. One red knot 2" in diameter, or two black ring knots 1" in diameter,

or

No. 3. One red edge knot 3" across face.

3 piece bottoms and 2 piece stapled ends permissible, stock graded as sides, bottoms and ends above.

Other species than pine of like grade are permissible.

LUG—DISPLAY

(Display sizes, Tariff No. 1, including No. 20 and all other sizes, same as juice grade, page 15.)

Ends 4 $\frac{1}{2}$ " in width. May contain:

No. 1. One red knot 1 $\frac{1}{2}$ " in diameter,

or

No. 2. One black ring knot 3 $\frac{3}{4}$ " in diameter.

Sides 3 $\frac{3}{4}$ " in width. May contain:

No. 1. One red knot 1" in diameter,

or

No. 2. One black ring knot 3 $\frac{3}{4}$ " in diameter.

Tops. Must be clear and free from cross-grain.

Cleats and Side Slats. Must be clear and free from cross-grain.

Bottoms 5 $\frac{3}{4}$ " in width. May contain:

No. 1. One red knot not to exceed 1 $\frac{1}{2}$ ",

or

No. 2. One black ring knot not to exceed 3 $\frac{3}{4}$ " in diameter.

Bottoms Only. May contain stain and light pitch.

LUG—JUICE

Ends 4 $\frac{3}{4}$ " in width. May contain:

No. 1. One red knot 1 $\frac{1}{2}$ " in diameter,

or

No. 2. One black ring knot 3 $\frac{3}{4}$ " in diameter.

Sides 4 $\frac{3}{4}$ " in width. May contain:

No. 1. One red knot 1" in diameter,

or

No. 2. One black ring knot 3 $\frac{3}{4}$ " in diameter.

Tops. Must be clear and free from cross-grain.

Cleats. Must be clear and free from cross-grain.

Bottoms 5 $\frac{3}{4}$ " in width. May contain:

No. 1. One red knot not to exceed 1 $\frac{1}{2}$ ",

or

No. 2. One black ring knot not to exceed 3 $\frac{3}{4}$ " in diameter.

Bottoms Only. May contain stain and light pitch.

LUG—ONE-WAY

Not to exceed 15% of shook may contain stain.

Ends 6 $\frac{3}{4}$ " in width. May contain:

No. 1. One red knot 2" in diameter and one black ring knot 1 $\frac{1}{2}$ " in diameter,

or

No. 2. One red knot 3" in diameter,

or

No. 3. Any number of small red knots smaller in size than the smallest of those described above.

Sides and Bottoms 6 $\frac{3}{4}$ " in width. May contain:

No. 1. One red knot 3" in diameter,

or

No. 2. One red knot 2" in diameter and two black ring knots 1" in diameter,

or

No. 3. One red edge knot not to exceed 3" across face,

or

No. 4. Three black ring knots 1" in diameter, and two 3 $\frac{3}{4}$ " in diameter.

Cleats. Must be clear and free from cross-grain.

MELON—HONEYDEW OR PERSIAN

Not to exceed 15% of shook may contain stain.

Ends $6\frac{3}{4}$ " in width. May contain:

No. 1. One red knot 3" in diameter,

or

No. 2. One red knot 2" in diameter and one black ring knot 1" in diameter.

Sides $4\frac{3}{4}$ " in width. May contain:

No. 1. One red knot not to exceed 2" in diameter,

or

No. 2. Two black ring knots not to exceed 1" in diameter.

Bottoms $7\frac{3}{4}$ " in width. May contain:

No. 1. One red knot not to exceed 3" in diameter,

or

No. 2. Two black ring knots not to exceed $1\frac{1}{4}$ " in diameter,

or

No. 3. One edge knot 3" across face not over 2" in depth.

Side slats of Honeydew and Persian Melon Crates are subjected to considerable bulge and their strength must not be impaired on account of defects

(Attach to Page 16, June 15, 1939)

ORANGE AND GRAPEFRUIT

Not to exceed 15% of shook may contain stain.

Ends (No. 1) $11\frac{1}{2}$ "x $11\frac{1}{2}$ ". May contain:

No. 1. One red knot 3" in diameter,

or

No. 2. Two black ring knots 1" in diameter.

Ends (No. 2) $11\frac{1}{2}$ "x $11\frac{1}{2}$ ". May contain:

No. 1. One red knot $3\frac{1}{2}$ " in diameter,

or

No. 2. One red knot 2" in diameter and two black ring knots $\frac{3}{4}$ " in diameter.

Ends (No. 3) $11\frac{1}{2}$ "x $11\frac{1}{2}$ ". May contain:

No. 1. One red knot 4" in diameter,

or

No. 2. One red edge knot not to exceed 4" across face, provided all edge knots are bundled one way,

or

No. 3. One red knot 3" in diameter, and two black ring knots $\frac{3}{4}$ " in diameter.

Note: In the case of stapled ends there can be no edge knots.

Slats $4\frac{3}{4}$ ". May contain:

No. 1. One red knot not to exceed 2" in diameter,

or

No. 2. Two black ring knots not to exceed $\frac{3}{4}$ " in diameter,

or

No. 3. One edge knot $2\frac{1}{2}$ " across the face, not to exceed 1" in depth.

PEACH

Ends $4\frac{1}{4}$ " in width. May contain:

No. 1. One red knot $1\frac{1}{2}$ " in diameter,

or

No. 2. One black ring knot $\frac{3}{4}$ " in diameter.

Sides $3\frac{3}{4}$ " in width. May contain:

No. 1. One red knot 1" in diameter,

or

No. 2. One black ring knot $\frac{3}{4}$ " in diameter.

Tops. Must be clear and free from cross-grain.

Cleats. Must be clear and free from cross-grain.

Bottoms $5\frac{1}{4}$ " in width. May contain:

No. 1. One red knot not to exceed $1\frac{1}{2}$ ",

or

No. 2. One black ring knot not to exceed $\frac{3}{4}$ " in diameter.

Bottoms Only. May contain stain and light pitch.

PEAR

Ends $8\frac{1}{2}$ " in width. May contain:

No. 1. One red knot not to exceed $2\frac{1}{2}$ " in diameter,

or

No. 2. Two red knots not to exceed $1\frac{1}{4}$ " in diameter.

Sides $8\frac{1}{2}$ " in width. May contain:

No. 1. One red knot not to exceed $2\frac{1}{2}$ " in diameter,

or

No. 2. One red edge knot not to exceed 2" across face,

or

No. 3. Two red knots not to exceed $1\frac{1}{2}$ " in diameter.

Tops. Must be clear and free from cross-grain.

Bottoms. May contain stain.

No. 1. One red knot $1\frac{1}{2}$ " in diameter.

PERSIMMON

Ends $4\frac{3}{4}$ " in width. May contain:

No. 1. One red knot $1\frac{1}{2}$ " in diameter,

or

No. 2. One black ring knot $\frac{3}{4}$ " in diameter.

Sides $3\frac{3}{4}$ " in width. May contain:

No. 1. One red knot 1" in diameter,

or

No. 2. One black ring knot $\frac{3}{4}$ " in diameter.

Tops. Must be clear and free from cross-grain.

Cleats. Must be clear and free from cross-grain.

Bottoms $5\frac{1}{4}$ " in width. May contain:

No. 1. One red knot not to exceed $1\frac{1}{2}$ ",

or

No. 2. One black ring knot not to exceed $\frac{3}{4}$ " in diameter.

Bottoms Only. May contain stain and light pitch.

PICKING BOX—DECIDUOUS

May contain 20% stain.

Ends $7\frac{3}{4}$ " in width. May contain one red knot $2\frac{1}{2}$ " in diameter.

Cleats and Corner Posts. Must be clear and free from cross-grain.

Sides and Bottoms $7\frac{3}{4}$ " in width. May contain:

No. 1. One red knot not to exceed 2" in diameter,

or

No. 2. Two red knots, each not to exceed $1\frac{1}{2}$ " in diameter,

or

No. 3. Any number of small red knots.

PICKING BOX—ORANGE

May contain 20% stain.

Ends $11\frac{1}{2}$ " in width. May contain one red knot $2\frac{1}{2}$ " in diameter.

Cleats and Corner Posts. Must be clear and free from cross-grain.

Sides and Bottoms $5\frac{1}{4}$ " in width. May contain:

No. 1. One red knot not to exceed 2" in diameter,

or

No. 2. Two red knots, each not to exceed $1\frac{1}{2}$ " in diameter,

or

No. 3. Any number of small red knots.

POTATO

May contain light pitch and 20% stain.

Ends $5\frac{3}{4}$ " in width. May contain:

- No. 1. One red knot 2" in diameter,
or
No. 2. Two black ring knots, one not to exceed $1\frac{1}{2}$ " in diameter and the other not to exceed $\frac{3}{4}$ " in diameter.

Slats $4\frac{7}{8}$ " in width. May contain:

- No. 1. One red knot not to exceed 1" in diameter,
or
No. 2. Two black ring knots well spaced not to exceed $\frac{3}{4}$ " in diameter,
or
No. 3. One edge knot 2" across face $\frac{1}{2}$ " in depth or $1\frac{1}{2}$ " across face $\frac{3}{4}$ " in depth.

Tops and Bottoms $2\frac{3}{8}$ " in width. May contain:

- No. 1. One red knot not to exceed 1" in diameter,
or
No. 2. Two black ring knots well spaced, not to exceed $\frac{3}{4}$ " in diameter,
or
No. 3. One edge knot $1\frac{1}{2}$ " across face $\frac{3}{4}$ " in depth.

RAISIN—BULK OR CARTON

No stain permissible.

Ends $5\frac{3}{4}$ " in width. May contain one red knot $1\frac{1}{2}$ " in diameter.

Sides $5\frac{3}{4}$ " in width. May contain:

- No. 1. One red knot $1\frac{1}{2}$ " in diameter,
or
No. 2. One red edge knot not to exceed $1\frac{1}{2}$ " across face.

Tops and Bottoms $11\frac{1}{8}$ " in width. May contain:

- No. 1. One red knot 3" in diameter,
or
No. 2. One red knot 2" in diameter and two red knots 1" in diameter,
or
No. 3. One red edge knot not to exceed $2\frac{1}{2}$ " across the face.

RHUBARB

Not to exceed 15% of shook may contain stain.

Ends $4\frac{7}{8}$ " in width. May contain:

- No. 1. One red knot $1\frac{1}{2}$ " in diameter and one black ring knot 1" in diameter,
or
No. 2. One red knot 3" in diameter,
or
No. 3. Any number of small red knots smaller in size than the smallest of those described above.

Sides $4\frac{7}{8}$ " in width. May contain:

- No. 1. One red knot 2" in diameter,
or
No. 2. One red edge knot not to exceed $2\frac{1}{2}$ " across face,
or
No. 3. Two black ring knots $\frac{3}{4}$ " in diameter.

Bottoms $5\frac{1}{4}$ " in width. May contain:

- No. 1. One red knot 2" in diameter,
or
No. 2. Two black ring knots 1" in diameter.

SWEAT BOXES

May contain 20% stain.

Ends $7\frac{3}{4}$ " in width. May contain one red knot $2\frac{1}{2}$ " in diameter.

Corner Posts. Must be clear and free from cross-grain.

Sides and Bottoms $7\frac{3}{4}$ " in width. May contain:

- No. 1. One red knot not to exceed 2" in diameter,
or
No. 2. Two red knots, each not to exceed $1\frac{1}{2}$ " in diameter,
or
No. 3. Any number of small red knots.

TRAYS—CANNERY

May contain 20% stain.

All frames must be clear and free from cross-grain.

Bottoms. May contain two red knots 1" in diameter away from edges.

TRAYS—DEHYDRATING

May contain 20% stain.

All frames must be clear and free from cross-grain.

Bottoms. May contain one red knot 1" in diameter away from edges.

TRAYS—DRYING

May contain 20% stain.

All frames must be clear and free from cross-grain.

Bottoms. May contain two red knots 1" in diameter away from edges.

VEGETABLE

**ANISE; BROCCOLI; CABBAGE; CARROT;
CAULIFLOWER; CELERY; CORN;
LETTUCE; PEAS**

May contain light pitch and 20% stain.

Posts and Rails $1\frac{1}{8}$ " x $1\frac{3}{8}$ " or $1\frac{3}{8}$ " triangular. Must be free from knots and cross-grain.

Panels $7\frac{3}{4}$ " in width. May contain:

No. 1. One red knot 4" in diameter,

or

No. 2. Two black ring knots, one not to exceed 2" in diameter and the other not to exceed $\frac{3}{4}$ " in diameter,

or

No. 3. One edge knot 3" across face $1\frac{1}{2}$ " in depth.

Slats $2\frac{7}{8}$ " in width. May contain:

No. 1. One red knot not to exceed 1" in diameter,

or

No. 2. Two black ring knots well spaced not to exceed $\frac{3}{4}$ " in diameter,

or

No. 3. One edge knot 2" across face $\frac{1}{2}$ " in depth or $1\frac{1}{2}$ " across face $\frac{3}{4}$ " in depth.

Slats $3\frac{3}{4}$ " in width. May contain:

No. 1. One red knot not to exceed $1\frac{1}{4}$ " in diameter,

or

No. 2. Two black ring knots well spaced not to exceed 1" in diameter,

or

No. 3. One edge knot 2" across face, $\frac{1}{2}$ " in depth, or $1\frac{1}{2}$ " across face, $\frac{3}{4}$ " in depth.

Note—All long vegetable slats must be free from cross grain and spike knots (See page 4, (1) C and (4)).

MELON FIELD CRATES

May contain stain.

Corner Posts $1\frac{1}{4}'' \times 1\frac{3}{4}'' \times 12''$ cut triangular.
Must be clear and free from cross-grain.

Head Rails $2\frac{3}{4}''$ in width. May contain:

No. 1. One or two small knots not to exceed $\frac{3}{4}''$ in diameter.

Head Panels $4\frac{3}{4}''$ in width. May contain:

No. 1. One red knot not to exceed $1\frac{1}{2}''$ in diameter,

or

No. 2. Two black ring knots not to exceed $1''$ in diameter.

Slats $\frac{3}{8}'' \times 1\frac{7}{8}'' \times 23\frac{1}{2}''$. Must be clear and free from cross-grain.

VEGETABLE FIELD CRATES

May contain stain.

Posts $1\frac{3}{4}'' \times 1\frac{3}{4}''$. Must be clear and free from cross-grain.

Rails $2\frac{3}{4}''$ in width. May contain:

No. 1. One or two red knots not to exceed $\frac{3}{4}''$ in diameter.

Panels $7\frac{3}{4}''$ in width. May contain:

No. 1. One red knot not to exceed $2''$ in diameter,

or

No. 2. Two black ring knots not to exceed $1''$ in diameter.

Slats $3\frac{3}{4}''$ in width. May contain:

No. 1. One red knot not to exceed $1\frac{1}{4}''$ in diameter,

or

No. 2. Two black ring knots not to exceed $1''$ in diameter.

Attach to Back of Page 23

(Mar. 16, 1939)

Merits of the Wooden Box and Crate.

The important reason for the wide use of the wooden box in agriculture, industry, and foreign trade is that of its versatility. The wooden box can be varied in size and strength so as to provide protection for articles in such extremes as from pencil leads to bombing planes. The outstanding merits of wooden boxes are as follows.

The availability of wooden boxes in thousands of sizes and weights, yet they are all derived from the six standardized styles.

The property by which wood resists being dented or punctured. This protects wooden boxes from ropes and slings used in loading and unloading. Wooden boxes are self supported when stacked and require no braces to keep from tilting. This allows freight cars to be filled from floor to roof, end to end. This reduces also the warehouse charges without danger to the product.

The loss occurred in marketing or theft in storage and in transit is curtailed to a high degree due to properly constructed wooden boxes.

Containers are frequently subjected to extremes in temperatures while in transit. A properly constructed wooden box will protect the contents from spoilage by rain, snow, or high humidity.

Wooden boxes can often be used for other purposes after the product is delivered. They are either used in some other industry or in the case of beer cases are used many times.

Lumber and National Defense.

Lumber is necessary to national defense as evidenced by the twenty-two items made of wood or wood products placed on the Critical List. Included in these twenty items are boxes and crates for bombs and shells which are made of wood. Of the plans now underway which will require lumber in the next twelve months it is interesting to note that boxes and crates for domestic and foreign shipments and storage will amount to 3,500,000,000 board feet out of a total lumber use of 11,555,000,000 bd. ft. This means that 30% of the lumber to be used for defense purposes shall consist of boxes and crates.

The use of lumber releases other materials needed for defense uses. Wood can be used to replace metal and other scarce materials in many articles such as furniture, boxes and crates for food, ship construction, and other similar items.

Lumber consumption in the United States in 1929 was 36,807,000,000 b.f. not including 9,700,000 squares of wood shingles. 1940 consumption was 29,045,000,000 b.f. of lumber and 8,400,000 squares of wood shingles. Of the lumber consumed in 1940 approximately 12% was used in boxing and crating.¹ The only industry which outdid the wood box and crating industries was that of the building and construction industry which consumed 70%. As these figures were for 1940, a full year before the United States swung into the war one can see how the surge of the war will raise these production figures.

1. More About Lumber and National Defense
Timber Engineering Company, Inc., Washington, D. C.

The annual meeting of the Pacific Division, National Wooden Box Association, held at the Palace Hotel, San Francisco, February 11-18 echoed the fact that the wooden box industry must do all in its power to keep up with the defense industries in supplying necessary packaging material. The wooden box industry is one of the few industries that is doing business better than usual because of war needs.

The wooden box industry, however, is feeling the results from being unable to secure woods equipment and the steel items needed in factory operation.

The industry must not only produce the necessary containers essential for the movement of food but defense housing, cantonments, and shell box needs must also be met.

Some of the boxes used by the armed forces include; powder boxes, fuse boxes, small arms boxes, gun barrel boxes, propellor protractor cases, telescope sight boxes, submarine detector cases, sight boxes, navy ordanance parts box, food containers, percussion cap boxes, and many other type boxes.

This has caused the association to favor a longer working week. A 48 hour week is urged instead of the present 40 hour week. It is believed by the association members that this would go a long way in helping to relieve the present shortage.

Arsenal Demand.

United States arsenals moving into a 24-hour-per-day

and 48-hour-per-week schedule will create a new demand for the many types of boxes used for ammunition shipments.

The ordnance department specification for arms boxes are very rigid due to the long storage periods and frequent handlings incurred in this type of shipping. This requires the boxes to be built very sturdy.

Munition boxes require hinged covers, interior blockings, and air-tight, moisture proof metal linings. Nailed wooden boxes are regarded as standard for small caliber ammunition, 37mm shells for anti-tank and anti-aircraft guns, and for hand grenades.

It is necessary to put a coat of dark stain on all boxes for small arms ammunition. The stain serves the purpose of wood preservation and also as a camouflage.

Army Buyers.

The army at the present time is becoming one of the nation's largest single customers for fresh fruits and vegetables. For over \$1,500,000 a month is being spent for fruit and vegetables, with all indications that this figure will rise sharply.

This increasing demand for fruit and vegetable produce will increase the demand for wooden containers for wood is the commercial pack of the produce industries. The operators of the 29 Quartermaster Market Centers, who do the purchasing, are experienced with the advantages and economies of wooden containers so this advantage held by

the wooden box and crate industry shall continue. For the army buyers must make all purchases under Army specifications which are based on established Government grades. Therefore in order for the sellers to complete negotiations with the Army buyers they must know what sort of packaging is required. And the large part to be played by wooden boxes and crates is evident by the listed scores of wooden containers acceptable to the railroads and preferred by the trade.

To help the government in its scientific packing the National Wooden Box Association has installed up-to-date testing equipment near the large purchasing office in Washington, D. C. These testing devices are such as meet the American Railroads approval. By testing boxes as are used to pack clothing the attempt will be made to get the Army Quartermaster Corps to O. K. the specifications. Thinner shooek will be used in an effort to meet competition by fibre containers who have been shipping some of the Army clothing.

Because of the Lease-Lend schedule containers must be light yet stand up under the repeated handlings and shipping to distant points. The protection needed under these requirements allows a great opportunity for wooden boxes. This is indicated by the requirements of the Field Service Division of Army Ordnance demanding wooden boxes and crates of eleven different sizes for tubes, cans, and pails of special lubricants and cleaning compounds.

So it seems evident that procurement officials will

continue to favor wooden containers to meet the hazards of long storage and multiple handling.

Wooden boxes are also important in the packing of propellers, motors, sub-assemblies and completed planes. The greatest need comes in the shipping of motors. These must be boxed keeping export shipments in mind. This requires the necessary weather-proofing to protect the motor under all conditions.

Propellers must be carefully shipped because of the fine balance that must be maintained. With the present all out for war schedule the production of planes will increase tremendously. This will necessitate a large demand for box material.

One of the most constructive factors of the wooden box and crate industry, as well as the lumber industry on the whole, is the United States Forest Products Laboratory, Madison, Wisconsin, which spends much time and money ironing out the difficulties incurred by the wooden box industry. The experiments and research work carried on at the Laboratory help to make better products for the lumber industries and thus help combat competitors.

The Forest Products Laboratory recently received an appropriation of \$100,000 by the Field Service of the Army Ordnance Department to analyze and prescribe specifications for packing scores of ordnance items other than ammunition. The purpose is to modernize and standardize packing methods throughout the Ordnance Field Service. The new weapons and methods of warfare made this complete review of Field Service

container specifications necessary. As the Ordnance Field Service must also take care of export shipping it will be necessary to have a pack that can be stored at shipping depots indefinitely, then transplanted to foreign barracks and back if necessary.

As the Forest Products Laboratory did similar work in World War I it is evident that successful experiments shall result. For stocks of equipment were still in good condition in arsenal warehouses that were left over from the last war when the present war broke out.

Agriculture and Fruit.

The extension of the seasons of the vegetable and fruit industries has greatly aided the volume of wooden boxes and crates produced and sold. This has been made possible through rapid refrigerated transportation which has enabled the products to reach their destination in peak condition.

The fruits which now have standardized types and sizes of wooden boxes and crates are apples, bananas, oranges, grapefruit, lemons, tangerines, apricots, avocados, peaches, plums, prunes, pears, pineapples, grapes, melons, cherries, cranberries, rhubarb, strawberries, and raspberries, and other soft fruits.

Vegetable boxes and crates are commonly used for such products as asparagus, artichokes, carrots, celery, lettuce, broccoli, cabbage, cauliflower, cucumbers, potatoes, peppers, radishes, spinach, sweet-potatoes, tomatoes, onions, and eggplant.

Wooden boxes get the call in the first stages of the fruit and vegetable industries because of their use in harvesting the agricultural crops. These nailed wooden containers are used because of the following advantages:

1. The rigid walls of sawed wooden containers provide dependable protection against exterior loads and blows.
2. It is possible to pile the boxes in layers without injuring the contents.
3. The strenght of the containers is not affected by moisture or weather conditions.
4. Wooden boxes can be arranged for economy of space yet provide the necessary ventilation.
5. New sizes and types can be readily produced to meet requirements.
6. Wooden boxes and crates are manufactured throughout the United States making possible delivery at all times.

The importance of the wooden box industry in relation to the shipment of vegetables can be realized when one sees that 329,802 carloads of fresh vegetables are shipped each year. As many of the markets are of considerable distance from the producing area it is up to the wooden boxes and crates to provide adequate means of shipping the produce. Ice, shaved into snow can be forced under pressure into the carloads of vegetables to protect them on the trip. The strength of the wooden boxes is not affected by the water of the melting ice which allows the produce to arrive in good shape.

Large quantities of wooden boxes are used to transport poultry and dairy products. The rigid specifications for butter and cheese boxes are met by wooden containers.

The potato growers are shippers who are continually trying to decrease their costs by improving the methods of handling their crops. To accomplish this end the practical growers are using sawn wooden picking boxes. The Western states have a 50 lb. picking box which is easily hauled and distributed in the fields. The box keeps it place on trucks and conveyors because of the ease with which it piles.

One picker using these boxes can pick a row 1440 feet long per hour with some time to rest. The same picker using sacks was only able to pick a row of 1200 feet per hour with no time to rest. Besides the saving in field cost, picking boxes protect early potatoes from scuffing and bruising.

New potato packages have also been developed which allows six ten pound potato sacks to be packed in a crate of special design. The great advantage in this pack is the acceptance with which the consumer buys the potatoes put up in this manner.

Sweet corn shipments from California are now possible to eastern markets because of the adoption of the precooling system as was practiced in other perishable crops.

Corn is picked in the field and placed in the cooler with no more than an hour in time elapsing. A sown pine crate was designed to meet with the precooling, ventilation, and refrigeration requirements as well as the carrying ability.

This crate allows early sweet corn to be brought to the consumer without great loss of fresh flavor.

The crates are loaded into precooled refrigerator cars and then have crushed ice blown in on top, completely covering the crates.

Another new box to be developed is the Pyramid Prune Pack. The pyramid shape allows a maximum of space in which air circulates freely and yet keeps the prunes in place in the pack. The beautiful appearance of the Pyramid Pack puts the prune into the "de-luxe" class, greatly aiding in its street selling appeal. This new box has stimulated the prune sales immensely.

Another field that the wooden box has opened up for itself is that of supplying the nationally known Palmetto Pigeon Plant at Sumpter, North Carolina, with materials that are used from the nest to the shipping containers. The squabs are packed in wooden boxes and shipped by train.

The fishing industry of New England also selects wooden boxes. Their purposes are because of the strength of wood; the clean odor and appearance of fresh-cut lumber; the flexibility of manufacture that allows daily delivery of containers of various styles and sizes varying from a single pound to half a ton.

Fancy wooden boxes used for gift purposes are receiving an impetus due to the demand for plastics and metals in vital defense industries. This allows the wooden box to specialize in beautiful designs that allows their use under

wide circumstances.

A recent improvement made in the wooden box and crate industry is the introduction of heavy duty staplers which by an advanced wire stitching technique greatly strengthen the boxes and crates. Constant engineering have improved stapling machines so that the material may move foreward at all times, thus enabling a continous high speed flow of work through the machines.

Citrus Trade.

The three leading citrus producing states in the country, Florida, Texas, and California, have a combined container market representing an annual volume of some 90 to 100 million standard box units.

Many problems are encountered in shipping such quantities especially when the delivered condition determines the price. To get these results the contents are graded and then firmly place-packed being protected by a container having rigid ends, center partition, sides and bottom, and a springy top that prevents shifting during transit. By these safeguards the fruit industry has attained such quality so as to gain national recognition. And it is only the goods shipped in these containers that is regarded as having the top citrus values. This can be demonstrated by a shipment of oranges from the same sections of Florida which brought an average of \$2.36 per box when packed in standard boxes, \$2.20 per box in other containers. These some conditions were true for Florida seeded grapefruit as well as Texas

and California citrus fruits.

The only explanation of these conditions is that the wooden box deliver the fruit in a perfect condition, thereby making it more worth while for those concerned.

The standard citrus box divided into twin compartments by a center partition and holding its contents firmly in place by a bulged top delivers the product with a tree like quality.

Managers of brewery warehouses are in the majority when they demand wooden cases, the difference between these and substitutes being the matter of cases that last forever and those which are just few-trip cases.

The Northampton Brewery Corporation upon checking test cases of types other than wooden cases found that these test cases lasted from seven to nine trips if there wasn't too much rain.

Another important fact concerning the use of wooden cases is the motions that are saved, which result in the direct saving of money. Wooden cases reduce the delivery costs by increasing the efficiency of the crews and trucks.

The ability of wooden boxes to stand up in all kinds of weather, as they remain outside at fairs, picnics, races, and other outdoor events makes them the choice for beverage companies.

Wooden cases allow consumers to place the case on a damp basement floor or wet garage floor without fear of losing a cash deposit. This also relieves the tension of

dealers who may be otherwise forced to antagonize the customer by refusing to refund the deposit.

Breweries answering a national delivery questionnaire reported 57 per cent of their production delivered within fifty miles of the plant, 24.7 per cent between the fifty and one-hundred and fifty mile circles, and only 18.3 per cent in the shipping zone beyond. Wooden cases, assuring long life and low cost per trip are thus indicated for the bulk of the production of America's typical breweries.¹

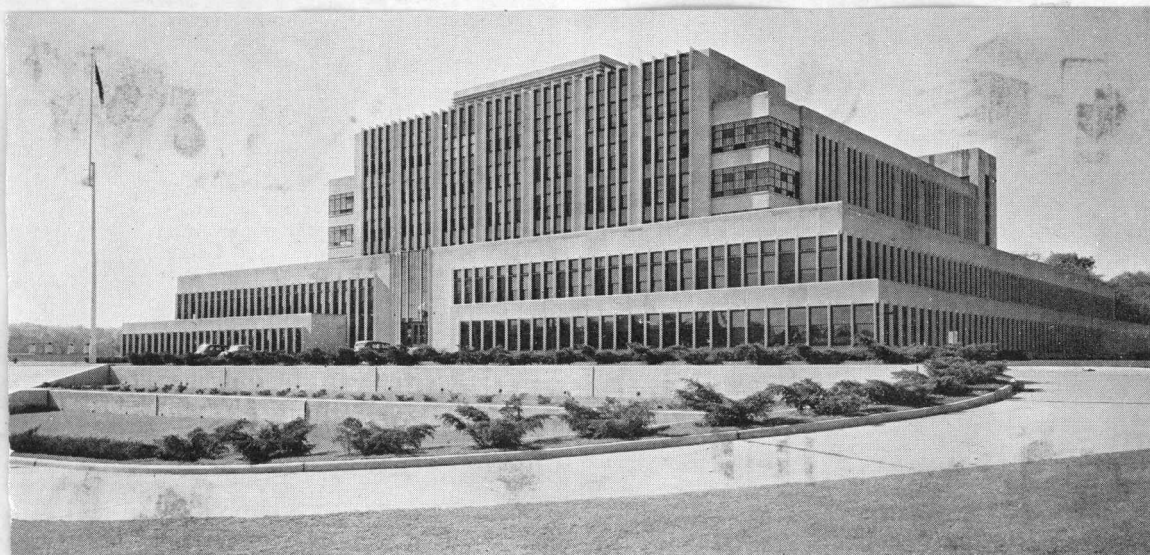
Advantages of Wooden Containers.

Greater Economy in Packing.

The Forest Products Laboratory, Madison, Wisconsin, puts in much research and time in the development of containers particularly because about 12 per cent of all the timber cut annually goes into lumber for boxes and crates and an additional 7 per cent of the wood pulp production annually is used for fiber containers. The laboratory began commercial research on better boxes in 1905 in order to develop more efficient utilization of wood.

The laboratory's main aim is to develop boxes of such design and structure as will give maximum service for the minimum materials. Therefore lumber thicknesses, nailing, reinforcements, and the other necessary details are checked thoroughly. It was found that low grade lumber could be used if the knots and knot holes were in the right place in the

boards. The correct number of nails that will give the utmost strength to the box is also determined, as well as the amount the board can be made thinner without impairing the strength of the box. The laboratory found out that the three-way corner is more secure than any other type of construction for crates. This information in the hands of the box manufacturer has enabled him to build more efficient containers by arranging the parts so they are in balance with other parts and thus greatly increase the strength.



U. S. Forest Products Laboratory, Madison, Wisconsin.

Box and crate manufacturers reduce their operating costs through the recovery of waste. Many uses for shavings, sawdust, block wood and edgings have been developed.

Shavings are baled to be used for anything from livestock bedding to filtering impurities from domestic gases. Automatic stockers utilize shavings and sawdust for heating purposes. Block wood is also used for fuel purposes as is the pressed-fuel logs made of shavings and sawdust.

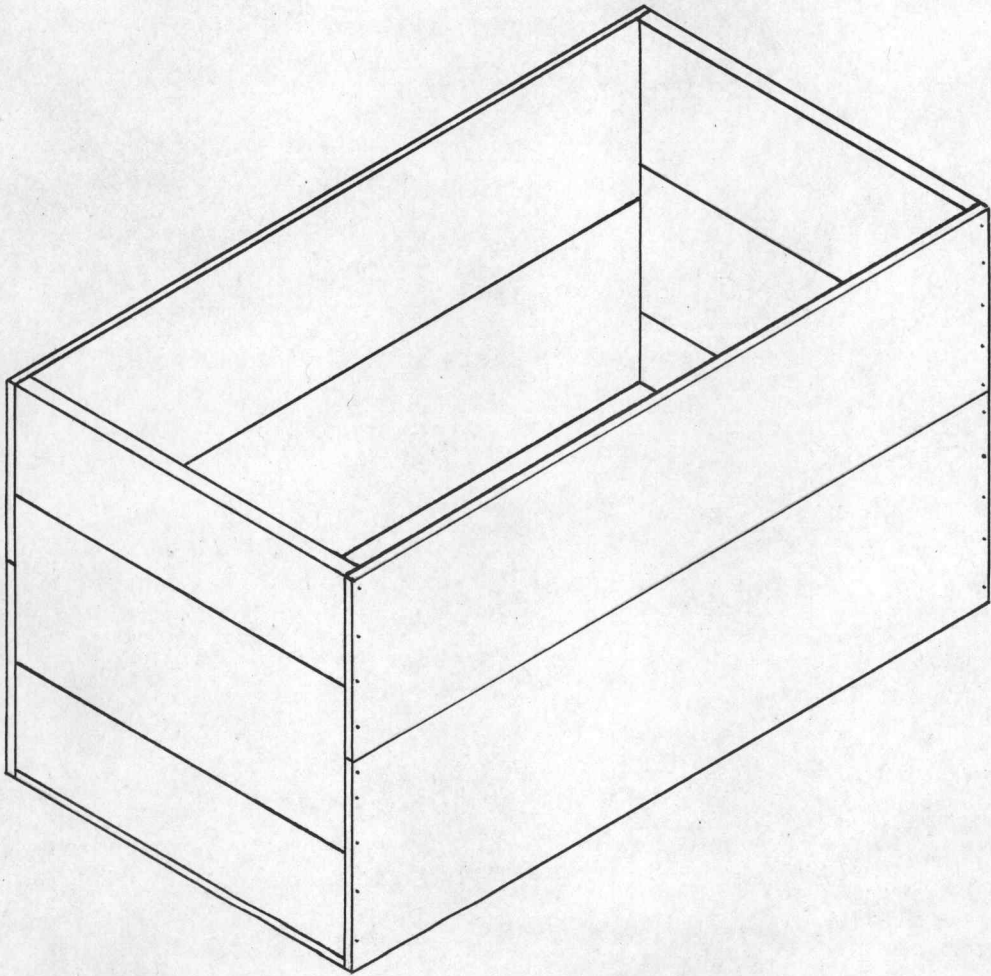
Sawdust can be used in the production of wood flour.

The carriers and manufacturers have seen the advantage of superior products and so have formed agencies of their own to continue and further the study of containers. The railroads and truckers have realized the money that can be saved if damage is decreased.

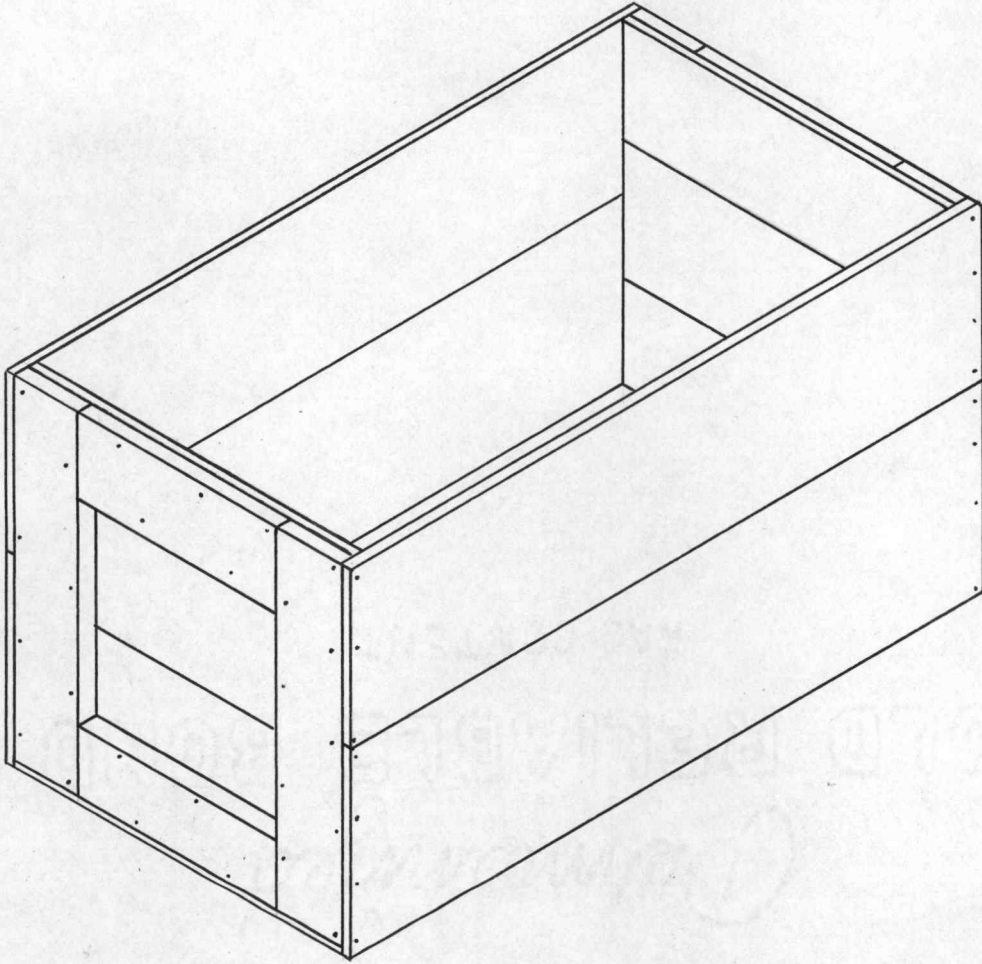
The combined efforts of the manufacturer, carrier, and distributor when worked in with the Forest Products Laboratory will result in a superior product along all lines.

One of the distinct advantages to come out of the Forest Products Laboratory continued efforts in designing boxes is the standardization of nailed wooden boxes into six styles. From those basic styles many different designs are followed to secure any need in the container field. This standardization of the nailed wooden box, however, makes it possible for the buyer of containers to be able to get the type of box he desires in any part of the country.

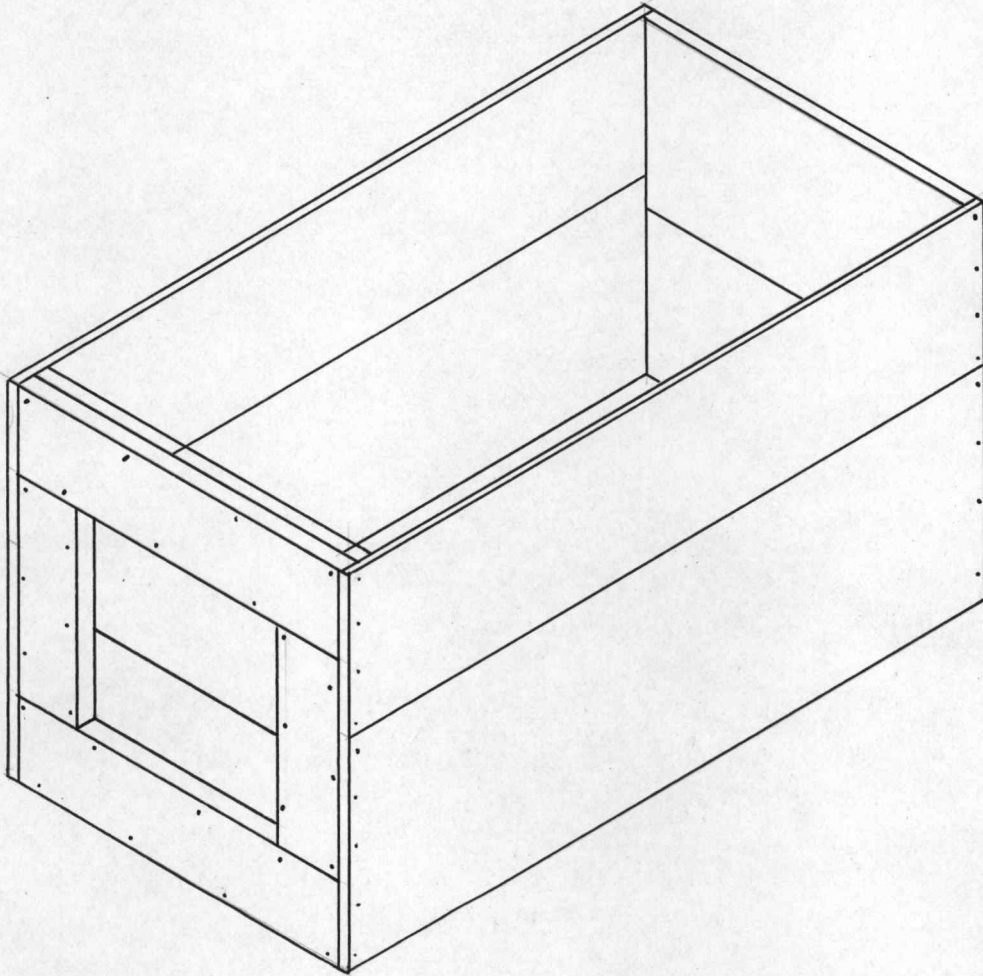
These six styles are demonstrated on the following pages.



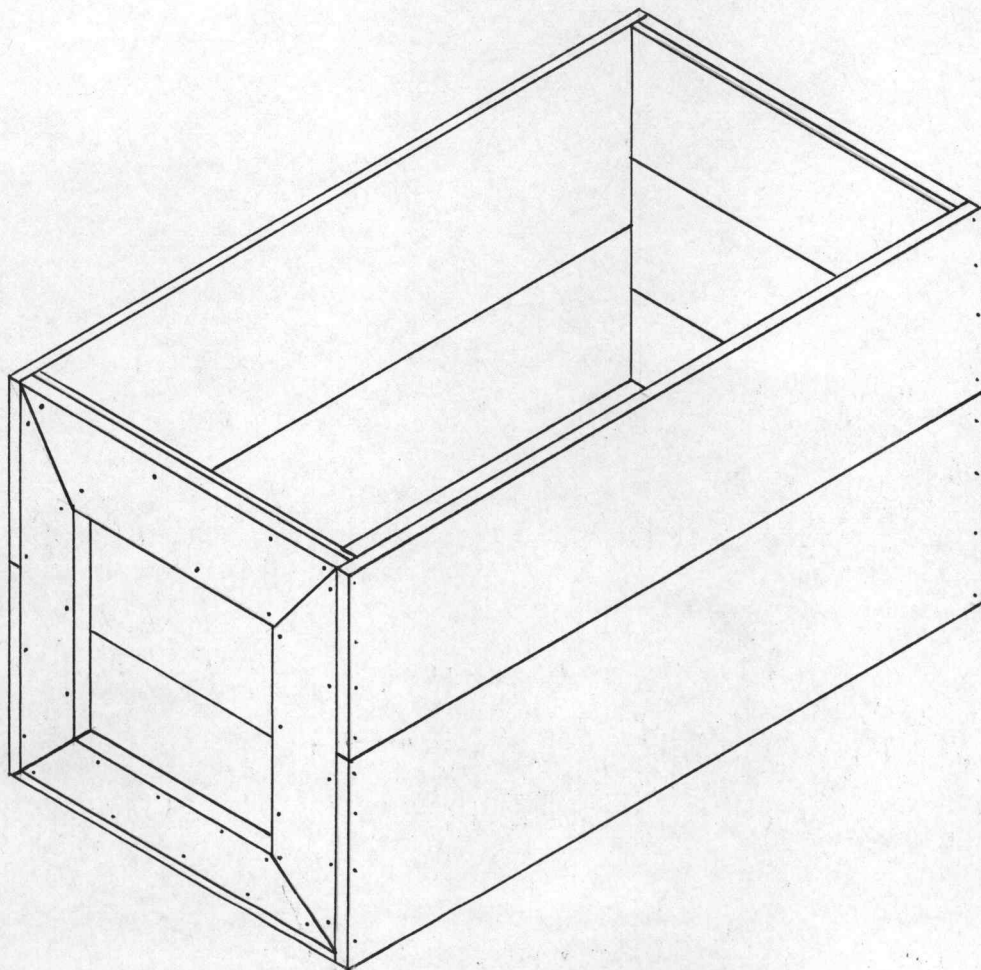
STYLE 1



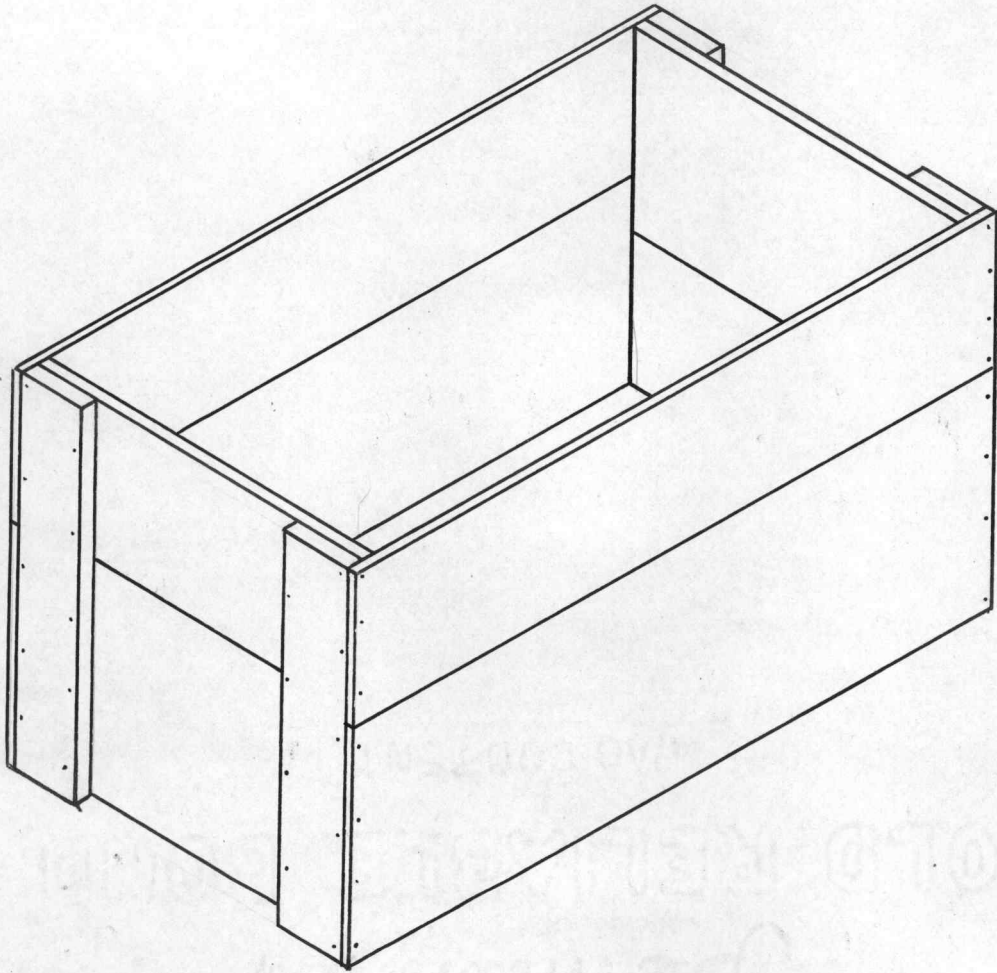
STYLE 2



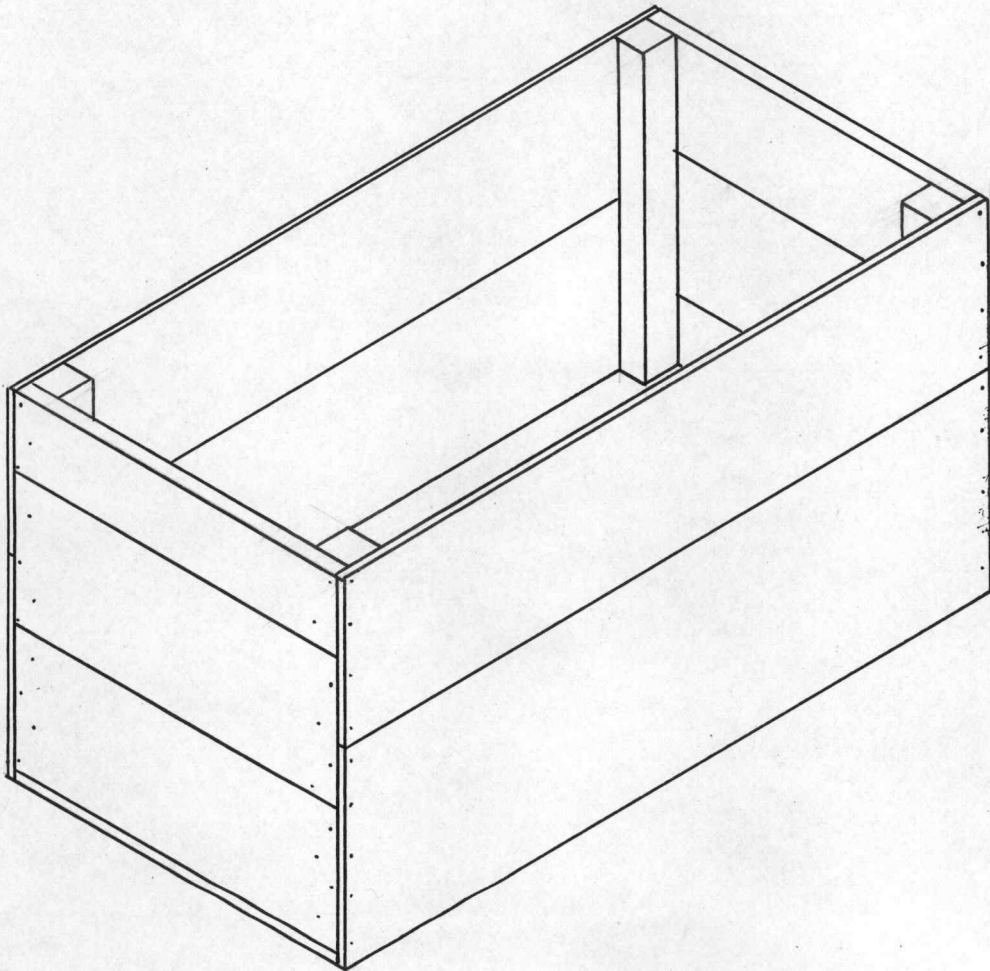
STYLE 2½



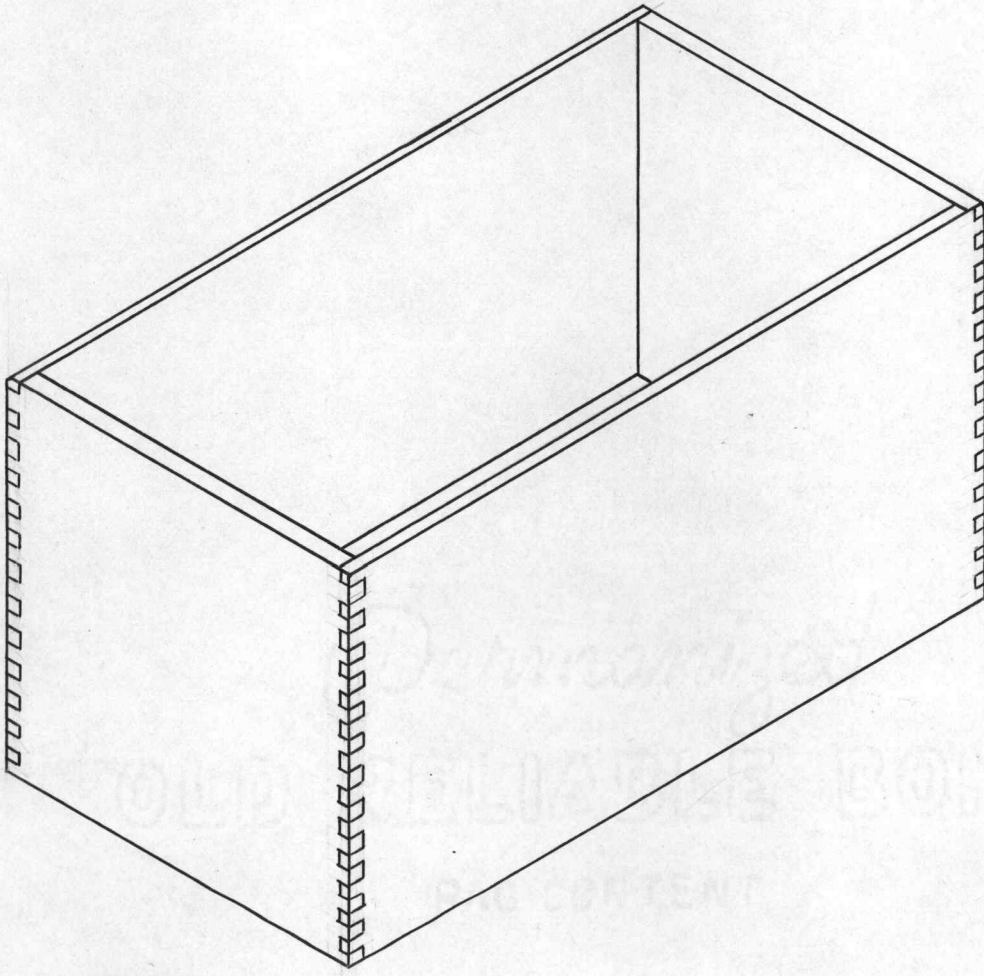
STYLE 3



STYLE 4



STYLE 5



STYLE 6

Truck Profits.

A produce trucker to be successful must move the produce, move it fast, and get it to its destination in good condition. To accomplish this it is necessary to cut down handling time at the terminals in both loading and unloading, and also keeping his truck up to capacity on every trip.

The wooden box is the prime reason the truck operator can work under the above conditions and do it so efficiently. This is because of the boxes' ability to fit so easily into every method of handling or loading. The ability to save storage space is especially important from a truckers standpoint. The savings incurred by truckers because of the manner in which wooden boxes can be stacked, and the ease with which they are handled, plus the speed and savings in labor and loading or unloading a truck of boxed products is the reason truckers always want wooden boxes and crates. These savings in loading and unloading not only cuts down labor costs but also means a greater utilization of valuable equipment.

Three important reasons why truckers prefer wooden boxes and crates are as follows:

1. The rectangular shape of sawn containers permits the loading of wide varieties of produce.
2. It makes possible the utilization of every available inch of space on the truck bed, containers of varied sizes fitting into proper niches.
3. Permits conservation of sidewalk space, an important

consideration in any terminal market.

Wooden boxes allow the utilization of every cubic foot of available space when loaded in the truck. When mixing loads the wooden box allows different sized boxes to be stacked together and properly fitted to save space. Then too, the strength of the wooden box allows the stacking of any type of commodity without fear of damaging the contents.

The box industry realizing the needs of the trucking industry is taking this into account on their new designs. An example of this is the new peach box being used in Colorado. This box carries a full bushel of peaches and allows every bit of space in the truck to be utilized, permits fast handling of the peaches in a large unit and still gives perfect protection to the fruit.

This need for greater efficiency and economy in handling, transportation and merchandising of all commodities is the reason the wooden box has such strong allies, in the grower, shipper, trucker, and merchant.

Export Shipments.

The numerous foreign shipments of American goods demands that these products be brought to their destinations safely. Therefore it is very necessary to take care to avoid shipping damage. Consumer packages that arrive as cracked containers, crushed cartons or torn boxes discredit the manufacturer and decrease sales. On long voyages time will tend to discolor products and their packages, for salt

air, heat, and shifting loads can quickly make a product non-salable.

The resulting damage claims are costly in dollars and also time. It is easy to lose the customers good will because of this. The products receive much hard treatment from the shipping point to the dock through the trucking or railroad service. Then on shipboard the cargo is piled on top of each other and stacked up, necessitating that the products must be properly packaged. When on the long journeys cases will be twisted out of shape unless they are strongly reinforced to stand the strains.

Much of the trade of wooden boxes is accomplished through the auction markets in the large cities. Here immense amounts of packaged goods are turned over every day. Therefore it is necessary in this system to have uniform grading and packing, an advantage that sawn wooden boxes and crates with their increasing majority of produce shipped are quick to take. The auction buyers are paying the growers the highest premiums yet paid because of the attractiveness with which fruit is being packed today. This is made possible because the growers are adopting containers scientifically designed to protect the colorful Eye Appeal.

More than one million carloads of fruit and vegetables are being shipped annually by rail, truck and boat--90% of the total in containers. Of the four types of containers in common use, boxes and crates carry approximately 49% of

of the crops; bags, 20%; baskets and hampers, 17%; and barrels 4%.¹

In several sections of the country grower organizations are cooperating to reduce the number and sizes of containers. The Northwest apple box was the outcome of one of these meetings, this container being used predominately in Washington, Idaho, Oregon, and California. In other sections, lettuce producers, citrus growers, and other groups are continually standardizing their containers.

Pallet System.

The last two decades has seen containers constantly decreasing in size. To offset the increased handling costs because of change many shippers are using the pallet or skid system of consolidating many individual packages into one-man loads of large dimensions.

Mobile lift trucks are used to move and stack units of bottled beverages in such quantities as 72 cases at a time, or 24 boxes of citrus fruits in one operation.

Here is where wooden boxes and crates stack firmly because of the rigidity of their rectangular shapes and thus fit into the pallet system perfectly. Wooden box factories are now producing the pallets themselves, these platforms being four feet wide, six feet long and from four to twelve inches high. The making of one big load out of many small ones allows the ready transportation of goods through the

factory and warehouse and enables the load to be accurately spotted on floor level or placed at other levels.

Packing Flaws.

With the present war raging, and its consequent effect upon shipping trade the United States now more than ever before has the best opportunities for its trade with South America. The South American importers have repeatedly threatened to break their ties with the United States exporters because of the poor packaging methods that have been followed by the United States Exporters. Some types of American export packaging do not meet South American requirements. Breakage has been excessively high in many cases. The ease with which pilferage is accomplished in carton shipments has also caused room for dissentment. A recent Department of Commerce release shows that where other styles of cases have been and are being used for numerous export commodities, the reinforced nailed wooden box is still one of the most important types of outer shipping containers in the export trade.

Claim Reductions.

One distinct advantage of wooden boxes and crates over all other competitors is that of the safe way in which wooden boxes and crates deliver their products. Freight loss and damage claims dropped 12.1% in 1939 despite a 14 per cent increase in freight traffic during the year.¹

1. Wooden Box and Crate, Vol. II, No. 1
April 1940, Page 11.

The goods customarily shipped in wooden containers which helped establish the average decrease were fresh fruit and vegetables, eggs, and machinery. Damage claims for fresh vegetable shipments dropped to 18.9%.²

In those fields where more fragile containers are challenging the strength and rigidity of wood the damage accounts decreased but little. The furniture industry is one of these fields where container substitutes for wooden boxes and crates have crept in during the last decade. It is significant to note that the furniture damage account has dropped only two per cent since 1930.

The need for continued good packing and shipping is demonstrated by the fact that the total claims in 1930 amounted to \$34,944,056, while the claims paid in 1939 only amounted to \$18,885,330. The great reduction in claims paid is certainly worth the care and effort of good packaging.

Realizing the good that can come through the good will from satisfied customers the shippers and railroads have put on a perfect shipping drive. Realizing that the sale is completed only when the goods are delivered to the customer in perfect condition a pronounced effort has been put forth by all those connected with the shipping of goods. Special effort is to be placed on finding the cause of the trouble, for when this is obtained it is easy to prevent further damage.

2. Wooden Box and Crate, Vol. II, No. I
April 1940, Pg. 11

Modern Export Packaging, 1940, A book released by the Transportation Division of the Bureau of Foreign and Domestic Commerce, United States Department of Commerce favorably comments about wooden boxes as follows.

The reinforced nailed wooden box is still one of the most important types of outer shipping container used in the export trade. When properly designed and constructed and used for the commodities for which it is best adapted this standard export shipping case is generally a very satisfactory package for all-around use.

The wooden case will resist the roughest sort of handling, is proof against the ordinary hazards of puncturing, and the use of straps and sealing devices minimizes pilferage. Such cases can be made so as to require little storage space; knocked-down boxes can be delivered in compact bundles, and many types of set-up boxes "nest" while in storage prior to use.

Reviewing the material of this paper three facts are continually brought forth.

(1) The prominent part played by wooden boxes and crates in the lumber industry. This field absorbs a large percentage of the timber cut, being a live and vital industry serving many of the other important industries in the United States and other countries.

(2) The progress made by the Wooden Box and Crate Industry, expanding and progressing to serve all lines which need any type of packaging or containers.

(3) The manner in which the Wooden Box and Crate Industry has responded to take the lead in providing containers for the present emergency.

It is this type of cooperation and progress that has kept the Wooden Box and Crate Industry at the top of the container field, and with the improvements being made in the present crisis the Wooden Box and Crate Industry will continue to lead the field after the war as it has in the past.

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