

STATE OF ARKANSAS DEPARTMENT OF LABOR

SAFETY CODE FOR WOODWORKING PLANTS

CODE No.2 (Authority, Act 161 of 1937)

Promulgated by State Department of Labor Little Rock, Arkansas

Effective July 5, 1951 ..

CONTENTS

| | |
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| Table of Contents | i |
| Section 1. Definitions | 1 |
| Section 2. Plant Layout | 1 |
| 2.1 Machine Layout | 1 |
| 2.2 Floors and Aisles | 2 |
| Section 3. Machines and Equipment | 2 |
| 3.1 Machine Construction, Drive, Feed, Speed, and Control | 2 |
| Section 4. Machines | 4 |
| 4.1 Circular, Rip, Crosscut, Resaw, and Swing Cut-off Saws | 4 |
| 4.2 Band Saws and Band Resaws | 10 |
| 4.3 Jointers | 11 |
| 4.4 Tenoning Machines | 12 |
| 4.5 Boring and Mortising Machines | 13 |
| 4.6 Wood Shapers, Etc. | 14 |
| 4.7 Planing, Molding, Sticking, and Matching Machines, Etc. | 15 |
| 4.8 Profile and Swing-Head Lathes (Including Wood Heel Turning Machines) | 15 |
| 4.9 Sanding Machines 16 4.10 Miscellaneous Machines | 17 |
| Section 5. Venser Machinery | 17 |
| 5.1 Steaming Equipment and Soaking Pits | 17 |
| 5.2 Log Handling Equipment | 18 |
| 5.3 Saws | 18 |
| 5.4 Veneer Cutters and Wringers | 18 |
| Section 6. Cooperage Machinery | 19 |
| 6.1 Saws | 19 |
| 6.2 Single and Double Stave Planers | 20 |
| 6.3 Stave and Heading Jointers (Matchers) | 20 |
| 6.4 Stave Croziers | 21 |
| 6.5 Barrel Sanding Machines | 21 |
| 6.6 Power Windlass for Barresl | 21 |
| 6.7 Pail and Barrel Lathes | 21 |
| 6.8 Miscellaneous Cooperage Machinery | 21 |
| Safe Operating Methods--Cooperage Machinery | 21 |

DEFINITIONS

SECTION 1

"Shall" and "Should". The word "shall" is to be understood as mandatory; The word "should" as advisory.

Point of Operation. The term "point of operation" shall be understood to mean that point at which cutting, shaping, boring, or forming is accomplished upon the stock.

Push Stick. The term "push stick" shall mean a narrow strip of wood or other soft material with a notch cut into one end and used to push short pieces of material through saws.

Push Block. The term "push block" shall mean a short block of wood provided with a handle similar to that of a plane and having a shoulder at the rear end and used for pushing short stock over revolving cutters.

SECTION 2 -PLANT LAYOUT

2.1--Machine Layout;

(a) Machines should be so located that there will be sufficient space in which to handle the material with the least possible interference from or to workmen or machines. Machines should be so placed that it will not be necessary for anyone to stand in or so near an aisle as to be liable to hazard.

NOTE: The following conditions represent good practice:

Rip and Crosscut Bench or Table Saws-The minimum distance or clearance on each working side of the saw table should be equal to 3 feet more than the longest material handled.

There should be no regular working station close to a rip saw and in line with a possible kick-back. In such case, if it is not practical to relocate either the saw or the working station a substantial barrier should be erected to protect the worker.

(b) Woodworking machinery shall be firmly secured to substantial floors or foundations. Small units shall be secured to benches, tables, or stands of adequate strength and so designed as to prevent overturning or unintentional movement. This does not apply to portable band tools.

NOTE: Except in very strongly constructed building it is advisable to locate heavy duty high speed machinery on the ground floor to reduce vibration. Frequently vibration and noise from such machinery can be greatly reduced by cushioning the machine foundation with rubber, felt, cork, or other elastic material.

(c) Machines should be so located with respect to sources of both natural and artificial light, that light of sufficient intensity will fall on the work. Supplementary illumination at the point of operation should be provided where necessary. Direct or reflected glare and shadows including moving shadows should be avoided. NOTE: For specific requirements and helpful information see American Recommended Practice of Industrial Lighting A11-1942.

NOTE: Proper lighting is of vital importance. While no definite figure can be given to show the importance of bad lighting in causing accidents, careful studies of the subject have shown that except in modern well-lighted plants insufficient or otherwise defective lighting is a factor in at least one accident out of four. Too much is often as bad as insufficient illumination. It is also important that continuous attention be given to the maintenance of all lighting equipment, i.e., cleaning and adjustments of reflectors. Dust accumulated on the lamp bulbs quickly cuts down the intensity of the light. Recent investigations indicate that the color of ceilings, walls,

1

floors, and equipment has a definite bearing on the absorption of light. In general, it is suggested that preference be given to colors which absorb less light and that important or dangerous parts of equipment be in contrasting color in order that they will be seen easily.

(d) Provision should be made for the removal of shavings and dust.

NOTE: For specific requirements see American Standard Regulations for the Installation of Blowers and Exhaust Systems for Dust, Stock, and Vapor Removal, Z-33.1-1938.

2.2--Floors and Aisles:

2.2.1--Repair of Floors. All floors shall be kept in good repair and, shall be free from protruding nails, splinters, holes, unevenness, loose boards, and tripping hazards such as pipes, wiring, conduits, extension cords, junction boxes and the like.

2.2.2--Non-slip Floors. Floors in the working area about all wood working machines shall be provided with effective means to prevent slipping. NOTE: Falls are a major source of injuries. Obviously falls about machinery are particularly dangerous.

Slippery floors may be prevented by:

- (a) Sprinkling sharp sand or abrasive grains or a heavy fresh coating of paint, varnish or glue.
- (b) Periodical application of paints containing abrasive particles.
- (c) Installing a non-slip floor covering or mat about the machine.

If this is done the floor should be recessed to the thickness of the material or the edges of the floor covering should be beveled to a thickness of not over 1/8 inch.

(d) Keeping wood chips and sawdust (particularly on wooden floors) off the floor by suitable exhausts, enclosures and collectors. This also reduces cleaning-up costs, reduces the fire hazard and the health hazard and means a better place to work.

2.2.3--Aisles. In new installations and in extensive rearrangements in existing installations aisles for one-way traffic shall be not less than the width of the widest vehicle or load plus 3 feet. Lines shall be painted on the floor or some similarly effective method be employed to mark aisleways.

NOTE: Aisle congestion is a serious source of injuries to personnel and damage to stock and equipment. It can also interfere seriously with production and cause inefficiency and loss of time.

SECTION 3 -Machines and Equipment

3.1--Machine Construction, Drive, working surface of each machine

FEED, SPEED, AND CONTROL:

3.1.1--Machine Construction.

(a) The height of the table should be such as to best promote efficient operation with minimum fatigue for the operator.

NOTE: The height of table (or point of operation) above the floor for various machines for best efficiency should be as follows:

| | | | |
|---------------|-----|----------|-----|
| Circular Saws | 36" | Shapers | 36" |
| Band Saws | 42" | Jointers | 36" |

(b) Each machine shall be so constructed as to be free from sensible vibration when the largest size tool is mounted and run idle at full speed. NOTE: Vibration tends to wear and break down machinery and increases the danger of the breakage or throwing of knives and of other accidents. Excessive vibration also makes good work more difficult, slows production, and increases spoilage.

2

(c) Arbors and mandrels shall be constructed as to have firm and secure bearing and be free from play.

(d) The use of wooden band-saw wheels other than those of commercial manufacture is prohibited.

(e) Oscillating saws (automatic cut-off machines where two or more saws or arbors are rotated about each other continuously) are prohibited.

(f) Saw frames or tables should be constructed with lugs cast on the front of the frame or provided with an equivalent means to limit the size of saw that can be mounted, so as to avoid overspeed due to mounting a saw larger than intended.

NOTE: The purpose of this is to avoid saw overspeed due to mounting a blade larger than the machine was designed for.

(g) Rip-saw gauges or fences shall be so constructed that they can be positively secured to the table without changing their alignment with the saw. Saw with tilting tables or tilting arbors the gauge or fence shall be so constructed that it will remain accurately parallel to the saw regardless of the angle of the saw with the table.

NOTE: A guide that is loose or out of alignment with the saw blade will cause kick-backs, and work

necessary to see the line of cut to make a true cut.

(h) Crosscut saw gauges or fences shall be so constructed as to slide in grooves or tracks that are accurately machined to insure exact alignment with the saw for all positions of the guide.

(i) Hinged saw tables shall be so constructed that the table can be positively secured in any position and in true alignment with the saw.

3.1.2--Machine Drive. Driving power for woodworking machinery should be direct-connected individual motors.

NOTE: In order to keep the sawdust out it is advisable to provide complete enclosure for gears and V-belts. Furthermore V-belts are far more hazardous than flat belts of similar strength and power-transmitting capacity. Their nip-points should always be effectively guarded.

The initial expense of individual motor drive is frequently higher than that of other power-transmission equipment such as line shafting, etc., but it is usually preferable because it provides better control of the individual machines, the elimination of overhead shafting and belting improving lighting and general appearance of the shop, avoids the expense and hazards of oiling and maintenance of overhead transmission equipment.

3.1.3--Machine Control

(a) A mechanical or electrical power control shall be provided on each machine which will make it possible for the operator to cut off the power from each machine without leaving his position at the point of operation. NOTE: Where there is electrical control, it is recommended that hand-fed circular saws, and machines of like operation be provided with an emergency foot switch which will make it possible for the operator to cut off the power without removing his hands from the work.

(b) On machines driven by belts and shafting a locking-type belt shifter or an equivalent positive device shall be used.

NOTE: At no time should it be necessary for an operator to shift a transmission belt by hand.

3.1.4--Self-Feed. Automatic feeding devices on machines should be installed wherever the nature of the work will permit.

NOTE: Automatic feeding devices are advantageous not only because they remove the operator's hands from the danger zone but they usually increase production as well.

3

3.1.5--Speeds. Circular saws shall not be operated at speeds in excess of 10,000 peripheral feet per minute unless especially tensioned for higher speeds in which cases the manufacturers etch upon each saw blade the speed at which it should operate. These etched speeds shall not be exceeded. Saw blades not so etched shall not be operated in excess of 10,000 peripheral feet per minute.

The following table gives the revolutions per minute for various diameters of saw blades when the peripheral speed is 10,000 feet per minute

| Diameter of Saws | R.P.M. | Diameter of Saws | R.P.M. |
|------------------|--------|------------------|--------|
| 8" | 4,774 | 20" | 1,910 |
| 10" | 3,819 | 22" | 1,736 |
| 12" | 3,183 | 24" | 1,592 |
| 14" | 2,728 | 26" | 1,469 |
| 16" | 2,387 | 28" | 1,364 |
| 18" | 2,122 | 30" | 1,273 |

SECTION 4 MACHINES

4.1-- CIRCULAR, RIP, CROSSCUT, RESAW AND SWING CUT-OFF SAWS:

4.1.1--Guarding of Saws Beneath and Behind Tables. For all circular saws where conditions are such that there is a possibility of contact with the portion of the saw either beneath or behind the table, that portion of the saw shall be covered by the exhaust hood or if no exhaust system is required then with a guard that shall be so

NOTE: The part of the saw blade beneath or behind the table is not necessarily guarded by location since sweepers, operators, and maintenance men must at times work or reach underneath the saw table. Intent on their work, they occasionally come in contact with the saw unless it is guarded. The guard should be so designed as not to collect sawdust.

4.1.2--Hand-fed Rip-saws.

(a) Hoods. Each circular hand-fed rip-saw shall be guarded by a hood which shall completely enclose that portion of the saw above the table, and that portion of the saw above the material being cut. The hood and mounting shall be so arranged that the hood will automatically adjust itself to the thickness of and remain in contact with the material being cut, but it shall not offer any considerable resistance to insertion of material to saw or of passage of material being sawed. The hood shall be of adequate strength to resist blows and strains incidental to reasonable operation, adjusting, and handling, and shall be so designed as to protect the operator from flying splinters and broken saw teeth. It shall be made of material that is soft enough to be unlikely to cause tooth breakage. The material should not shatter when broken, should be non-explosive, and should be no more flammable than wood. The hood shall be so made that the operator can see his line of cut when he is in proper position to feed the saw.

The hood shall be so mounted as to insure its operation to be positive, reliable, and in true alignment with the saw; and the mounting shall be adequate in strength to resist any reasonable side thrust or other forces tending to throw it out of line.

NOTE: Many circular saw hood guards of requisite strength and good design are on the market. It is emphasized that homemade guards are rarely effective because their proper design is difficult. The following information is from the American Standard:

4

HOOD MOUNTING. Saws are used for so many operations that it is doubtful if any one type of mounting will fit all possible conditions.

For efficiency and serviceability of the guard, mountings are recommended in the following order: (a) Hood mounted on spreader attached to throat piece (throat piece should be locked in position); (b) Other spreaders attached to frame, carriage or table; (c) Arm mounting attached to table or frame; (d) Ceiling, side-suspension, or floor-stand mountings should only be used when other types of mountings are impractical.

DISCUSSION OF MOUNTINGS.

(a) If hood is mounted on spreader, it can be used even if material being cut extends beyond the sides of the saw table. But this mounting is not practical for grooving, dadoing, or rabbeting operations.

(b) If hood is mounted on an arm attached to the side of the table it can be used on most grooving, dadoing, and rabbeting operations; but this arm will restrict the size of work that can be cut on that side of the table.

(c) It will be an added advantage in some operations if the hood and mounting can be so designed that the hood will prevent the material being cut from being raised off the table by the centrifugal upward force of the saw in case of pinching or binding before material reaches the spreader.

(d) For tilting-arbor or tilting-table saws the hood should be mounted on the saw frame or carriage so that the hood will remain in line with the saw when the saw or table is tilted at an angle.

HAND-FED RIP-SAWS

(b) Spreaders. Each hand-fed circular rip-saw shall, be furnished with a spreader to prevent material from squeezing the saw or being thrown back on the operator. The spreader shall be made of saw steel or tool steel, or its equivalent, that has been hardened, tempered, and ground to gauge so that it is thinner than the saw kerf but thicker than the saw blade. It shall be of sufficient width to provide adequate stiffness or rigidity to resist any reasonable side thrust or blow tending to bend or throw it out of position. The spreader shall be so attached as to remain in true alignment with the saw even when either the saw or table is tilted and should be so placed that there is not more than 1/2 inch space between the spreader and the back of the saw when the saw is mounted in the machine.

completion of such operations, the spreader shall be immediately replaced.

NOTE:CIRCULAR-SAW SPREADERS--Each spreader should be so shaped on the side toward the saw that it will approximately follow the curve of the saw, and should be not less than 3 1/2 inches wide at the level of the table. If for some special reason this width cannot be obtained, a minimum of not less than 2 inches may be regarded as permissible.

The value of a spreader in preventing kick-backs decreases rapidly with its distance from the back of saw. In no case should this distance be greater than 1/2" inch, but 1/4" inch is better if proper design, installation, and maintenance is followed. When throat pieces are used a spreader should be firmly mounted on each throat piece. The throat piece must fit accurately and securely locked in place to give the spreader adequate stability.

When the spreader is mounted on the saw arbor it should not extend above the top saw teeth so that it need not be removed in grooving.

Hand-fed Rip-Saws

(c) Non-Kick-back Fingers or Dogs. Each hand-fed rip-saw shall be provided with one or more non-kick-back fingers or dogs mounted on the hood and so located as to oppose the thrust or tendency of the saw to pick up the material or throw it back toward the operator. They shall be designed to provide adequate holding power for all thickness of materials being cut.

NOTE: Circular-Saw Kick-backs-- Kick-backs on rip-saws are usually caused by one of the following: (a) Failure to provide effective spreader; (b) Improperly conditioned saw allowing material to pinch on saw; (c) Improper alignment of gauge or fence; (d) Improperly conditioned or twisted green lumber.

Properly mounted anti-kick-back dogs, kept sharp and free to move, will prevent most kick-backs.

Some dogs are so designed as to be very effective for one thickness of material but have very little holding power when used on either much thicker or much thinner material. Other dogs have very good holding power but are so located that they do not come in contact with the material when it is in position to be thrown upward by the saw. For a circular saw where the arbor is above the table the rotation of the saw is reversed and it would therefore be necessary to locate the kick-back fingers in front or ahead of the saw to oppose the upward thrust of the saw.

The higher the saw blade extends above the work, the less the chance of a kick-back because it is the forward running teeth at the top of the blade that gives the "kick" to the lumber. Therefore, "Keep the saw blade up and the lumber down" is an important maxim.

Fillister Piece--In order to use the hood guard effectively on circular rip-saws when cutting narrow strips, a fillister piece should be used. This should be made of wood about 2' inches wide. It should be about 3/4 inch thick or slightly thinner than the thickness of the material being cut. It should be provided with cleats or brackets at the end so that it will either fit down over the front and back ends of the table, or can be quickly attached to the fence or gauge.

Special consideration should be given to the use of jigs or fixtures when cutting irregular pieces or oblique angles. A special application of this principle is the jig for cutting wedges and pointing stakes.

4.1.3--HAND-FED CROSSCUT TABLE SAWS (Including Trimmer Saws).

(a) Each circular crosscut table saw shall be guarded by a hood which shall meet all the requirements of 4.1.2a for hoods for circular rip- saws.

(b) Each circular crosscut saw should also be provided with a spreader which should meet all the requirements of 4.1.2b.

(c) Hoods for trimmer saws with mechanical feed should remain in contact with the material being cut but this is not mandatory.

SAFE OPERATING METHODS -CIRCULAR RIP-SAWS

1. Only experienced operators that have received complete instructions and authorization should be permitted to operate circular saws.
2. Before starting a rip-saw the following parts of the machine should be checked to make sure that it is in proper operating condition: (a) Inspect the saw blade for cracks. Cracked saws are hazardous and should not be used. (b) Make sure that blade is not dull. A dull blade is more hazardous than a sharp one. (c) See that the saw blade is firmly

tightened to the arbor. (d) Check the spreader to see that it is in exact alignment with the saw blade and is set not over ½” inch from the rear of the saw blade. (e) See that all guards are in place and in operating condition (Transmission, Hood, Anti-kick-back device, and fence or guide). (f) Clear the saw table of scrap lumber and sawdust. (g) Make sure the work area around the machine is clean and not slippery.

3. When operating a circular rip-saw the operator should take a position to one side of the work to be pushed through the saw. This is done to prevent the lumber from striking the operator in case of a kick-back.
4. For short ripping and when lumber is partially through the saw and the uncut end rests completely on the table, a push stick should be used to guide the lumber through the saw. This is done to prevent any possibility of the operator's hand from coming in contact with the saw blade.
5. Before the operator leaves his machine at the completion of the job or for any other reason, the machine should be shut down.
6. After the operator shuts down the machine he should allow the saw blade to come to a complete stop before reaching to close it. The practice of slowing the blade down by thrusting a piece of wood against the cutting edge while the power is off should never be permitted.
7. Operators should wear safe clothing (no ties, no loose sleeves, no gloves, no jewelry) and safety goggles when operating a circular rip-saw. Loose clothing can be caught on the lumber and pull the operator's hands or body into the saw blade. Safety goggles will prevent sawdust, chips and possible flying portions of a broken saw blade from injuring the operator's eyes.
8. When cleaning a circular rip-saw, the machine should first be shut down. When the saw blade has stopped rotating a long-handled brush should be used to clean the machine.

4.1.4--REVOLVING DOUBLE ARBOR SAWS. Revolving double arbor saws shall be fully guarded in accordance with all of the requirements for circular crosscut saws or with all of the requirements for circular rip saws according to the kind of saws that are mounted on the arbors.

4.1.5--Circular Resaws.

(a) Each circular resaw shall be guarded by a hood or shield of metal above the saw. Such hood or shield shall be so designed as to guard against danger from flying splinters or broken saw teeth.

(b) Each circular resaw (other than self-feed saws with a roller or wheel at back of the saw) shall be provided with a spreader fastened securely behind the saw. The spreader shall be slightly thinner than the saw kerf and slightly thicker than the saw disk.

4.1.6--SELF-FEED CIRCULAR SAWS.

(a) Hoods. Feed rolls and saws shall be protected by a hood or by semi-cylindrical guards to prevent the hands of the operator from coming in contact with the in-running rolls at any point. The guard shall be constructed of heavy material, preferably metal, and the bottom of the guard shall come down to within 3/8” inch of the plane formed by the bottom or working surfaces of the feed rolls.

NOTE: Good practice requires the exhaust hood should be designed to guard the feed rolls.

(b) Non-kick-back Fingers. Each self-feed circular rip-saw shall be provided with sectional non-kick-back fingers for the full width of the feed rolls. They shall be located in front of the saw.

NOTE: The non-kick back fingers dig into the lumber if and when it starts riding back on the saw and prevents the lumber from kicking back

toward the operator. These fingers must be periodically sharpened and when wear has appreciably shortened them they should be replaced. All should be of the same length.

4.1.7--SWING CUT-OFF SAWS. The requirements of 4.1.7 are also applicable to sliding cut-off saws mounted above the table.

(a) Hood. Each swing cut-off saw shall be provided with a hood that will completely enclose the upper half

such a manner and of such material that it will protect The operator from flying splinters and broken saw teeth and will afford the operator a clear view of the cutting edge of the saw at all times.

The hood shall be hinged at the back and provided with an extension at the front so that, when the saw is returned to the back of the table, the hood will raise on top of the fence; and when the saw is moved forward, the hood will drop on top of, and remain in contact with the material being cut. NOTE: Most manufacturers of swing cut-off saws include hoods but some of these fail to enclose the point of operation at the lower section of the saw. There are at least two types of supplementary guards on the market to meet this condition. One is an adjustable extension to the hood that can be set in a fixed position immediately above the stock to be cut. The other is a hinged or floating section that is attached to the hood so that it rides over the stock being cut and completely enclose the point of operation.

(b) Counterweights. Each swing cut-off saw shall be provided with an effective device to return the saw automatically to the back of the table when released at any point of its travel. Such device shall not depend for its proper functioning upon any rope, cord, or spring. If there is a counterweight, the bolts supporting the bar and counterweight shall be provided with cotter pins; and the counterweight shall be prevented from dropping by either a bolt passing through both the bar and the counterweight, or a bolt put through the extreme end of the bar, or, where the counterweight does not encircle the bar, a safety chain attached to it. NOTE: Counterweights, being out of the way are apt not to be inspected, become loose and fall on the operator. Once properly set no further adjustment is needed for a specific machine and therefore in many shops the counterweight is molded in place when its proper position has been made sure of.

(c) Limit Stops. Limit chains or other equally effective devices shall be provided to prevent the saw from swinging beyond the front or back edges of the table, or beyond a forward position where the gullets of the lowest saw teeth will rise above the table top.

NOTE: Where wider than standard stock is being cut, i.e., over 12 inches, a lip or table extension may be installed directly in front of the saw.

(d) Latches. A latch should be provided to catch and retain the saw at the rear of the table and to prevent its rebounding.

SAFE OPERATING METHODS -CROSS CUT SAWS

NOTE: The safe operating methods as outlined under Circular Rip Saws apply to cross cut saws with the following additions:

1. The operator should take a position to the right of the saw blade, feed the material with his right hand, grasp the saw handle with his left hand and draw it across the lumber. In this position he is much less likely to reach into the line of cut and his body is not in front of the saw.

2. At the completion of each cut the saw should be returned past the guide and to its stationary rest. This should be done to prevent a possible rebound. The saw should also be so mounted as to have little tendency to rebound.

4.1.8--INVERTED SWING CUT-OFF SAWS (JUMP SAWS). Inverted swing cut-off saws shall be provided with a hood that will cover the part of the saw that protrudes above the top of the table or above the material being cut. It shall automatically adjust itself to the thickness of and remain in contact with the material being cut.

NOTE: Where jump saws are foot operated, provisions should be made to prevent accidental depression of the treadle. An inverted U-shaped guard over the treadle is applicable.

4.1.9--PORTABLE CIRCULAR SAWS. All portable, power driven saws shall be equipped with guards which will automatically adjust themselves to the work when in use, so that none of the teeth are exposed to contact above the work and when withdrawn from the work, the guard shall completely cover the saw to the depth of the teeth. All such saws should be equipped with a spreader.

NOTE: The frames of all portable saws should be grounded by means of a cord having a built-in ground connection. Where the building wiring does not include a grounding circuit, a suitable ground should be provided at each plug-in point.

In some models of portable saws the control buttons are not guarded to prevent unexpected starting due to accidental contact. All such controls should be protected by means suited to the condition.

SAFE OPERATING METHODS -ALL CIRCULAR SAWS (General)

1. No foreman or other person in charge should permit a circular saw to be operated with hood, spreader, or kickback device removed, or rendered in-operative, unless the nature of the operation renders it impossible of performance with such devices, or any of them, in position, in which case same should be immediately replaced upon completion of such operation.

2. The practice of inserting wedges between the saw disk and the collar to form what is commonly known as a "wobble saw" should never be resorted to. It is an extremely dangerous practice.

3. Saws should be inspected for cracks each time the teeth are filed or set. The cracks usually start in the gullets of the saw teeth. If cracked saws are continued in service, the crack gradually extends and may eventually cause the saw to fly apart. Also cracked saws do not cut as well, vibrate, and run snaky. If the saw is removed from service as soon as a crack is discovered the blade can usually be repaired by welding but this requires special skill both for the welding and the retensioning. The safest course is to return all cracked blades to the manufacturer for repair or replacement.

Some of the more important good operating rules are:

1. The saw should be operated only at the speed for which it is tensioned. If overspeeded much, the saw will wobble and vibrate causing it to heat and probably crack.

2. The teeth must have sufficient clearance (Set or hollow grinding) to prevent burning. If the saw gets hot and expands, cracking is likely.

3. The saw should be in perfect round.

4. The saw must be in perfect balance.

5. Saws must be kept sharp at all times. A dull saw forced will pound through the wood and thus cause heat and vibration expansion and then cracking.

6. A saw should never be forced. A saw in proper condition will practically "take" the work itself and will cut clearly without heating or vibration and will not readily kick-back.

4.2--BAND SAWS AND BAND RESAWS:

4.2.1--Enclosing Band-Saw Blades. All portions of the saw blade shall be enclosed or guarded, except the working side of the blade between the guide rolls and the table. Band-saw wheels shall be fully encased.

The outside periphery of the enclosure shall be solid. The front and back of the band wheels shall be either enclosed by solid material, by wire mesh or perforated metal. Such mesh or perforated metal shall be not less than 0.037 inch (U.S. Gauge No.20) and the openings shall be not greater than 3/8 inch. Solid material used for this purpose shall be of an equivalent strength and firmness. The guard for that portion of the blade between the sliding guide and the upper-saw-wheel guard shall either enclose the saw blade or protect the saw at the front and both sides.

The portion of the guard shall be self-adjusting to raise and lower with the guide. The upper-wheel guard shall be made to conform to the travel of the saw on the wheel and the top member of the guard should have at least a 2 inch clearance outside the saw and be lined with smooth material, preferably metal.

A large portion of band-saw accidents are caused by improper maintenance of wheel and blade enclosures even though they may be provided. It is necessary to require continuous inspection, repair, and adjustment especially of the blade enclosure between the upper wheel and the guide rolls at the point of operation.

No band-saw wheel should be run in excess of a speed which will allow a factor of safety of 10 for all parts of the wheel.

The wheel and also the frame of the saw should be marked by the manufacturer, showing the maximum allowable speed in revolutions per minute.

Band-saw wheels should be designed, manufactured, and mounted so that they will run true at the maximum allowable speed without excessive vibration.

4.2.2--Automatic Tension. Each band-saw machine shall be provided with an automatic tension control device to prevent breakage of saw blades due to improper tension.

4.2.3--Feed Rolls. Feed rolls of band resaws shall be protected with a semi-cylindrical guard to prevent the hands of the operator from coming in contact with the in-running rolls at any point. The guard shall be constructed of heavy material, preferably metal, and the edge of the guard shall come to within 3/8 inch of the plane formed by the inside face of the feed roll in contact with the stock being cut.

The required semicylindrical guards for the feed rolls of a band resaw should be attached to the framework holding the rolls so that they will be self-adjusting to the size of stock being run. Where an exhaust is provided it may be so designed as to guard the feed rolls.

SAFE OPERATING METHODS -BAND SAWS AND BAND RESAWS

1. Before starting a band saw not equipped with a tension indicator the blade should be tested with fingers and proper tension secured. Tension should be released from the blade when it is not in use.

2. The back thrust should be adjusted carefully to the normal position of the saw blade.
3. In cutting resinous or green wood an accumulation will build up on the band wheel. Unless the wheel is kept free of such build-up, blade breakage will result.
4. Using a small saw for large work or forcing a wide saw to cut on a small radius is bad practice. The saw blade should in all cases be as large as the nature of the work will permit.
5. Saws should not be stopped too quickly, nor by thrusting a piece of wood against the cutting edge of teeth when power is off. Modern saws are equipped with magnetic brakes which operate automatically when the power is shut off.
6. Kinked saw blades should be returned to the manufacturer for reconditioning. The kinking will have strained the metal beyond its yield point and if straightened by hammering, the blade will be weak at that point.
7. To avoid vibration, brazed joints should be the same thickness as the saw blade.
8. Each saw should be carefully examined as it is put on or taken off the band wheel to detect cracks or other defects. Cracked saws or saws which indicate probability of breakage should be promptly removed.
9. Band-saw blades break readily when cold. Room temperature should not be below approximately 45 degrees F. else the blade is likely to break when the machine is started.
10. A brush should be used for removing chips and sawdust from the working table.
11. Care should be used in the selection, as to size, shape and material of swabs used for lubricating resaw blades. The use of loose rags or waste should be prohibited.

4.3--JOINTERS:

4.3.1--Point of Operation. Each hand-fed planer and jointer with horizontal head shall be equipped with a cylindrical cutting head, the throat of which shall not exceed 7/16 inch in depth nor 5/8 inch in width. It is strongly recommended that no cylinder be used in which the throat exceeds 3/8 inch in depth or 1/2 inch in width. The square head is prohibited.

NOTE: The accident data shows that the jointer is one of the most dangerous of the woodworking machines. Effective guards are available but they must be faithfully used and properly maintained. The type of guard which is automatically adjustable both vertically and horizontally is far superior to the so-called "leg of mutton" type of guard because it keeps the operator's hands away from the knives more effectively.

4.3.2--AUTOMATIC GUARDS

(a) Each hand-fed jointer with a horizontal cutting head shall have an automatic guard which will cover all the section of the head on the working side of the fence or gauge. The guard shall automatically adjust horizontally for edge jointing and vertically for surface work, and shall remain in contact with the material at all times.

(b) Each hand-fed jointer with horizontal cutting head shall have a guard which will cover the section of the head back of the gauge or fence.

NOTE: The chief sources of injuries in jointer operation are the jointing of short pieces and taking too deep cuts. In running pieces less than 18" in length, push blocks or jigs should always be used. Great care should always be taken to set the knives for the correct cut for the nature of the wood being run. A semicircular metal cover hinged to the rear of fence is practical. It may be made to telescope if space is limited.

4.3.3--VERTICAL-HEAD JOINTERS. Each wood jointer with vertical head shall have either an exhaust hood or other guard which will cover the section of the head back of the gauge or fence.

SAFE OPERATING METHODS--JOINTERS

1. Spring tension should be checked regularly to assure satisfactory automatic operation of the point of operation guard.
2. The knives of the cutting head should also be inspected periodically for sharpness, chipping, etc. Dull knives will cause kick-backs, especially on edging of short stock or angle-cut stock.
3. Taking too deep a cut should be avoided. The maximum cut is naturally determined by the type of stock being run, but over-cutting is a frequent cause of kick-backs.
4. The position of the operator's hand is important. At the start of the cut one hand should be back of the head and unless a pusher stick is used, the other hand should take over the motion after the leading edge of the piece has passed the cutter. The pushing hand should not be rested over and along the top of the guide, since the fingers naturally ride along the rear of the guide or fence, and--if the rear guard is slightly out of adjustment--contact with the knife is probable.
5. The hazard of jointing short pieces may be eliminated by surfacing the stock before cutting it to length. Many shops follow this practice even at the expense of wasting moderate amounts of material, rather than accept the increased hazard of jointing short pieces.
6. The use of jigs, particularly on production work, is strongly recommended, because they permit jointing without the necessity of the operator's hands ever being close to the cutting head.

4.4--TENONING MACHINES:

4.4.1--Guarding of Cutting Heads.

(a) Each tenoning machine shall have all cutting heads, and saw if used, covered by metal guards. These guards shall cover at least the unused part of the periphery of the cutting head. If such guard is constructed of sheet metal, the material used shall be not less than 1/16 inch in thickness; and if cast iron is used, it shall be not less than 3/16 inch in thickness.

NOTE: It is not contemplated that the above hoods will retain a thrown or broken knife.

NOTE: Modern tenoners are now being manufactured with completely guarded cutting heads including the back, or trim, saw. Standard guarding of older type machines requires a certain amount of ingenuity, particularly for the saw, but it can be enclosed, leaving only the lower half of the blade exposed.

(b) Where exhaust system is used, the guard shall form part or all of the exhaust hood and shall be constructed of metal of a thickness not less than the above.

NOTE: The amount of waste material produced by a tenoner practically makes the use of an exhaust hood system a production necessity. Furthermore an exhaust hood is the most feasible means of enclosing the heads.

The enclosing of chains and sprockets eliminates the nip and shear point hazard which is serious on an unguarded feed.

The nip point between the end of the table or chute, which receives the material after it has been run, can be eliminated by proper design so that the opening between the two is insufficient for a "take-away" man's hands or gloves to enter.

The extending of the frame protects the "take-away" man by location.

4.4.2--FEED CHAINS AND SPROCKETS.

(a) Feed chains and sprockets of all double end tenoning machines shall be completely enclosed, except that portion of chain used for conveying the stock.

(b) At rear ends of frames over which feed conveyors run, sprockets and chains shall be guarded at sides by plates projecting beyond periphery of sprockets and ends of lugs.

(c) Where space permits, the rear end of the frame over which the feed conveyors run should be so extended that the material as it leaves the machine will be guided to a point within easy reach of the person "Taking-away" at the rear of the tenoner.

4.4.3--Hand-fed Tenoners. Hand-fed tenoning machines should be provided with a clamping or "hold-down" device to help the operator to hold the material being cut.

NOTE: The hold-down bar can be made mechanical by installing an adjustable latch to secure the bar on the stock being worked. If a manual hold-down bar is used, the operator's hand should be protected by a "Knuckle-guard" attached to the handle on the side next to the cutting head .

SAFE OPERATING METHODS –Tenoners

1. Proper maintenance of guards, knives, saws, bearings, etc., is especially important on tenoners, as with all multiple point of operation machinery.
2. Only well-trained, experienced operators should be employed.
3. Signs prohibiting operation by untrained personnel should be posted.
4. The design and location of the hold-down bar on hand-fed machines should be such that at no time will it be necessary for the operator's hands to be close to any cutting head or saw.

4.5--BORING AND MORTISING MACHINES:

4. 5. 1--CHUCKS. Safety-bit chucks with no projecting set screws shall be used.

NOTE: Set screws or other projections make possible the entangling of clothes, hair, or hands by the revolving part.

4.5.2--BORING BITS. Boring Bits shall be provided with a guard that will enclose all portions of the bit and chuck above the material being worked.

NOTE: All machines, vertical or horizontal, should be equipped with a device for securing the material accurately and positively to the bed or table.

4.5.3--CHAIN MORTISER. The top of the cutting chain and driving mechanism shall be enclosed.

4.5.4--COUNTERWEIGHTS. If there is a counterweight, one of the following or equivalent means shall be used to prevent its dropping;

- (a) It shall be bolted to the bar by means of a bolt passing through both bar and counterweight;
- (b) A bolt shall be put through the extreme end of the bar;
- (c) Where the counterweight does not encircle the bar, a safety chain shall be attached to it;
- (d) Other types of counterweights shall be suspended by chain or wire rope and shall travel in a pipe or other suitable enclosure wherever they might fall and cause injury.

NOTE: Vibration, however slight, can loosen set screws, bolts, or cotter pins and therefore the hazard of falling counterweights should be eliminated by attaching a safety chain to the bar and the weight or

by welding the counterweight to the bar.

4.5.5--UNIVERSAL JOINTS. Universal joints on spindles of boring machines shall be completely enclosed to prevent injury to operator.

4.5.6--GUARDING OPERATING TREADLES. Each operating treadle shall be covered by an inverted-U-shaped metal guard, fastened to the floor, of adequate size to prevent accidental tripping.

NOTE: The design of such a guard should be carefully considered since inadequate clearance for the operator's foot has been the cause of some accidents. The guard must effectively protect the treadle from falling objects but it must allow easy access for the foot.

SAFE OPERATING METHODS -BORING AND MORTISING MACHINES

1. Jigs can be used to advantage on table-type mortising or boring equipment, especially on production work. A jig used with the positive hold-down device completely eliminates the necessity of having the operator place his hands in the "danger area".

2. These machines should be provided with a mechanical or magnetic brake which will stop the machine as soon as the power is off. This increases the protection for the operator in the event of an emergency.

4.6--WOOD SHAPERS, Etc.:

4.6.1--GUARDING OF CUTTING HEADS. The cutting heads of each wood shaper, hand-fed panel raiser, or other similar machine not automatically fed, shall be enclosed with a cage or adjustable guard so designed as to keep the operator's hands away from the cutting edge. The diameter of the circular shaper guards shall be not less than the greater diameter of the cutter. In no case shall a warning device of leather or other material attached to the spindle be acceptable.

Cylindrical heads should be used wherever the nature of the work will permit. Templates, jigs, and fixtures which will remove the operator's hands from the point of operation shall be provided and workers shall be required to use them whenever the nature of the work will permit.

NOTE: Knife blades and collars for shaper heads should be precision ground so as to give uniform pressure on all knife blades and keep them from flying out during operation.

Shaper head collars can be provided with "stop-pins" which assist in retaining the knives in the head. These are merely pins inserted through the collar and recessed into the knife.

It is desirable to incorporate an automatic brake into the design of high-speed machinery such as shapers in order that the rotation of the head may be stopped as quickly as possible after the power is off.

4.6.2--SPINDLE STARTING AND STOPPING DEVICES. All double-spindle shapers shall be provided with a spindle starting and stopping device for each spindle.

SAFE OPERATING METHODS – SHAPERS

1. The practice of holding a block of wood, approximately 2 x 12 x 1 1/2 inches on edge in front of the head, between the operator and the cutting head is advisable when starting the shaper up--as a precaution against a loose knife.

2. Only experienced operators should be allowed to work on shapers.

3. Warning signs prohibiting operation by unauthorized personnel should be conspicuously posted and their observance enforced.

4.7--PLANING, MOLDING, STICKING AND MATCHING MACHINES, Etc.:

4.7.1--GUARDING OF CUTTING HEADS.

(a) Each planing, molding, sticking, and matching machine shall have all cutting heads, and saws if used, covered by a metal guard. If such guard is constructed of sheet metal, the material used shall be not less than 1/16 inch in thickness; and if cast iron is used, it shall be not less than 3/16 inch in thickness.

NOTE: It is not contemplated that the above hoods will retain a thrown or broken knife.

NOTE: Cutting heads on these machines present the same hazard as do all high-speed rotating cutting or surfacing equipment. All will throw their knives with a great force unless they are properly set up and well maintained.

(b) Where an exhaust system is used, the guards shall form part or all of the exhaust hood and shall be constructed of metal of a thickness not less than the above.

NOTE: Here again the use of exhaust hoods as guarding enclosures is the most practical solution. The hood is not expected to retain or stop a thrown blade but does, however, protect the operator's hands from contact with the knives.

4.7.2--FEED ROLLS.

(a) Feed rolls shall be guarded by a Hood or a semicylindrical guard to prevent the hands of the operator from coming in contact with the in-running rolls at any point. The guard shall be fastened to the frame carrying the rolls so as to remain in adjustment for any thickness of stock.

NOTE: It is important that the feed roll guards be attached to the framework that carries the rolls so that they are automatically adjustable to the stock.

(b) Planers shall be equipped with sectional feed rolls.

(c) Where solid feed rolls are used, the sectional finger type of anti-kick-backs shall be provided.

NOTE: It is recommended that the barrier guard be set to allow a clearance of only 1/4 inch between the lower edge of the barrier and the plane formed by the lower side of the roll.

The non-kick-back fingers for a smooth feed roll should be ground with the angle on the in-running face in order that they will hold a kick-back no matter what the thickness of stock may be. The individual finger type of dogs should be used.

SAFE OPERATING METHODS--PLANING, MOLDING, STICKING, AND MATCHING MACHINES, Etc.

1. Employees handling stock should be provided with heavy protective aprons--preferably of leather.

2. Means should be provided for assuring that the power cannot be applied to a machine while it is under repair or while cutting heads are being adjusted. The method recommended is to arrange the controls so that they can be locked open with individual padlocks for each person who works on the machine.

4.8-Profile and Swing-Head Lathes (Including Wood Heel Turning Machines):

4.8.1-Guarding of Cutting Heads.

(a) Each profile and swing-head lathe shall have all cutting heads covered by a metal guard. If such guard is constructed of sheet metal, the material used shall be not less than 1/16 inch in thickness; and if cast iron is used, it shall not be less than 3/16 inch in thickness.

NOTE: It is not contemplated that the above hoods will retain a thrown or broken knife.

NOTE: A hazard point that is often overlooked is the back-knife. This can be guarded by a barrier which will protect the operator or other personnel against unintentional contact. While there is no real necessity for the operator to approach this cutting head, injuries do occur if it is not guarded.

As far as possible, all chucks and other rotating parts should be smooth and free from projections.

(b) Where an exhaust system is used, the guard shall form part or all of the exhaust hood and shall be constructed of metal of a thickness not less than the above.

NOTE: Exhaust hoods should be designed to cover the point of operation as far as practicable. In many shops guards of sheet metal or reinforced plastic, hinged to be swung back out of the way to permit insertion and removal of the work, are used both to give protection and to stop flying chips.

SAFE OPERATING METHODS--LATHES

1. Hold-down equipment, or other methods of securing the stock to the bed or table should be utilized whenever practical. This eliminates the need for the operator to come within the hazardous area.

2. The principal hazard in lathe operation is connected with manually operated rigs, when the workman attempts to take too great a cut or when the tool is dull. In such cases he is likely to have the tool torn from his hand and probably gets it back either off of the wall or through rotation of the chuck. The set of the tool rest is important.

4.9- SANDING MACHINES:

4.9.1--Feed Rolls. Feed rolls of self-feed sanding machines shall be protected with a semi cylindrical guard to prevent the hands of the operator from coming in contact with the in-running rolls at any point. The guard shall be constructed of heavy material, preferably metal, and firmly secured to the frame carrying the rolls so as to remain in adjustment for any thickness of stock. The bottom of the guard should come down to within 3/8 inch of a plane formed by the bottom or contact face of the feed roll where it touches the stock.

NOTE: While common practice requires 3/8 inch clearance for this guard it is suggested that a 1/4 inch clearance is desirable. This is due to increased employment of women in industry. Extensive measurements made in connection with a study of glove sizes shows that many women can readily put their fingers through 3/8 inch openings. This study, supplemented by specific cases of finger injury through 3/8 inch and 1/2 inch openings, appears to justify lowering the present commonly accepted figure of a 1/2 inch opening as allowable in guards 4 inches or less from the moving parts or hazard point. It is therefore recommended that the width of opening be reduced to 1/4 inch for clearance up to 4 inches.

4.9.2--Drum Sanding Machines. Each drum sanding machine shall have an exhaust hood or other guard if no exhaust system is required, so arranged as to enclose the revolving drum, except such portion of the drum above the table, if table is used, as may be necessary and convenient for the application of the material being finished.

NOTE: A clearance of 1/4 inch is sufficient to allow the feeding of the material being sanded and will not allow an operator's hand to contact the first drum.

4.9.3--Disk Sanding Machines. Each disk sanding machine shall have the exhaust hood, or other guard if no exhaust system is required, so arranged as to enclose the revolving disk, except such portion of the disk above the table, if table is used, as may be necessary for the application of the material to be finished.

4.9.4--Belt Sanding Machines. Each belt sanding machine shall have both pulleys enclosed in such a manner as to guard the points where the sanding belt runs onto the pulleys. The unused run of the sanding belt shall be enclosed.

NOTE: A belt sander imposes a hazard similar to that of the nip point of any transmission belt. In addition the edge of the belt will cut deeply and of course the abrasive surface will tear flesh rapidly. The upper run of the belt should be guarded because it is very easy for the operator to lean over his work, or to attempt to slide the table and to hit his forehead on the top section of the belt.

SAFE OPERATING METHODS –SANDERS

1. The use of exhaust hoods as guard enclosures is practically mandatory on sanding equipment.

2. Means of exhausting or collecting the sawdust should be provided for portable belt or disc sanders. If conditions are such that effective exhausts cannot be applied respiratory protective equipment bearing the approval of the U. S. Bureau of Mines should be provided and their use required. Respirators should not be used in lieu of practicable means of eliminating the hazards.

4.10--MISCELLANEOUS MACHINES:

4.10.1-Combination of Universal Woodworking Machines. For combination or universal wood-working machines each point of operation of any tool shall be guarded as required for such tool in a separate machine. Such machines shall be provided with a separate stopping and starting device for each point of operation.

NOTE: This type of equipment is no longer "Universal". However, each point of operation must be taken care of as an individual part, whether a saw, a jointer head, a mortiser, or a drill.

SECTION 5 -VENEER MACHINERY

5.1--STEAMING EQUIPMENT AND SOAKING PITS:

5.1.1--Steam Vats and Soaking Pits.

(a) Sides of steam vats shall extend to a height of not less than 36 inches above the floor, working platform, or ground.

(b) Large steam vats divided into sections shall be provided with substantial walkways between sections. Each walkway shall be provided with a standard handrail on each exposed side. These handrails may be removable, if necessary.

NOTE: While a 36-inch railing is acceptable, consideration should be given to the standard railing height of 42 inches. This may or may not be practical dependent upon the layout of the plant.

Guard rails should be constructed in accordance with the provisions of the American Standard Safety Code for Floor and Wall Openings, Railings and Toeboards, ASA A12-1932.

NOTE: Provided the size of stock handled will permit, it is advisable to keep the size of the vat section to 8 feet or less.

5.1.2--Loading and Unloading. One or more of the following means shall be used in loading and unloading vats and soaking pits:

(a) The floor surface at the sides being used shall be so constructed as to prevent slipping, or all employees working at the vats shall be provided with and shall wear footwear having soles and heels of such composition as to prevent slipping.

NOTE: The slipping hazard is serious around vats and pits due to the constant presence of moisture, the accumulation of waste materials and the layout of some plants.

(b) The employee shall be provided with a safety belt attached to a life line. The life line shall be attached to a traveling trolley on a monorail or to a fixed anchorage or similar arrangement. The life line shall be permanently adjusted so that the employee, in event of slipping, falling or tripping, cannot fall into the vat.

NOTE: The use of safety belts and life line provides full safety if always used. It is difficult to secure unflinching employees' compliance in their use, however. Sometimes the conditions are such as to make this method impractical.

removed without requiring assistance from an employee at the edge of the vat.

NOTE: Mechanical handling is the safest method as the employee is protected by location. All mechanical handling equipment should be guarded in accord with the requirements for guarding power transmission equipment insofar as they apply.

(d) Hydraulic equipment shall be provided for draining the liquid from the vat. No employee shall be permitted to stand on the vat and no unloading shall be started until the liquid has been drained from the vat.

5.1.3--Ventilation.

(a) Insofar as possible vats should be located in buildings or in special sheds heated in cold weather to keep the amount of steam at a minimum.

NOTE: In addition to depending on natural ventilation, it is recommended that supply and exhaust systems be installed in order that air conditions within the plant will not be controlled by atmospheric changes.

(b) Means shall be provided to ventilate buildings in which steam vats are located. High ceilings with roof ventilators or louvers are desirable. Where ceilings or roofs are low, exhaust fans shall be provided,

5.2--LOG HANDLING EQUIPMENT:

5.2.1--Cranes, Log Trolleys, etc. All gears, sprockets, and other dangerous parts shall be enclosed with standard guards.

NOTE: The use of log trolleys or cranes is urgently recommended except where the stock handled is very small.

NOTE: Attention should be given to the installation and proper maintenance of travel limit stops or bumpers on the rails of all traveling cranes and trolleys. Fenders should be installed on each side of the leading wheels of all traveling cranes in order to clear the rails of obstruction.

5. 3--SAWS:

5.3.1--Drag Saws. Drag saws shall be so located as to give at least a 4-foot clearance for passage when saw is at extreme end of stroke; or if such clearance is not obtainable, the saw and its driving mechanism shall be provided with a standard enclosure.

NOTE: Even though proper clearance is available, or standard enclosures are provided, all persons should be in the clear before the saw is started.

5 .4--VENEER CUTTERS AND WRINGERS:

5.4.1--Veneer Slicer and Rotary Veneer-Cutting Machines, Knives shall be guarded to prevent accidental contact with knife edge.

NOTE: In addition to guarding the cutting head while in the machines it is recommended that guards or containers be provided for the knives' while they are being transported about the shop.

5.4.2--Veneer Clippers

(a) Veneer clippers shall have automatic feed or shall be provided with a guard which will make it impossible to place a finger or fingers under the knife while feeding stock.

NOTE: It is recommended that, where practicable, the guards should be of the vertical finger type.

NOTE: It is recommended that conveyors or traveling tables be installed to remove material from clippers.

(b) Sprockets on chain or slat-belt conveyors shall be enclosed.

5.4.3--Veneer Wringers. In-running side of veneer wringer shall be enclosed leaving only sufficient space to insert stock but not enough to permit fingers to enter the rolls.

NOTE: A solid barrier guard is recommended with clearance of not more than 1/4 inch between the lower edge of the guard and the bottom of the roll where it contacts the stock.

5.4.4--Operating Levers or Treadles. Operating levers or treadles on all veneer machinery shall be so located or protected that they cannot be shifted or tripped accidentally.

NOTE: An inverted U-shaped guard should be installed over treadles-- which will prevent tripping, by accidental contact, but which is designed for easy access by the operator's foot.

SAFE OPERATING METHODS--VENEER MACHINERY

1. Covers should be removed only from that portion of the vat on which men are working and a portable guard rail should be placed at this point to protect the workers.
2. Workers should be prohibited from riding or stepping on logs in steam vats.
3. Housekeeping, including the provision of prompt collection and disposal of waste bark, trimmings, etc., should be given major attention in a veneer plant.
4. All cranes, log trolleys and other hoisting equipment should be tested and inspected at frequent intervals.
5. When attaching dogs to logs, the workman should stand in a safe position and care should be taken not to place hands or fingers where they might be caught between the log and the dog.
6. Operators should never be permitted to ride the carriage of a veneer slicer.

SECTION 6 -COOPERAGE MACHINERY

6.1--SAWS :

6.1.1--Heading Bolters.

(a) Each heading bolter shall have the saw enclosed to prevent accidental contact. A hood shall be fastened to the back of block carrier to cover that portion of the saw which cannot be enclosed by a stationary housing.

NOTE: The principal hazards are mechanical and the proper design and maintenance of the saw guards are essential. The return device for the block or log carrier should be positive in action.

(b) The block carrier shall be provided with an effective device that will return the carrier automatically to a position in front of the saw. Such device shall not depend for its proper functioning upon any rope, cord, or spring. If a counterweight is used, a safety chain

shall be attached to it to prevent dropping should the bar break or the weight become disengaged. All bolts supporting the bar weight and chain shall be provided with cotter pins or equally effective devices. A bolt shall be put through extreme end of counterweight bar to prevent dropping of weight.

(c) A limit stop shall be provided to prevent the carrier from swinging too far back and thereby exposing to contact the unguarded portion of saw.

6.1.2--Swing Cut-off Saws. For rules covering this equipment, see 4.1.7

6.1.3--Bolt, Stave, and Heading Equalizers. Each bolt, stave and heading equalizer shall have the saws guarded in accordance with the provisions of 4.1.3.

NOTE: Feeding devices for this type of equipment should also be enclosed by approved guards.

6.1.4--Barrel-Stave Saws (Cylindrical Saws). Each machine of this type shall have the saw and the revolving part to which the saw blade is bolted enclosed to prevent accidental contact, except that part of saw immediately adjacent to the feeding device. (The above applies to this saw also.)

6.1.5--Heading Saws, Variable-Feed Saws, Flat-Stave Saws, Head Rounders etc.

(a) All machines coming under this rule shall have the saws enclosed to prevent accidental contact.

NOTE: Insofar as is practicable, all enclosures for saws necessitated by this code should conform to the specifications for saw guards appearing in other sections of this code.

(b) Where sprocket feed device is used, it shall be enclosed in such a manner as to prevent the operator's fingers from getting between the feed sprocket and the stock.

(c) Counterweights used to actuate feed shall operate in a stationary casing.

6.2--SINGLE AND DOUBLE STAVE PLANERS, SINGLE AND DOUBLE HEADING PLANER

6.2.1--Guarding of Cutting Heads. The exhaust hood or other guards, if no exhaust system is required, shall be so arranged and maintained as to guard effectively all cutting heads and knives of single and double planers.

NOTE: Barrier guards should be installed ahead of the feed rolls with only sufficient clearance for the entrance of the stock. This may be as little as 1/4 inch above the stock.

6.2.2--Point of Operation.

(a) Feed rolls, except such portion as may be necessary to admit stock, shall be completely enclosed. Sectional feed rolls should be provided for heading planers.

NOTE: Sectional fingers should be designed and installed so that they will be effective for any thickness of stock being worked.

(b) Where solid feed rolls are in use, a sectional finger device (or an equally effective safeguard) shall be used to prevent kick-backs.

6.3--STAVE AND HEADING JOINTERS (MATCHERS):

6.3.1--Guarding. Each stave or heading jointer shall have an adjustable or automatic guard to cover all of the head except that portion where the stock is applied.

6.3.2--Foot-Power Machines. Foot-power machines for jointing staves shall be equipped with a guard which prevents the operator's fingers from coming in contact with the knife.

6.4--STAVE CROZIERS:

6.4.1--Guarding. The cutting heads shall be encased except that part which actually embeds itself in the stock.

NOTE: Stave croziers operate at relatively high speeds and the mechanical hazard is serious--Guards for cutting heads should be strictly maintained.

6.4.2--Feed Chains. The feed chains and sprockets of stave croziers shall be completely enclosed.

NOTE: Minimum clearance for the entrance of the stock should be provided.

6.4.3--Counterweights. A safety chain shall be attached to counterweight to prevent dropping should the counterweight bar break or the weight become disengaged. All bolts supporting the bar, weight, and chain shall be provided with cotter pins or other equally effective devices. A bolt shall be put through extreme end of counterweight rod to prevent dropping of weight.

NOTE: Vibration of multiple head machine increases the possibility of loosened set screws, nuts, or other retaining device, as well as increased strains on material leading to fracture of the counterweight rod. Therefore close inspection and good maintenance are very important.

6.5--BARREL SANDING MACHINES:

6.5.1--Sanding Belts. Each belt sanding machine shall have both pulleys enclosed in such a manner as to guard the points where the sanding belt runs onto the pulley. The edges of the unused run of the sanding belts shall be enclosed.

NOTE: An exposed edge of the return run or unused portion of the belt can cause a serious cut if contacted by the operator.

6.6--POWER WINDLASS FOR BARRELS:

6.6.1--Counterweights. Counterweights shall operate in a stationary casing.

6.6.2--Control Levers. Control levers shall be located within easy reach of the operator when standing in the usual operating position.

NOTE: Levers should also be so located that the operator will not be endangered in the event of a slipping or parting cable.

6.7--PAIL AND BARREL LATHES:

6.7.1--Guards. The requirements of 4.8 for profile lathes, insofar as they are applicable, shall govern the guarding of pail and barrel lathes

NOTE: The hazard of exposed knives is approximately the same for this equipment as for profile lathes.

6.8--MISCELLANEOUS COOPERAGE MACHINERY:

6.8.1--Other Machines Not Excluded. The mention of specific machines under 6.1 to 6.7, inclusive, is not intended to exclude other woodworking machines from the requirements that safeguards be provided to reduce to a minimum the hazard due to the point of operation of such machines. Many plants have developed special pieces or types of machinery for operations peculiar to their production processes. Guards which will protect employees adequately should be installed and used on all such equipment.

SAFE OPERATING METHODS--COOPERAGE MACHINERY

1. Due to the amounts of sawdust, waste, chips, etc., produced, adequate and efficient exhaust systems should be installed.
2. Where the above is impossible, as for a temporary condition, approved respirators should be worn.

3. Other personal protective equipment, such as goggles, gloves, aprons etc., should be used as necessary.
4. It should be remembered that gloves should not be worn when operating rotating machinery.
6. Also, loose garments, sleeves, neckties, jewelry, etc., should never be worn by machine operators.
6. All saws, knives, cutting heads of cooperage machinery, as well as hand tools should be regularly inspected and repaired or replaced as required.