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MAINE STATE LIBRARY

**1926 CONSTRUCTION
MACHINE GUARDING
AND
HAND AND POWER TOOL SAFETY**

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MAINE DEPARTMENT OF LABOR

SUBPART I - Tools - Hand and Power

1926.300 General Requirements

- a. Condition of tools.
- b. Guarding.
- c. Personal Protective Equipment.
- d. Switches.

1926.301 Hand Tools

- a. Employers shall not issue or permit the use of unsafe tools.
- b. Wrenches, including adjustable, pipe, end and socket wrenches, shall not be used when jaws are sprung to the point that slippage may occur.
- c. Impact tools, such as drift pins, wedges and chisels shall be kept free of mushroomed heads.
- d. The wooden handles of tools shall be kept free of splinters or cracks and shall be kept tight in the tool.

1926.302 Power operated hand tools

- a. Electric power operated tools.
- b. Pneumatic power tools.
- c. Fuel powered tools.
- d. Hydraulic power tools.
- e. Powder actuated tools.

1926.303 Abrasive wheels and tools

- a. Sufficient power supply.
- b. Guarding.
- c. Use of abrasive wheels.
- d. Other requirements.

1926.304 Woodworking tools.

- a. Disconnect switches.
- b. Speeds.
- c. Self feed.
- d. Guarding.
- e. Other requirements - ANSI.

MACHINE GUARDING

“General Duty Clause”

OSHA STANDARD 1910.212(a)(1):

“One or more methods of machine guarding must be provided to protect the operator and other employees in the machine area from hazards such as those created by points of operation, ingoing nip points, rotating parts, flying chips and sparks.”

TRANSLATION:

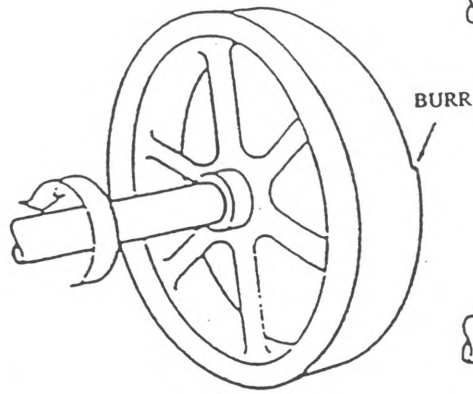
All moving parts of machines must be guarded if exposed to employee contact.

MECHANICAL POWER TRANSMISSION APPARATUS:

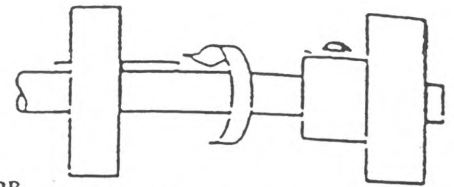
“The drive mechanism on any machine or power tool which connects the motor to the area where work is actually performed upon the material being processed.”

EXAMPLES INCLUDE:

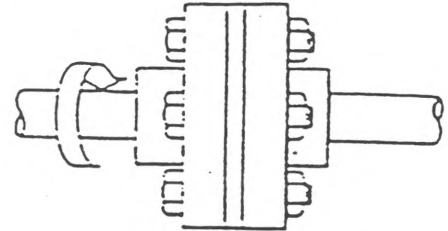
- * Belts and Pulleys
- * Chains and Sprockets
- * Gears and Rocker Arms
- * Shafts and Couplings
- * Spindles and Flywheels
- * Other reciprocating, rotating or moving parts



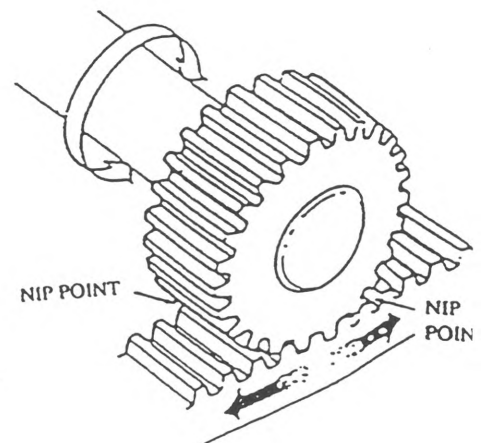
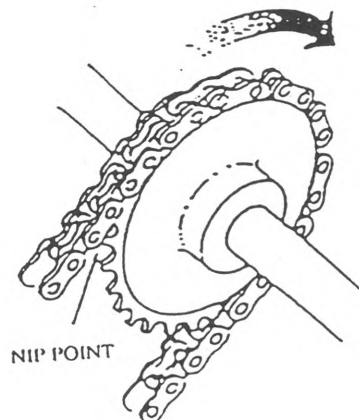
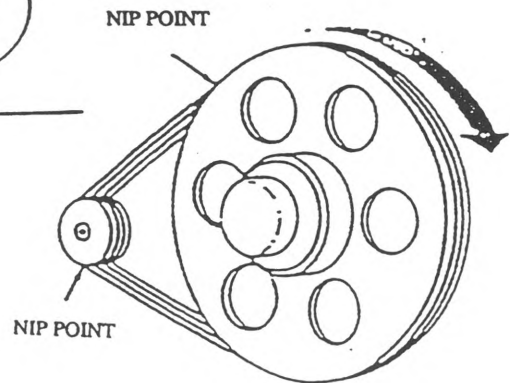
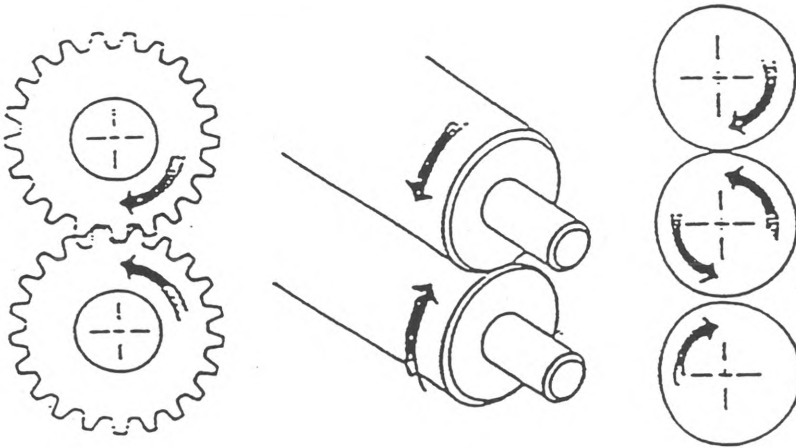
ROTATING PULLEY WITH SPOKES AND
PROJECTING BURR ON FACE OF PULLEY



ROTATING SHAFT AND PULLEYS WITH
PROJECTING KEY AND SET SCREW



ROTATING COUPLING WITH
PROJECTING BOLT HEADS

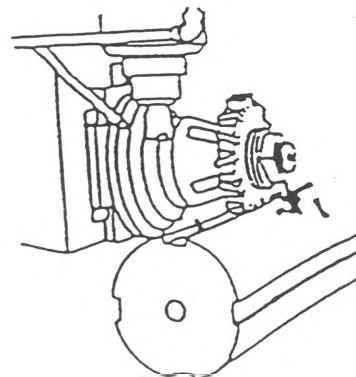
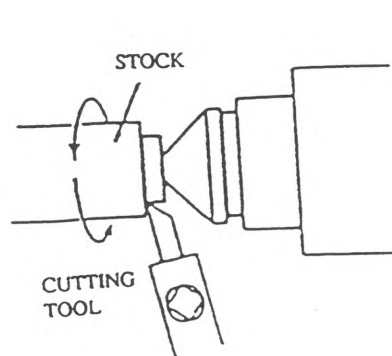
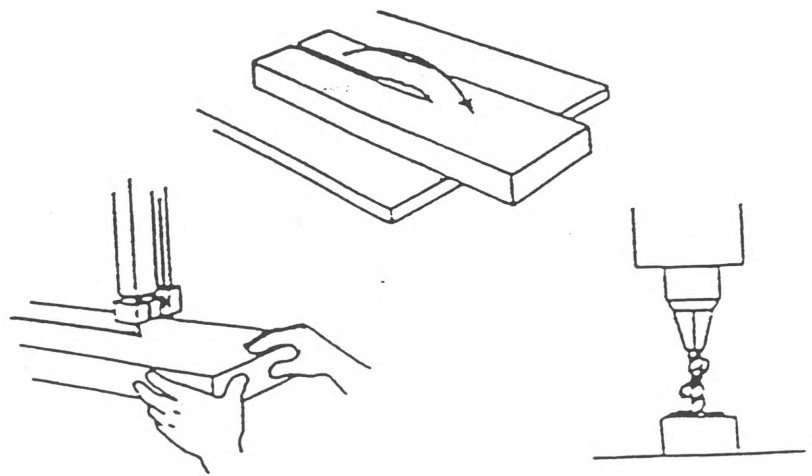
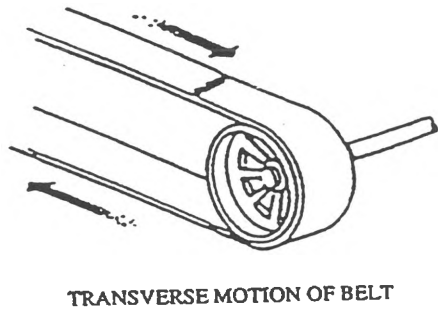
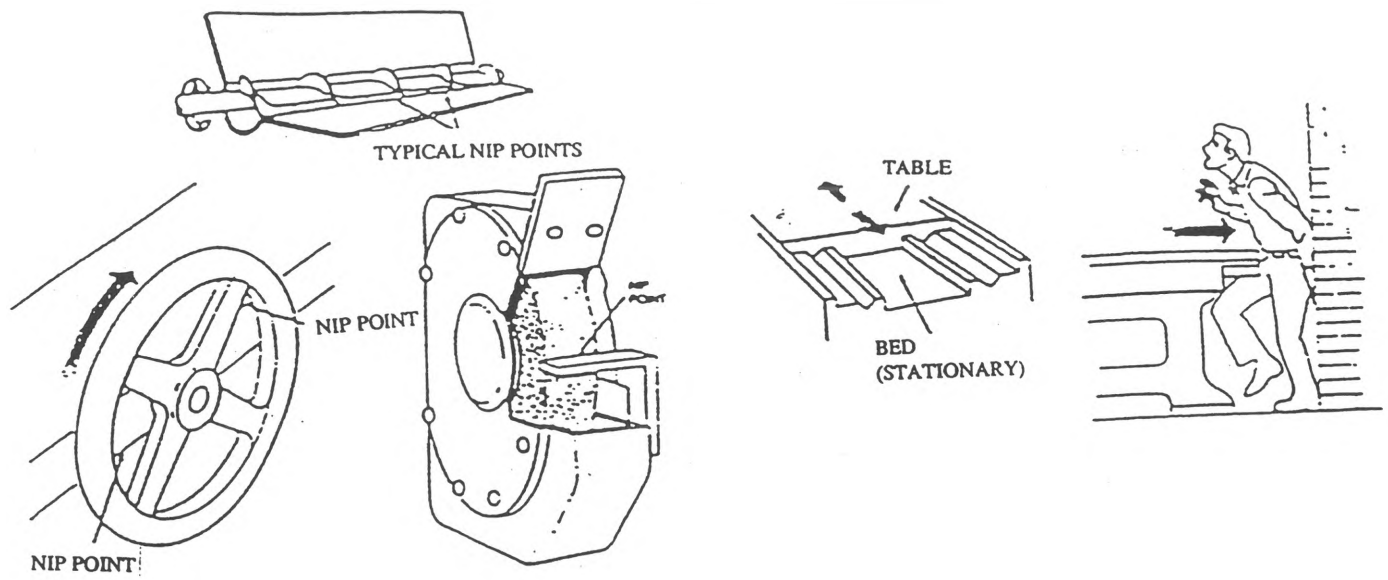


POINT OF OPERATION:

“The area on a machine or power tool where work is actually performed upon the material being processed.”

EXAMPLES OF MACHINES WITH POINT OF OPERATION HAZARDS

- * Power Saws and Shears
 - * Power Presses
 - * Milling Machines
 - * Jointers and Planers
 - * Forming Rolls and Calenders
 - * Most Portable Power Tools
- circular saws, sanders, grinders,
rotary hammers, nibblers, shears,
explosive actuated fastening tools



1910.213 WOODWORKING MACHINERY REQUIREMENTS:

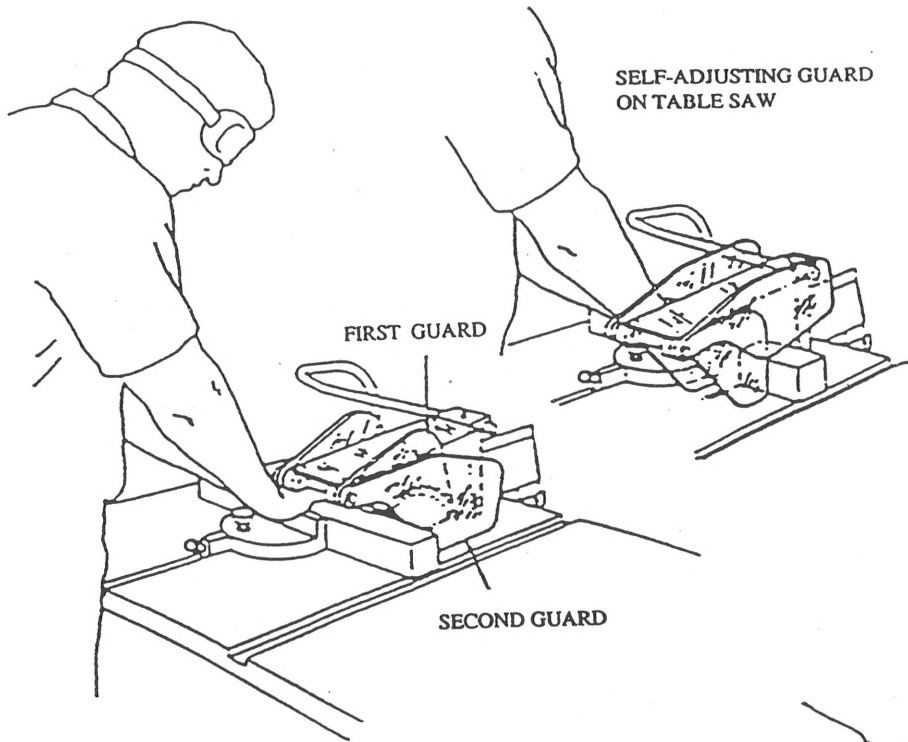
Machine Controls:

1. Power switch so located on each machine to allow the operator to cut off power without leaving his/her position at the point of operation.
2. On applications where injury to the operator might result if motors were to restart after power failures, provision shall be made to prevent machines from automatically restarting upon restoration of power (i.e. magnetic restarts).
3. All power and operating controls to be located within easy reach of the operator while at his/her regular work location.

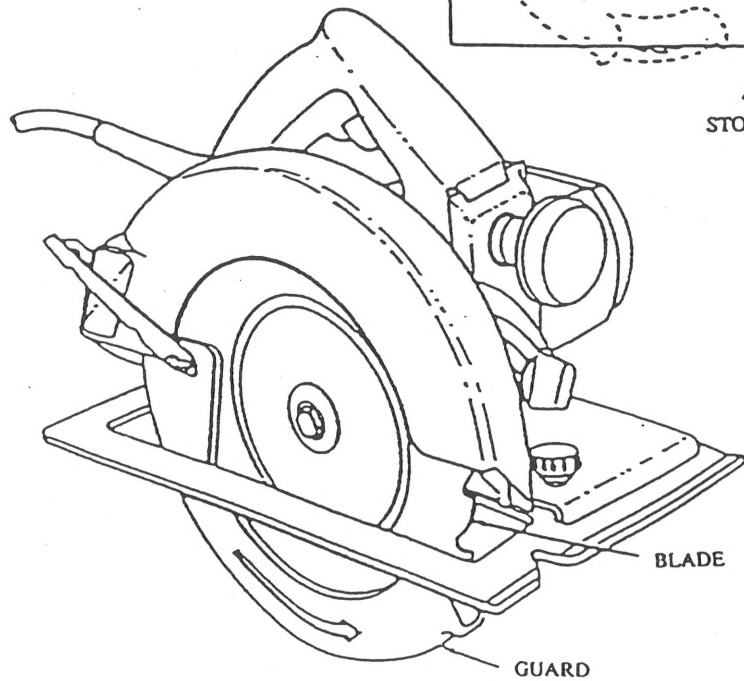
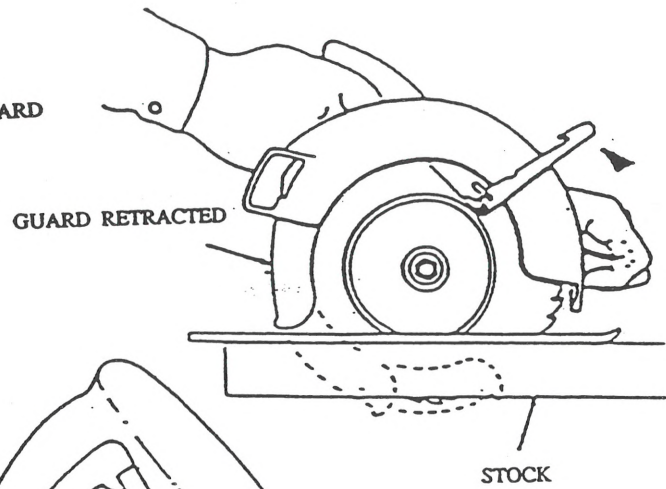
TABLE SAWS / RIP SAWS

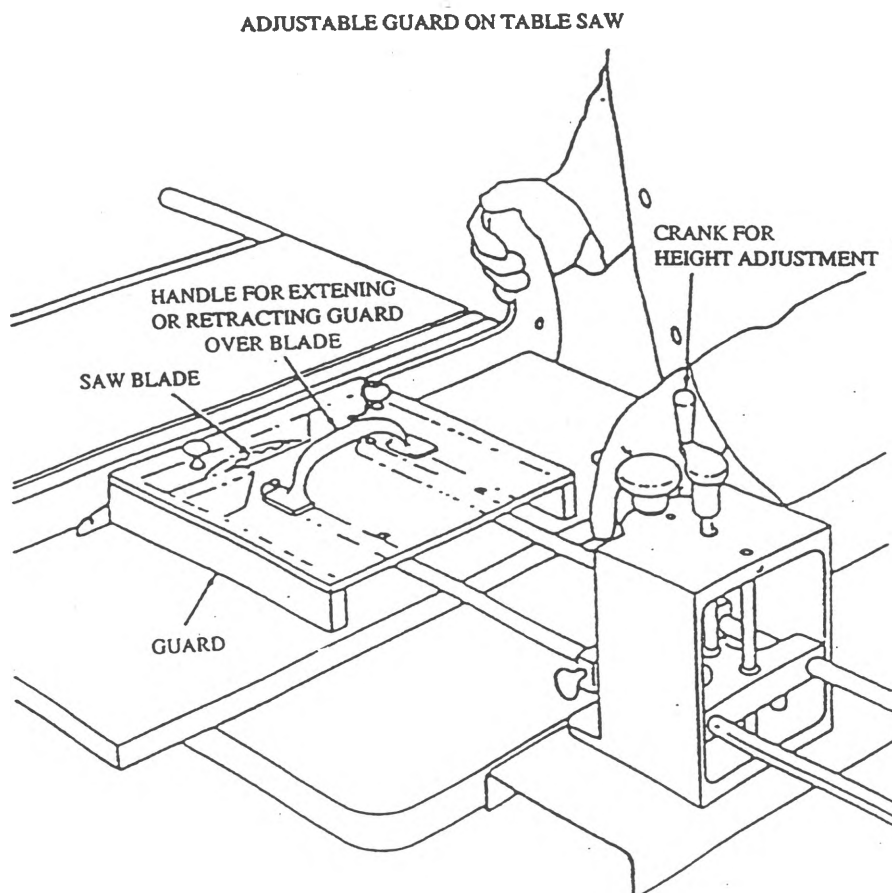
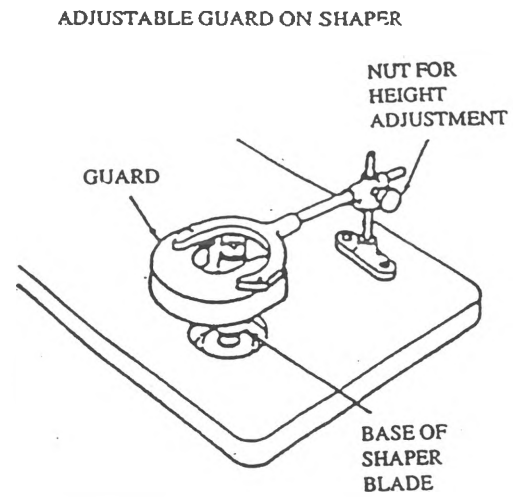
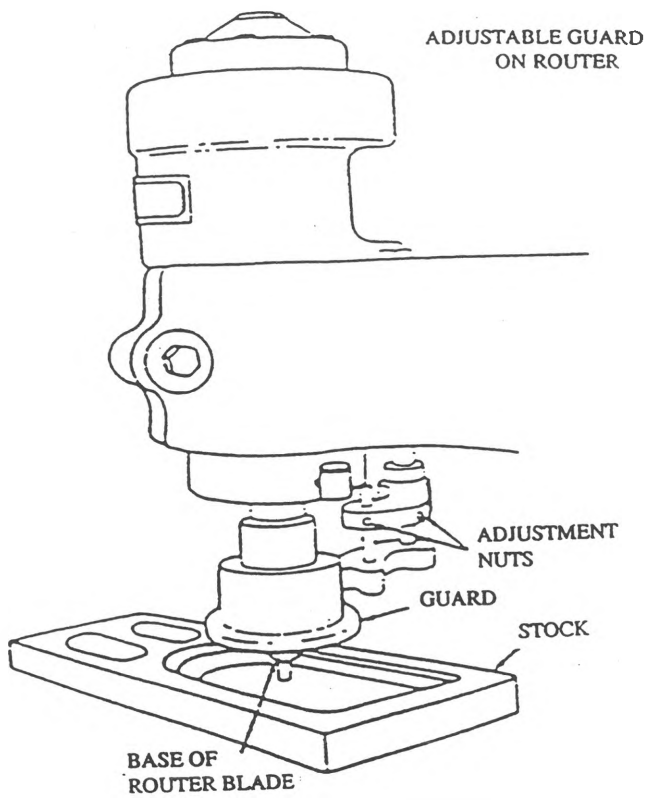
Must have:

1. Exposed portions of blades guarded by an automatically adjusting hood;
2. Spreader installed at rear of blade to prevent material from squeezing the saw and/or being thrown back toward the operator.
3. Nonkickback fingers or dogs installed and located as to oppose the thrust or tendency of the saw to pick up material or to throw it back toward the operator;
4. All drive belts and pulleys covered by guards.



SELF-ADJUSTING GUARD
ON CIRCULAR SAW



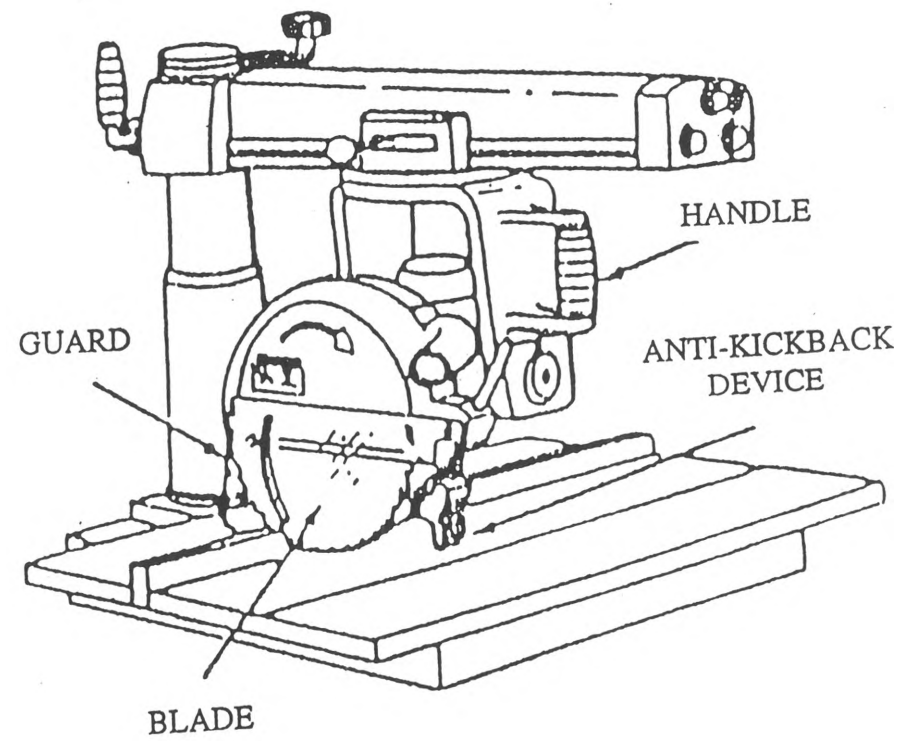


RADIAL ARM SAWS

Must have:

1. The upper portion of the blade as well as the arbor end covered by an upper hood guard;
2. Sides of the lower exposed portion of the blade guarded by an automatically adjusting guard;
3. nonkickback fingers with adequate holding power for all sizes of material being cut;
4. An adjustable stop to prevent excess forward travel of the blade;
5. A feature such as a counterweight which causes the cutting head to return gently to the starting position when released by the operator (raising the front of the unit slightly to cause the same effect is also allowed.)

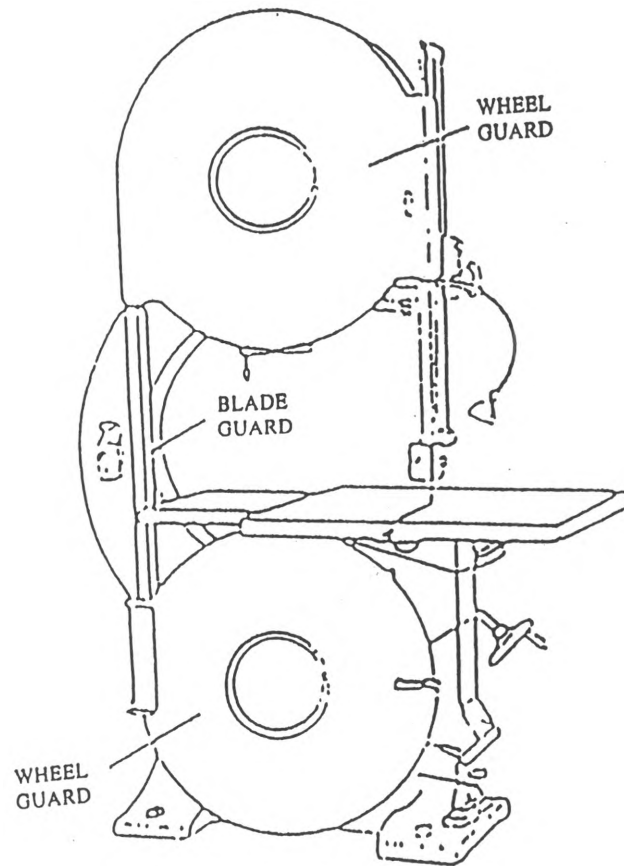
SELF-ADJUSTING GUARD
ON RADIAL ARM SAW



BANDSAWS

Must have:

1. All portions of the saw blade enclosed or guarded except for the working portion of the blade between the bottom of the guide rolls and the table;
2. Bandsaw wheels fully encased by guards of solid material or mesh with openings greater than three-eighths inch;
3. A blade tension control device to indicate proper tension for the standard saws used on the machine.

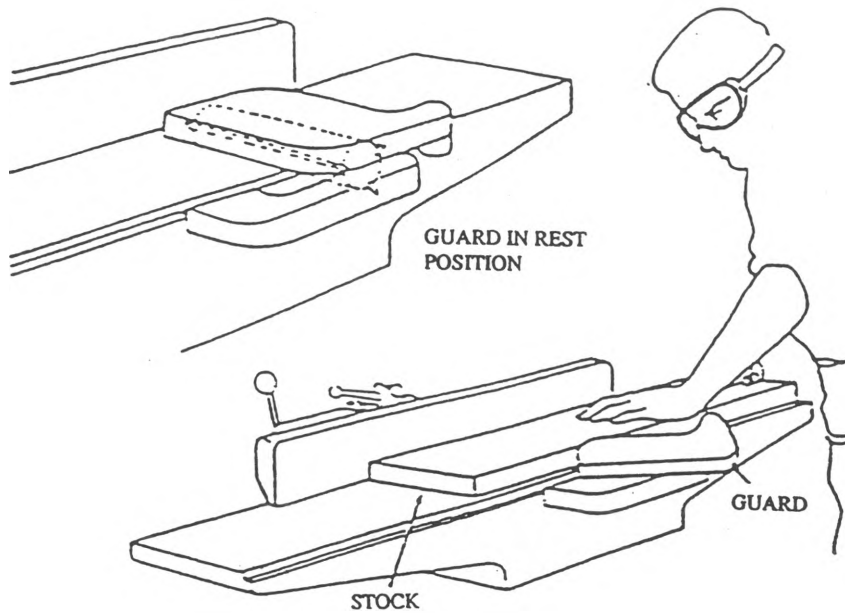


FIXED GUARDS ON A BANDSAW

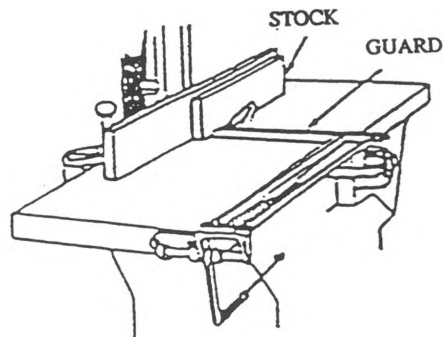
JOINTERS / PLANERS

Must have:

1. Horizontal cylindrical cutting heads with a knife projection of one-eighth inch or less;
2. Table openings kept as small as possible (no more than one-eighth inch between edge of rear table and the cutter head);
3. Cutting heads protected by an automatically adjusting guard to cover all unused portions of the head to keep operator' hands from coming into contact with the revolving knives.



SELF-ADJUSTING GUARD
ON A JOINTER



SELF-ADJUSTING GUARD
ON A JOINTER

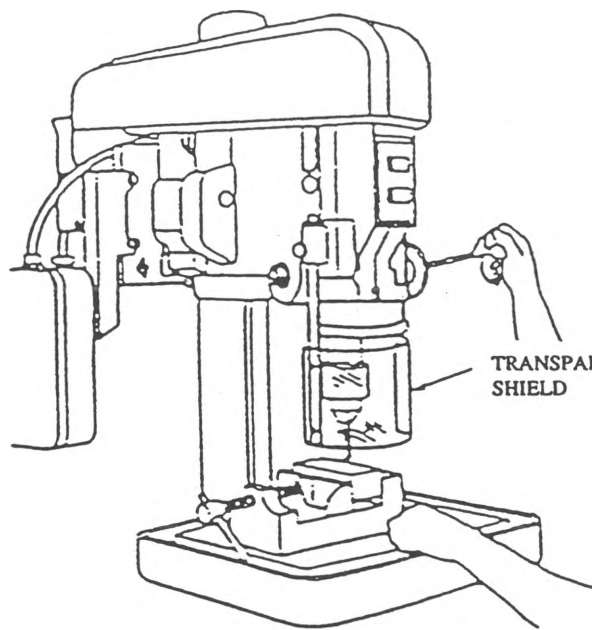
WOOD LATHES

Must have:

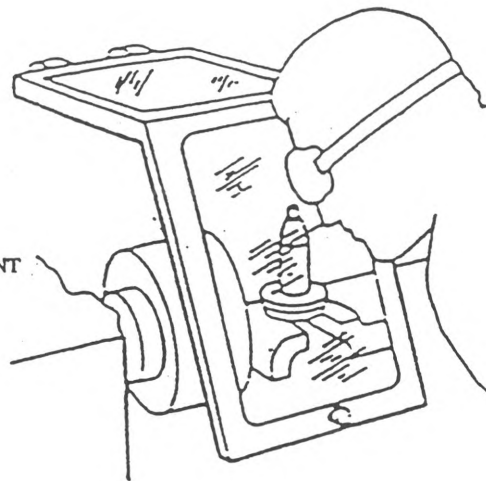
1. Long curved guards extending over the top of the lathe in order to prevent the work pieces from being thrown out of the machine if they should become loose.

SANDING MACHINES

1. Disk sanders must have a guard so arranged as to enclose the shaft and unused portion of the disk below the table.
2. Belt sanders must have guards at each nip point where the sanding belt runs onto a pulley.



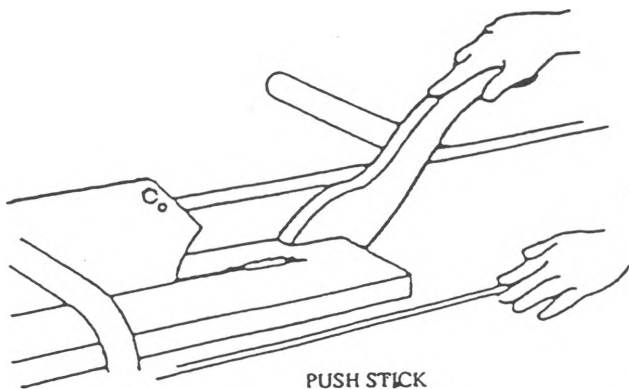
DRILL



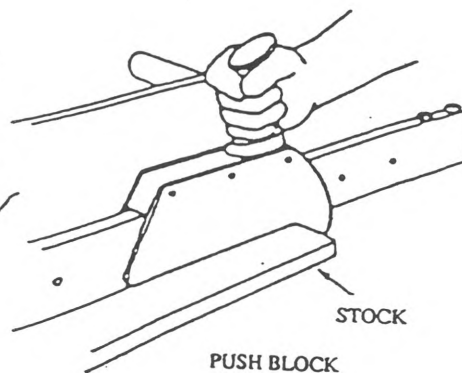
LATHE

Holding tools can place or remove stock.

A push stick or block, such as those in below, may be used when feeding stock into a saw blade. When it becomes necessary for hands to be in close proximity to the blade, the push stick or block may provide a few inches of safety and prevent a severe injury. In the illustration the push block fits over the fence.



PUSH STICK



STOCK

PUSH BLOCK

1910.215 ABRASIVE WHEEL MACHINERY

Bench grinders must have:

1. Guards which cover the spindle end, nut, flange projections, and unused portion of wheel (maximum degree of exposure allowed varies by type);
2. Adjustable work rests kept adjusted to within one-eighth inch of the wheel;
3. adjustable tongue guards kept adjusted to within one-quarter inch of the wheel;
4. All wheels closely inspected and sounded (ring tested) by the user prior to mounting.

NOTE: .212(b) requires machines designed for fixed locations to be securely anchored.

Inspections, Handling and Storage of Abrasive Disks and Wheels

While they are being unpacked abrasive disks and wheels should be inspected for shipment damage and then, given the “ring” test by a qualified person. This test can be used for both light and heavy disks or wheels that are dry and free of foreign material. **To conduct the ring test**, a light disk or wheel should be suspended from its hole on a small pin or the finger, and a heavy one should be placed vertically on a hard floor. Then the wheel or disk should be gently tapped with light tool, such as a wooden screwdriver handle. A mallet may be used for heavy wheels or disks. The tap should be made at a point 45 degrees from the vertical centerline and about 1 or 2 in. (2.5-5 cm) from the periphery. A wheel or disk in good condition will give a clear, metallic ring when tapped. A clear ring indicates good condition. Wheels and disks of various grades and sizes give different pitches.

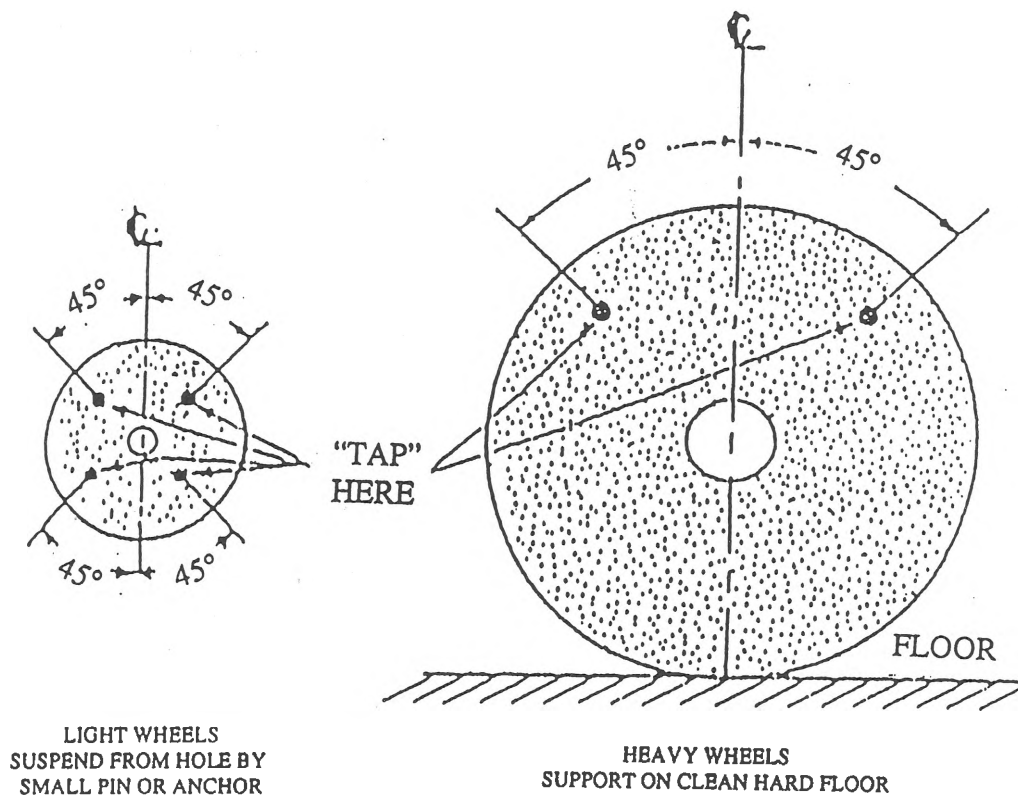
Daily inspection of grinding machines should include those points necessary to safe operation.

Abrasive disks and wheels require careful handling. They should not be dropped or bumped. Large disks and wheels should not be rolled on the floor. Disks and wheels too large or heavy to be hand-carried should be transported by truck or other conveyance that provides the correct support.

Store abrasive disks and wheels in a dry area not subject to extreme temperature changes, especially below-freezing temperatures. Wet wheels might break or crack if stored below 32° F.

Breakage can occur if a wheel or disk is taken from a cold room and work is applied to it before it has warmed up. Abrasive disks and wheels should be stored in racks in a central storage area (Figure 10-14) under the control of a specially trained person. The storage area should be as close as possible to grinding operations to minimize handling and transportation.

The length of time abrasive disks and wheels may be stored and still be safe to use should be in accordance with manufacturers’ recommendations. Disks and wheels taken out of long storage should be given the ring test. Follow this by a check for recommended speed, and a speed test on the machine on which they will be mounted. Check the speed of all grinding wheels against the spindle speed of the machine; some are designed only for low-speed use.



RING TEST

GRINDER CHECKLIST

TYPE _____ RPM _____

SIZE _____ PERIPHERAL SPEED _____

Item	OK
WHEEL GUARD: securely fastened	<input type="checkbox"/>
properly aligned	<input type="checkbox"/>
GLASS SHIELD: clean	<input type="checkbox"/>
unscored	<input type="checkbox"/>
in place	<input type="checkbox"/>
WORK REST: within 1/8 in. (3.2 mm) of wheel	<input type="checkbox"/>
securely clamped	<input type="checkbox"/>
FRAME: securely mounted	<input type="checkbox"/>
no vibration	<input type="checkbox"/>
WHEEL FACE: well lighted	<input type="checkbox"/>
dressed evenly	<input type="checkbox"/>
FLANGES: equal size	<input type="checkbox"/>
correct diameter (1/2 wheel diam.)	<input type="checkbox"/>
SPEED: correct for wheel mounted	<input type="checkbox"/>
GUARD FOR POWER BELT OR DRIVE: in place	<input type="checkbox"/>

DATE _____ DEPARTMENT _____

INSPECTED BY _____

Figure 10-13. A summary of checkpoints for safe grinder operations.

SUMMARY OF SAFETY RULES FOR VARIOUS WOODWORKING TOOLS

Every operator should be trained in the safety rules covered in this chapter. As a summary, safety rules that demand close attention are listed below. Be sure operator checks the manufacturers manual, understands the requirements, and follows the recommended procedures.

TABLE SAW

- Feed with body to side of stock
- Blade height
- Splitter and antikickback fingers for ripping
- Stock firm to fence
- Remove ripfence for crosscuts
- Blade guards

CIRCULAR SAW

- Blade guards
- Binding
- Blade--correct type
- Blade--tight on the arbor
- Firm support for work
- No obstructions
- Begin cut with motor at manufacturer's recommended speed for materials being cut

RADIAL ARM SAW

- Ripsawing--direction of (cut) feed and antikick fingers
- Blade guards
- Pull for cross cuts
- End plates on track--arm tight
- Clamp handles tight
- Material tight to fence
- Return cutter to rear of track

BAND SAW

- Feed with body to side of stock
- Guard height 1/8-in. clearance of material
- Tension and type of blade
- Release cuts before long curves
- Stop machine to remove scrap or pull out incomplete cut
- Flat stock

JOINTER PLANER

- Depth of cut
- Length of stock
- Sharp cutters
- Don't pass hands over cutters
- Push stick for small stock
- Guard

WOOD SHAPER

- Clamping work piece
- Use correct guard
- Feed into knives--don't back off
- No feeding between fence and cutters
- Collar and starting pin work for irregular work--stock of sufficient weight
- Fence opening only enough to clear cutters
- Use stock as guard by shaping the underside of stock
- Spindle nut tight
- Shape only pieces 10 in. or longer

SANDER

- Keep hand from abrasive surface
- Ventilation
- Belt or disk condition
- Sand on downward side of disk

LATHE

- Stock without defects, glued joints dry
 - (When using V-belt lathes, power should be off when changing speeds.)
 - Toolrest close to stock
 - Hold tools firmly in both hands
 - Remove toolrest when sanding or polishing
-

1910.242 HAND AND PORTABLE POWERED TOOLS AND EQUIPMENT

(a) General Requirements:

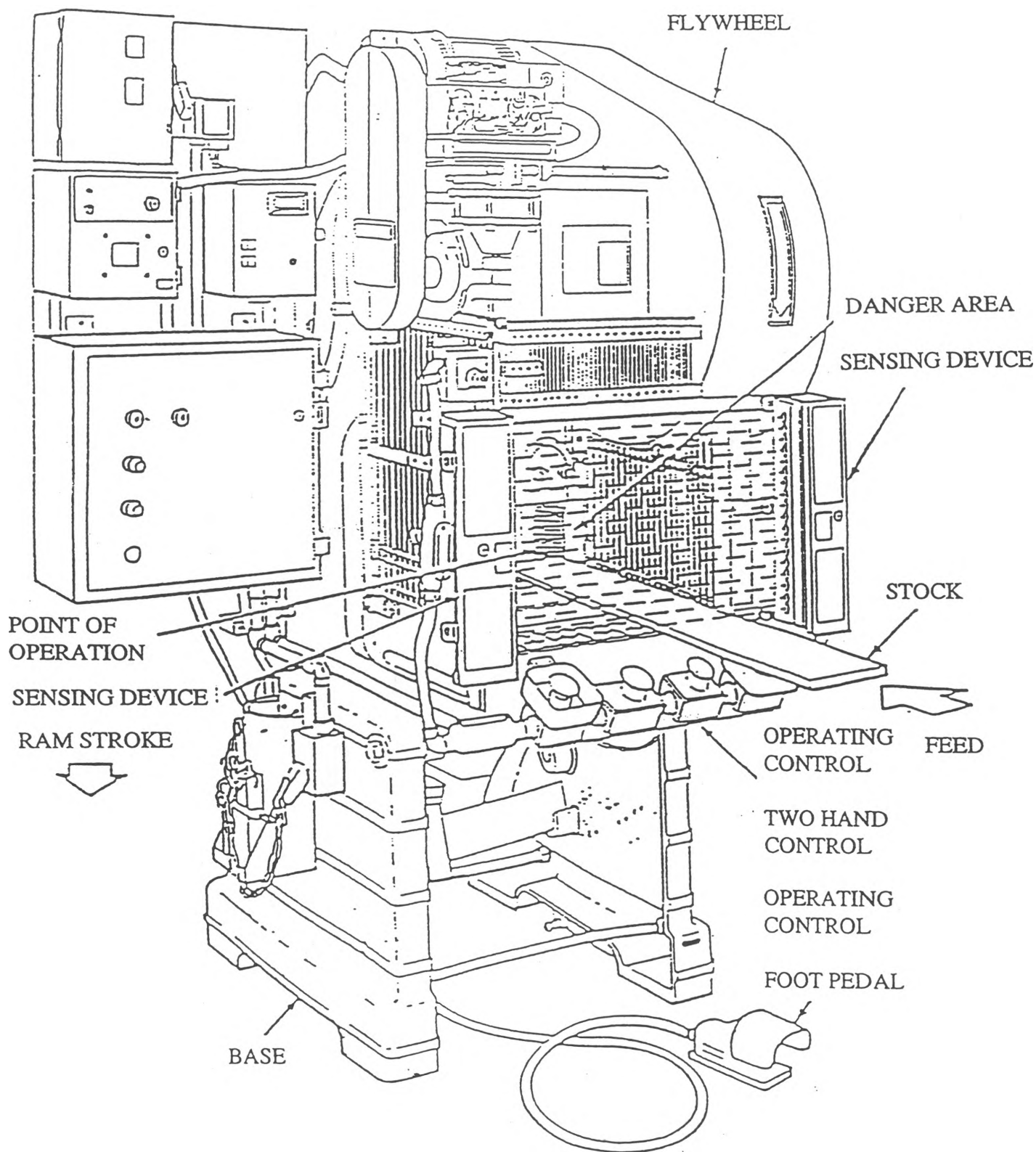
Each employer shall be responsible for the safe condition of tools and equipment used by employees, including those which may be furnished by employees.

TO PREVENT INJURIES:

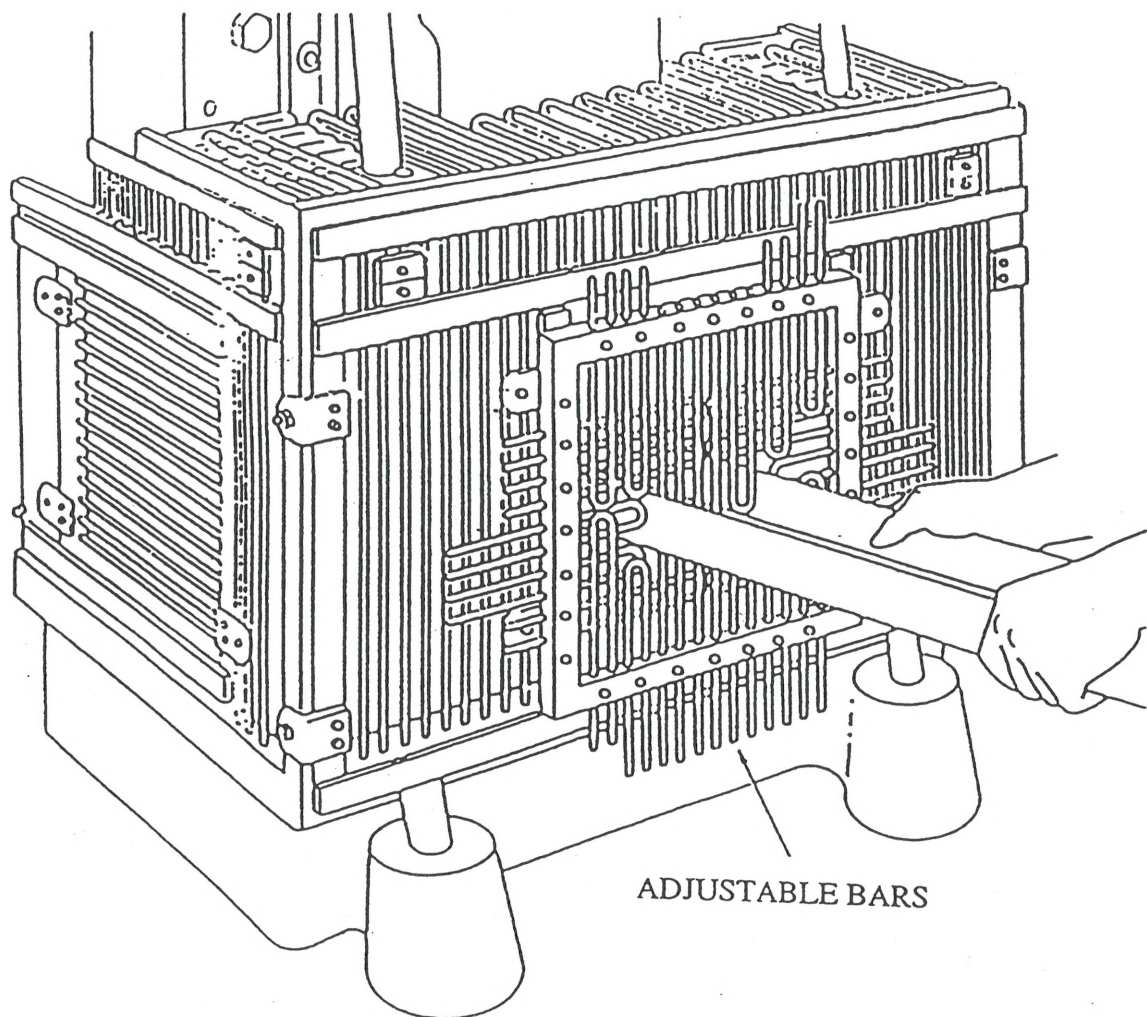
1. Tools must be maintained in good condition, i.e. no cracked wooden handles and no mushroomed heads.
2. Employees must be instructed to use the proper tool for the job, i.e. screwdriver vs. chisel, wrench vs. pliers, etc.

TYPES OF MACHINE SAFEGUARDING DEVICES:

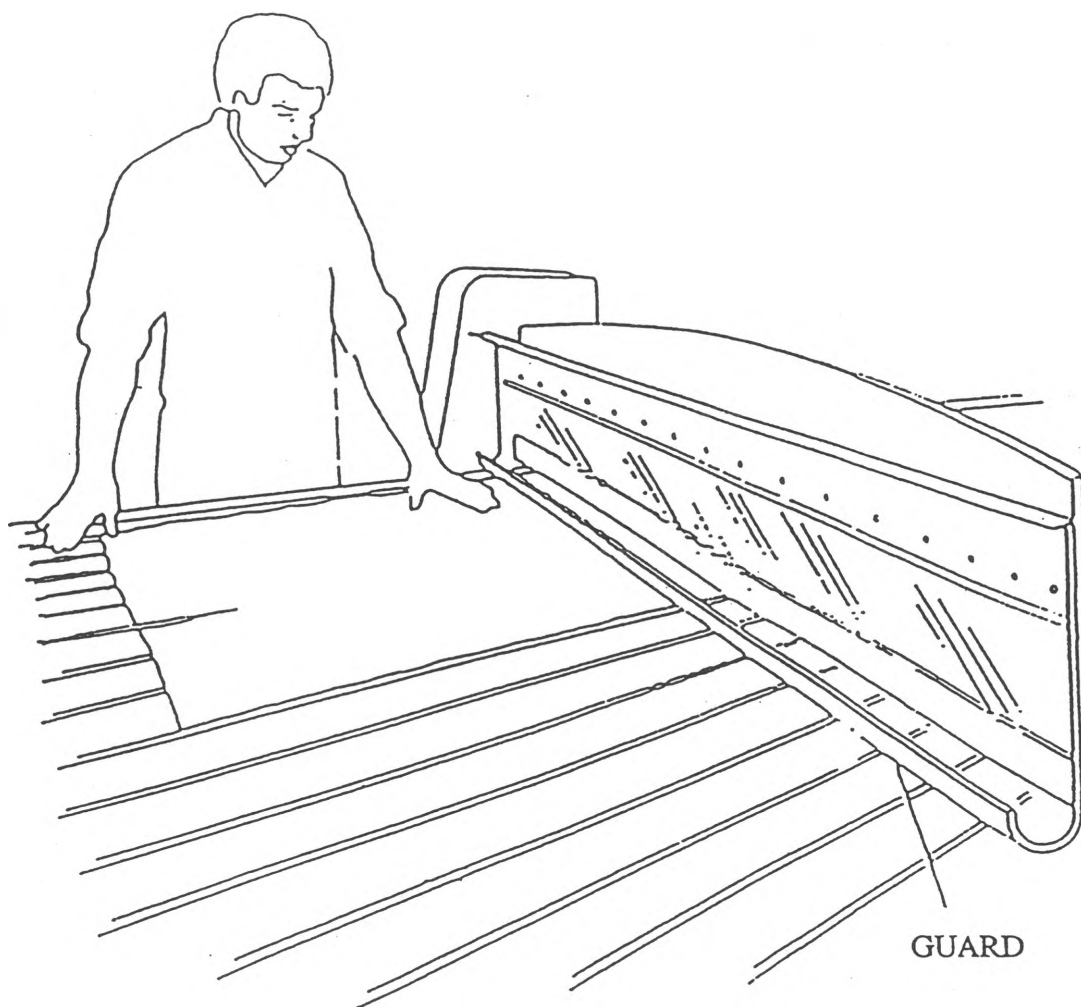
- * Presence Sensing Device
- * Gate or Movable Barrier
- * Fixed Barrier Guard
- * Adjustable Barrier Guard
- * Holdout or Restraint Device
- * Pull-out Device
- * Sweep Device
- * Electrical Interlocks
- * Pressure Pads and Trip Wires
- * Two Hand Control Devices
- * Hand-held Feeding Tools



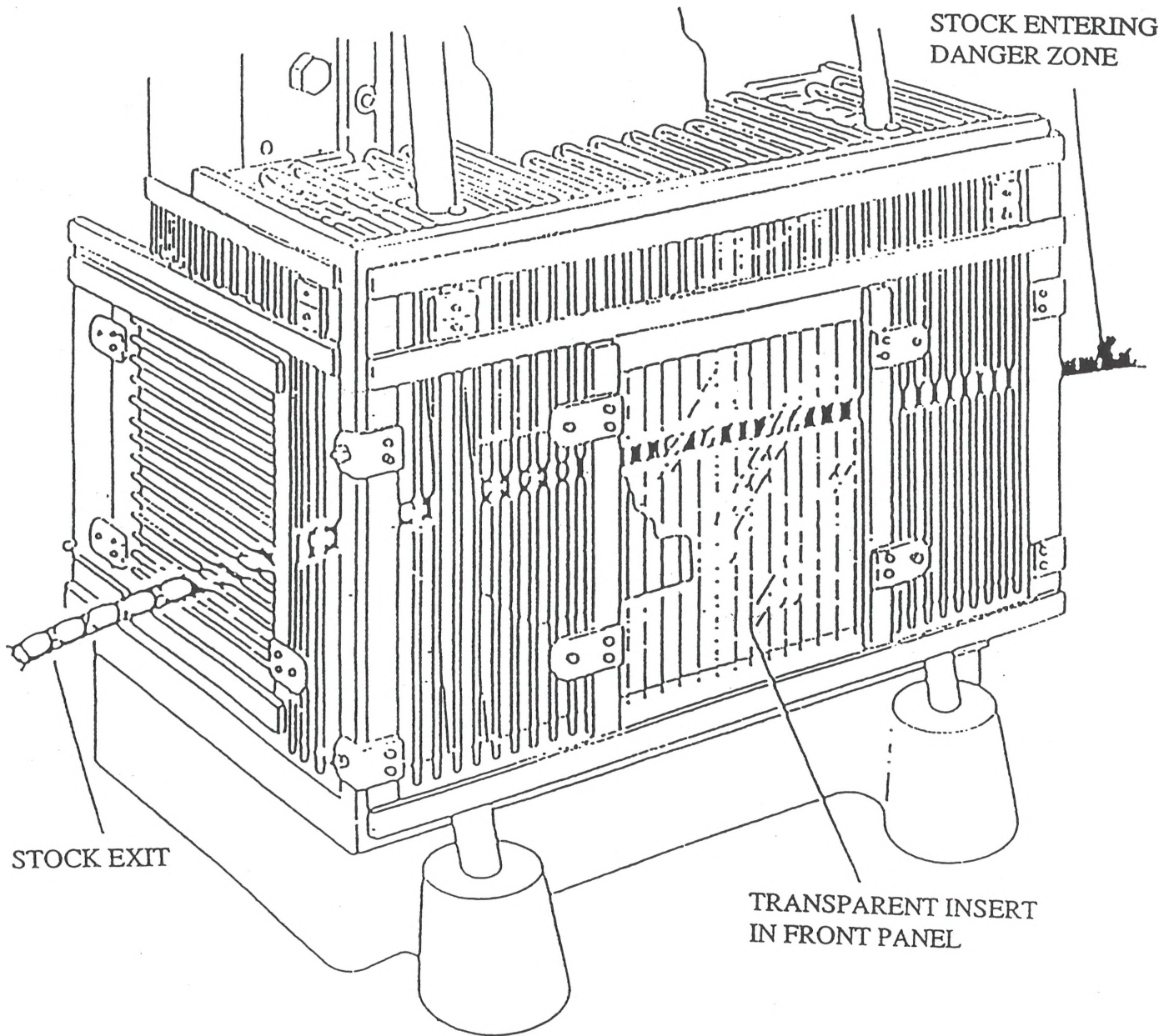
MECHANICAL POWER PRESS WITH
PRESENCE SENSING DEVICE



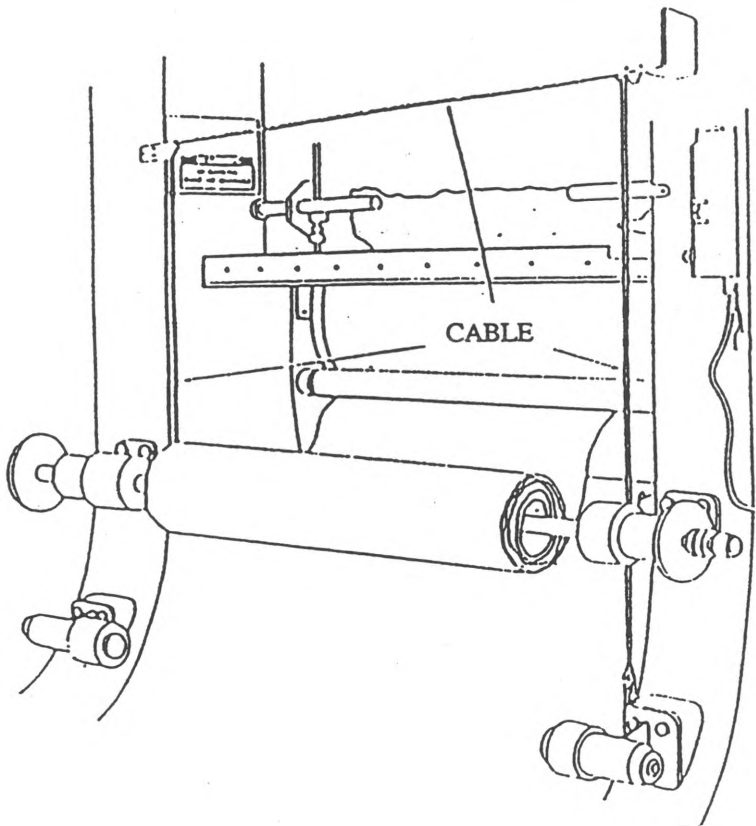
ADJUSTABLE GUARD ON POWER PRESS



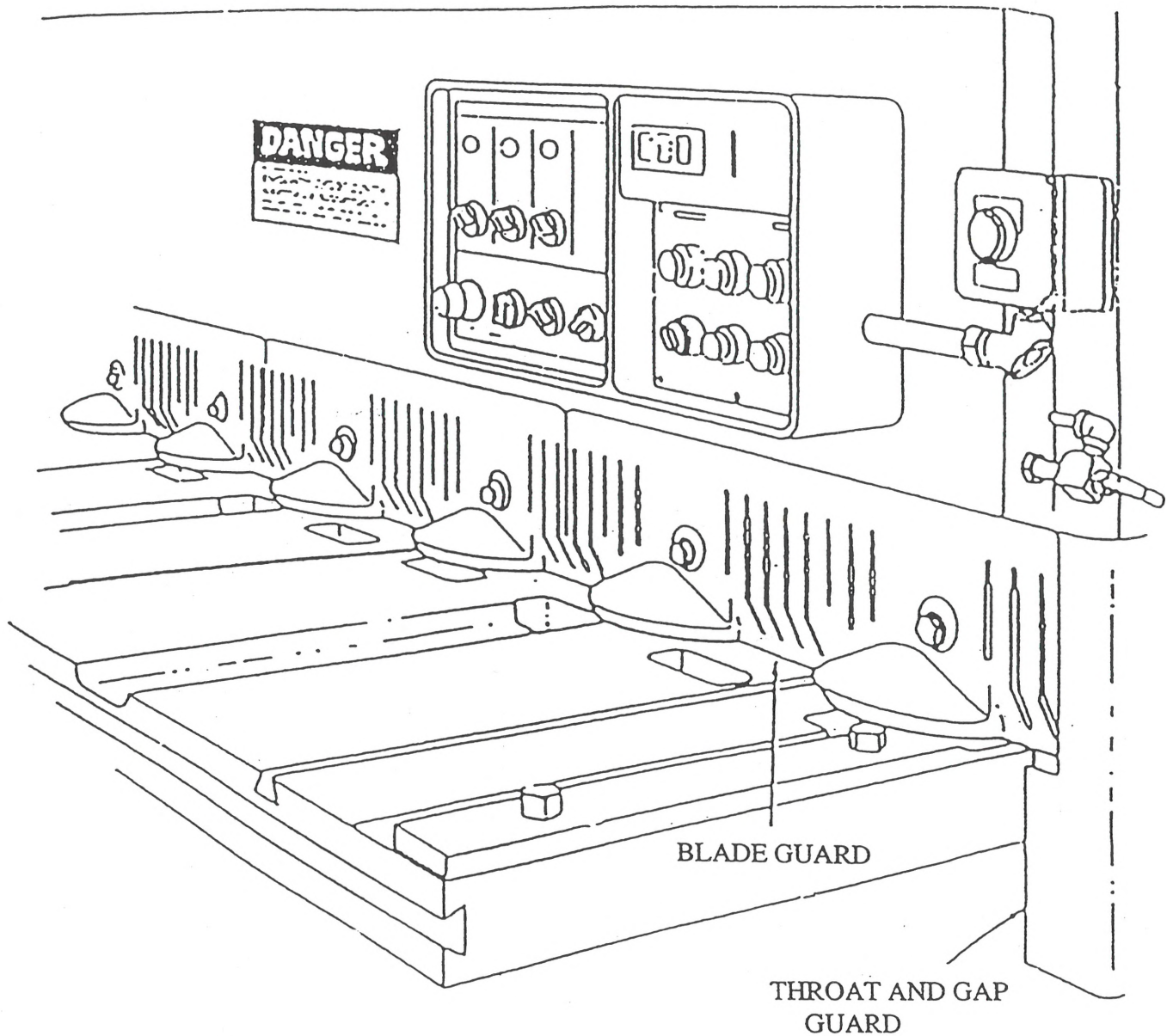
FIXED GUARD ON VANEER CLIPPER



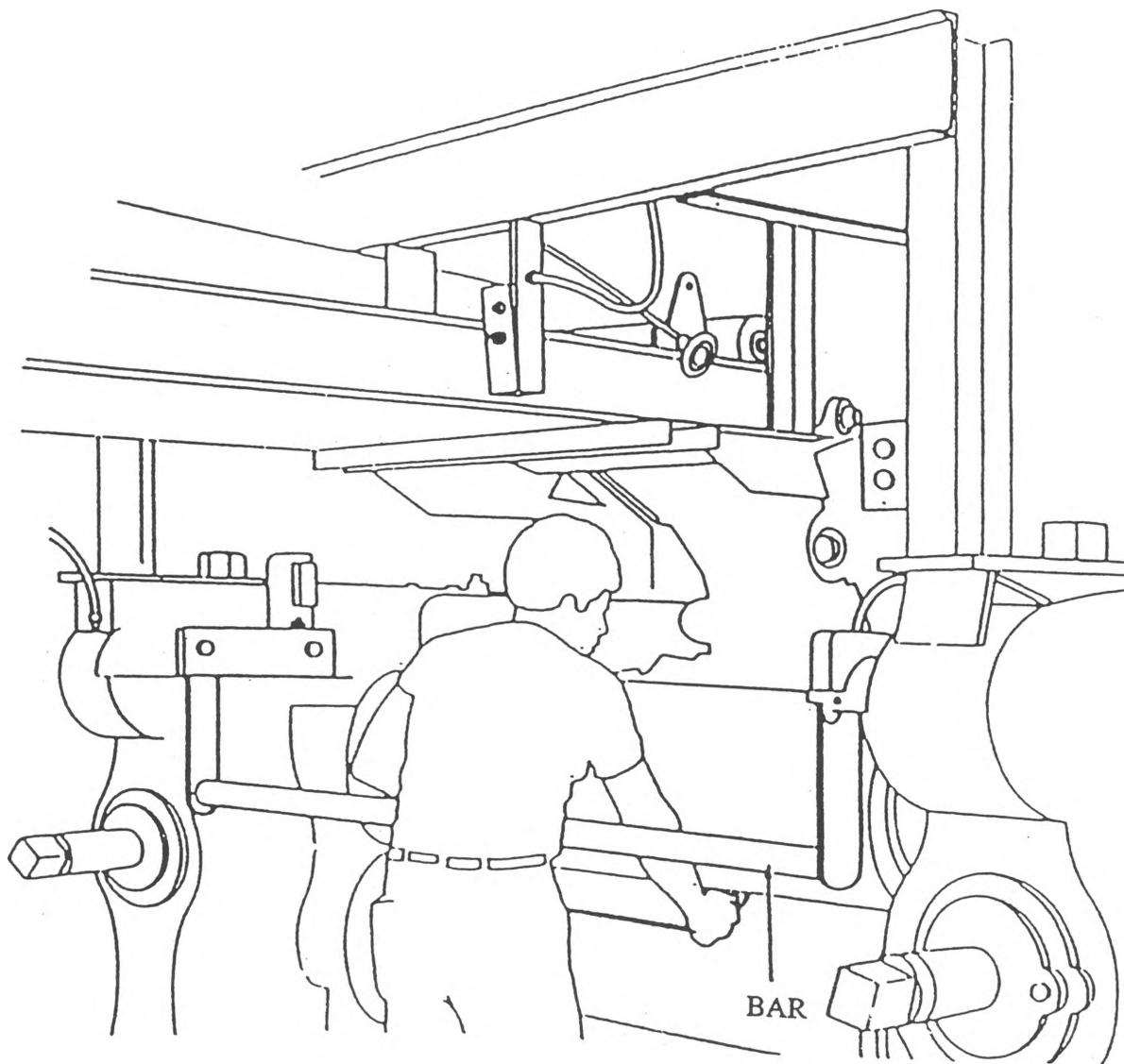
FIXED GUARD ON POWER PRESS



SAFETY TRIPWIRE CABLE
ON A CALENDER



FIXED GUARDS ON A POWER PRESS BRAKE



PRESSURE-SENSITIVE BODY BAR ON A RUBBER MILL

MAINE
DEPARTMENT OF
LABOR
Labor Standards

**45 State House Station
Augusta, Maine 04333-0045**

TEL: (207) 624-6400

FAX: (207) 624-6449

E-MAIL

webmaster_bls@state.me.us