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JAMES J. DAVIS, Secretary
BUREAU OF LABOR STATISTICS
ETHELBERT STEWART, Commissioner

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SAFETY CODE SERIES

SAFETY CODE
FOR
PAPER AND PULP MILLS

NATIONAL SAFETY COUNCIL, SPONSOR

—
TENTATIVE AMERICAN STANDARD
Approved December 8, 1925
American Engineering Standards Committee



APRIL, 1926

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NO. 410

WASHINGTON

APRIL, 1926

SAFETY CODE FOR PAPER AND PULP MILLS

INTRODUCTION

The National Safety Council was invited to act as sponsor for a safety code for paper and pulp mills during the year 1920. The sponsorship was accepted by the council, and under the rules of procedure of the American Engineering Standards Committee a sectional committee was organized, consisting of the following members:

Name and address	Interest represented	Sectional committee group
Chairman, Robt. M. Altman, safety director Marathon Paper Mills Co., Rothschild, Wis.	American Paper and Pulp Association and National Safety Council.	Manufacturers of paper and pulp.
A. P. Costigane, secretary and safety engineer Ontario Pulp and Paper Makers' Safety Association, Toronto, Ontario, Canada.	Ontario Pulp and Paper Makers' Safety Association.	Do.
G. E. Williamson, executive engineer Strathmore Paper Co., Mittineague, Mass.	American Paper and Pulp Association and National Safety Council.	Do.
Cyril Ainsworth, director bureau of inspection, Pennsylvania Department of Labor and Industry, Harrisburg, Pa.	International Association of Industrial Accident Boards and Commissions.	State regulatory bodies.
John F. Meade, director division of industrial safety, Department of Labor and Industries, Boston, Mass.do.....	Do.
Henry Schreiber, deputy, Industrial Commission of Wisconsin, Oshkosh, Wis.do.....	Do.
W. A. Dearborn, chief engineer Federal Mutual Liability Insurance Co., 142 Berkeley St., Boston, Mass.	National Association of Mutual Casualty Companies.	Insurance interests.
John L. Thompson, superintendent engineering and inspection division, Travelers Insurance Co., Hartford, Conn.	National Workmen's Compensation Service Bureau.	Do.
John A. Dickinson, mechanical engineer, Bureau of Standards, Washington, D. C.	U. S. Bureau of Standards	Federal Government.
L. R. Thompson, in charge Industrial Hygiene and Sanitation, U. S. Public Health Service, Washington, D. C.	U. S. Public Health Service.....	Do.
W. C. Winn, International Brotherhood of Sulphite Mill Workers of the United States and Canada, Lisbon Falls, Me.	U. S. Department of Labor.....	Do.
Holger Jensen, manager engineering and rating division, Maryland Casualty Co., Baltimore, Md.	American Society of Safety Engineers and engineering section of the National Safety Council.	Engineering societies.
Charles W. Pusey, Pusey & Jones Co., Wilmington, Del.	American Society of Mechanical Engineers.	Do.
Al Kroes, director of safety education Employers' Mutual Liability Insurance Co. of Wausau, Wis., Fond du Lac, Wis.	American Pulp and Paper Mill Superintendents' Association.	Do.
Charles Ludwig, assistant superintendent Meade Pulp & Paper Co., Chillicothe, Ohio.	Society of Ohio Safety Engineers and Ohio Manufacturing Association.	General interests.
Secretary, J. M. Sandel, safety engineer National Safety Council, Chicago, Ill.	National Safety Council.....	Do.

The sectional committee gratefully acknowledges the helpful cooperation of the following persons and organizations who have sat with the committee at its invitation:

John Lundrigan, industrial superintendent, and superintendents and safety engineers of the International Paper Co.

Walter A. Gleason, safety director Hammermill Paper Co., Erie, Pa.

Henry Obermanns, general superintendent Hammermill Paper Co., Erie, Pa.

R. P. Higginbotham, safety engineer, and superintendents of the Crocker-McElwain Co., and the Chemical Paper Mfg. Co., Holyoke, Mass.

W. R. Wilson, safety engineer, and superintendents of the American Writing Paper Co., Holyoke, Mass.

Members of the American Pulp and Paper Mill Superintendents' Association, Kalamazoo, Mich.

Charles R. Blodgett, secretary safety committee, Eastern Manufacturing Co., Bangor, Me.

The initial code was prepared by J. M. Sandel, safety engineer National Safety Council, and was revised five times by the sectional committee and members of the above-named organizations and the paper and pulp section of the National Safety Council, who cooperated. The code was discussed at meetings of the paper and pulp section at the National Safety Congresses of 1923 and 1924, at a meeting of the Kalamazoo section of the American Pulp and Paper Mill Superintendents' Association, with the operating men of the International Paper Co. at Glens Falls, N. Y., and with the operating men of the paper mills at Holyoke, Mass. The code in its present form was approved by the sectional committee by letter ballot by September 26, 1925, and immediately submitted to the American Engineering Standards Committee following approval by the executive committee of the National Safety Council. The code was approved by the American Engineering Standards Committee, December 8, 1925.

SECTION 1. SCOPE AND PURPOSE

Rule 10. Scope.

This code applies to establishments where paper and/or pulp are manufactured. For logging and transportation of logs to the mill, see American Logging and Sawmill Safety Code. This code does not include requirements for guards for belts, pulleys, gears, etc., nor any other subjects covered in other codes, either completed or under way.

Rule 11. Interpretations and exceptions.

The purpose of this code is to provide reasonable safety for life, limb, and health. In cases of practical difficulty or unnecessary hardship, the enforcing authority may grant exceptions from the literal requirements of this code or permit the use of other devices or methods, but only when it is clearly evident that reasonable safety is thereby secured.

NOTE.—It is suggested that in cases where exceptions are asked the enforcing authority consult with the Committee on Safety Code for Paper and Pulp Mills, in care of American Engineering Standards Committee, 29 West Thirty-ninth Street, New York City, or National Safety Council, 108 East Ohio Street, Chicago. Such consultation will tend to bring about uniform application of the code and will keep the committee informed of criticisms which should be considered if and when the code is revised.

Rule 12. New and old installations.

After the date at which this code becomes effective all new construction and installations shall conform to its provisions unless exception is allowed in accordance with Rule 11.

Rule 13. Reference to other codes.

The present code is supplemented by the following codes, complete copies of which may be obtained through the office of the American Engineering Standards Committee, 29 West Thirty-ninth Street, New York City:

Boilers. (Write American Society of Mechanical Engineers, 29 West Thirty-ninth Street, New York City.)
 Building Exits.
 Conveyors.¹
 Compressed Air Machinery and Equipment.¹
 Electrical (Fire) Code, National.
 Electrical (Safety) Code, National.
 Electric Power Control.
 Elevators.
 Floor Openings, Railings, Toe Boards.¹
 Grinding Wheels.
 Head and Eye Protection (Goggles, etc.).
 Ladders.
 Lighting.
 Lightning Protection.¹
 Logging and Sawmill Machinery.
 Pipe Lines, Identification of.¹
 Power Transmission (including belts, gears, shafting, etc.).
 Sanitation.¹
 Ventilation.¹
 Woodworking Machinery.

Rule 14. Mandatory and advisory.

The word "shall" is to be understood as mandatory, and the word "should" as advisory.

PART I.—THE YARD**SECTION 10. UNLOADING AND STORAGE OF PULP WOOD****Rule 100. Unloading pulp wood in the yard.**

(a) Where locomotive cranes are used for loading or unloading 8-foot logs or with stackers, the pulp wood should be piled so as to allow a clearance of 18 inches between the pile and the end of the cab of the largest locomotive crane in use, when the cab is turned in any working position.

NOTE.—Such distance should be maintained when unloading from box cars, care being taken to pile at a sufficient distance from the center of the track to have the safe clearance when a locomotive crane is used.

(b) If no locomotive cranes are used, the minimum distance of pile from center line of track shall be 8½ feet.

(c) For wood of short lengths (4 feet or less) and where tracks will be moved, piles of wood should be located so that there will always be a clearance of at least 8½ feet from the center line of the track which is in actual use.

¹ Codes being prepared and are not yet available.

(d) Piles of pulp wood shall not contain logs protruding irregularly over a walkway. Piling of logs shall be arranged so that no piling behind can cause pile face to be forced into walkway by pile pressure, thus reducing the clearance specified in rule 100 (a).

Rule 101. Unloading pulp wood from ships.

(a) Railroad cars shall not be spotted on tracks adjacent to the locomotive crane unless clearance mentioned in rule 100 (a) can be maintained.

(b) Ladders to boat docks shall be securely fastened in place.

Rule 102. Locomotive cranes.

(a) If locomotive cranes are used, the cranes shall be securely anchored to tracks, or outriggers shall be used.

(b) A heavy chain or cable shall be securely fastened to the boom and to the frame of a locomotive crane at the base to prevent the boom from falling should it break at the base.

Rule 103. Flat cars.

(a) Flat cars for the conveyance of pulp wood should be equipped with safety stake pockets unless they are to be unloaded by crane and grab buckets or by hand. (See fig. 1.)

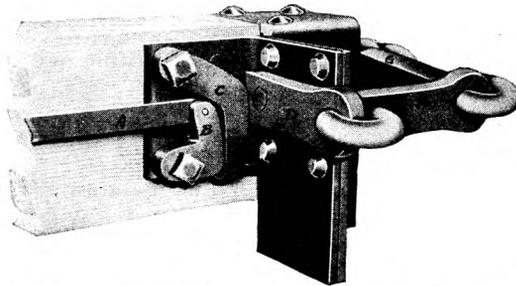


FIG. 1.—Safety stake pocket for use on flat cars used to convey pulp wood.

(b) For wood of short lengths (4 feet or less) sufficient hardwood stakes of size not smaller than 4 by 4 inches shall be used to prevent the load from shifting.

Rule 104. Yard illumination.

Lighting shall be provided in the yard.

Rule 105. Warning signals.

Except where the locomotive engineer can obtain a clear view of at least 200 feet of track, a warning signal should be provided on every curve; this shall be an automatically operated electric gong or a standard whistling post.

Rule 106. Gangplank construction.

Gangplanks for use in unloading pulp wood from box cars shall be of sound construction, at least 5 feet wide, and of adequate strength for the loads to be handled. The edges should be raised to prevent trucks and other conveying equipment on wheels from rolling off. Where car doors are wider than the above specified minimum width,

the doors shall be closed so as to leave an opening or exit from the car directly on and no wider than the gangplank width.

Rule 107. Yard housekeeping.

Materials other than mentioned above should be stored in such a way as to minimize the possibility of injury to employees.

NOTE 1.—Rules and recommendations for railroad operation in yards may be found in the published recommendations of the American Railway Association.

NOTE 2.—Rules and recommendations for the operations in connection with river driving and the hot pond may be found in section 17 and rule 211 of the American Logging and Sawmill Safety Code.

Rule 108. Pike poles.

Handles of pike poles should be made of split wood, preferably hickory or ash, or of saplings of the same woods.

Rule 109. Operating rules.

(a) *Chains and ropes for locomotive cranes and jammers.*—Chains used on locomotive cranes and jammers shall be inspected at least once a week, and cables and ropes in use shall be inspected daily. Inspection tags showing date of last inspection and allowable loads should be attached to all tackle when it is placed in the storeroom. Frozen rope shall not be used.

NOTE.—Ropes (manila or hemp) used in cold (freezing) weather or in climates where there is long continuous cold should be kept away from water and wet material. If moisture freezes in the fiber, the rope becomes unsafe.

(b) *Anchorage for jammers.*—The anchorage of jammers shall be frequently inspected, whether the jammers be located on cars or on the ground.

(c) *Unloading cars.*—Where safety stake pockets have not been provided on cars, the cutting of wires and chopping of stakes should be done only by experienced and agile employees. The stakes should be first partially cut through and then wires should be cut on the side of the car opposite to where the stakes have been cut. The employees should be cautioned not to work directly in front of the load. Wire cutters equipped with long handles are recommended.

(d) Care shall be taken so that hand-brake wheels and brake shafts are not damaged.

(e) *Hand tools.*—Pickaroons, peavies, and hand tools shall be kept sharp so as to prevent wood from slipping. If handles are once broken, they shall be renewed, not repaired.

(f) *Safety instruction.*—All men shall be instructed by their foremen of the dangers and hazards of all yard equipment used. This shall include railroad, conveyor, and sling-load hazards. Inexperienced men shall be carefully instructed by their foremen in the use of hand tools.

(g) *Walkways.*—Walkways shall be kept in safe condition and clear of any material, which shall always be removed immediately after unloading. Holes near the tracks shall be filled in.

(h) One hatch tender shall be responsible for the safety of the men working in the holds of boats. He shall signal hoisting engineer to lift the load only after the men are clear of the load and falling sticks.

SECTION 11. WOODPILE**Rule 110. Arrangement of woodpiles.**

Woodpiles should be safeguarded by orderly piling of the wood at the bottom to control the pile and maintain the clearance required in Rule 100. (See fig. 2.)

Rule 111. Removal of pulp wood.

(a) To remove pulp wood from the woodpile when frozen, the use of an endless wire rope and ship's anchor in connection with a drum is recommended. (See fig. 3.)

NOTE.—The use of a wire rope and anchor enables employees to keep in the clear and the pile can be very quickly loosened. It also eliminates the use of dynamite and prevents breakage of wood.

(b) If dynamite is used, it shall be done only by experienced employees. If a fuse is used for exploding the dynamite, the minimum length of fuse shall be 16 inches.

NOTE.—A battery and electric detonator is much less hazardous and preferable to the use of fuses.

Rule 112. Conveyors.

(a) The sides of the conveyor shall be constructed so that the wood will not fall off. For small sizes of wood, the minimum height of the sides shall be 2 inches; for larger sizes of wood, the height of the sides shall be increased as much as is necessary to prevent wood from falling, but not less than one-half the diameter of the largest stick handled.

(b) Where conveyors cross passageways and roads, a horizontal platform should be provided under the conveyor extending out from the sides of the conveyor a distance equal to one and one-half times the length of the wood handled. The platform should extend the width of the road and 2 feet on each side of it. The edges of the platform should be provided with rails, or other protection to prevent wood from falling.

Rule 113. Signs.

Where conveyors cross walkways and roads in the yards, signs reading "Danger, falling wood," or equivalent warning shall be erected.

Rule 114. Sprayers.

Sprayers should be installed in woodpiles.

NOTE.—This is recommended (1) to prevent decay, (2) to reduce the fire hazard in the summer.

SECTION 12. UNLOADING AND STORAGE OF RAW MATERIALS**Rule 120. Clothing.**

Respirators, goggles, or protective masks shall be provided for workmen unloading alum, clay, soda ash, lime, bleach powder, sulphur, caustic soda, and similar hazardous material. When unloading acid workmen shall be provided with goggles, rubber gloves, and rubber aprons. Respirators, goggles, protective masks, and rubber gloves that have been used shall be cleaned and disinfected before being used by another employee.

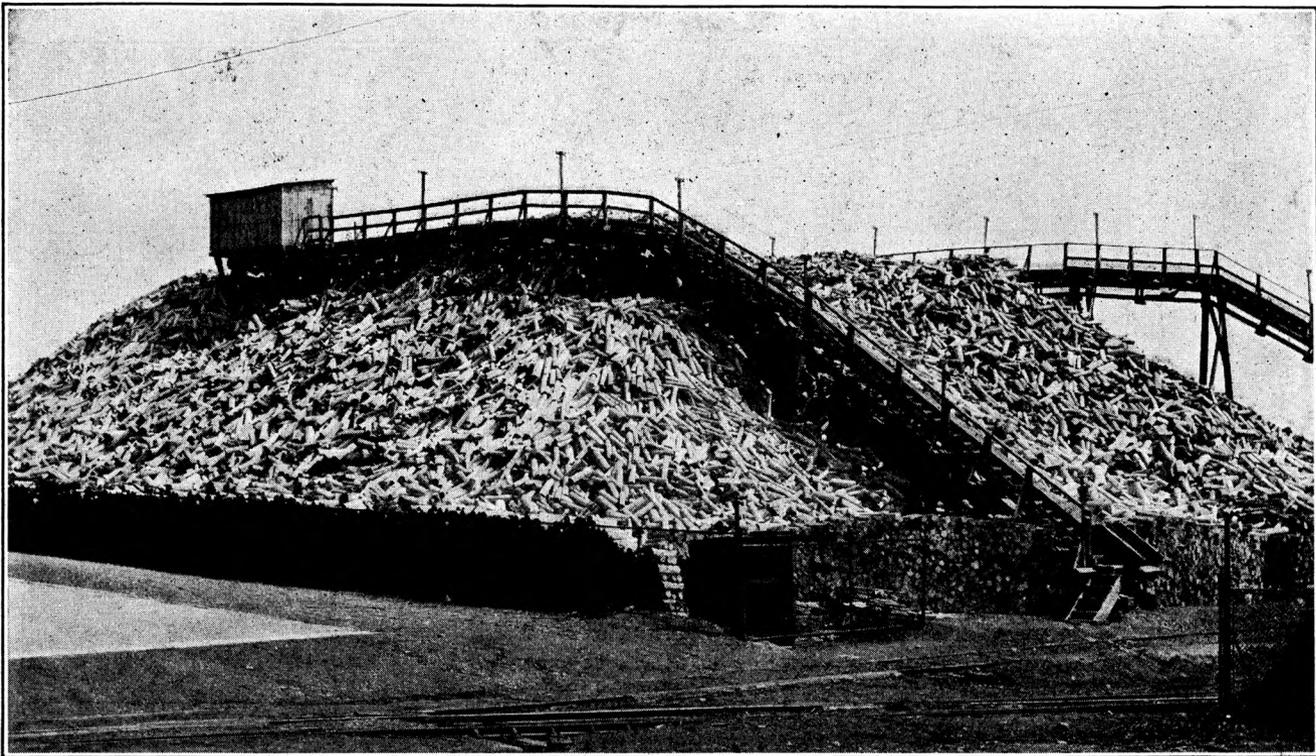


FIG. 2.—Proper storage of pulp wood



Fig. 3.—Use of an anchor in loosening frozen pulp wood

NOTE 1.—Electrically driven portable fans relieve poor ventilation in congested places, such as box cars and bins. A slight movement of air will reduce the discomfort of the protective equipment, which should never be removed. Conductors to fans shall be free from defects, so as to reduce hazard of electric shock.

NOTE 2.—When unloading raw materials onto platforms, steel plates have been found efficient when equipped with accessories to prevent plates from slipping. Perforated plates provide drainage, but the surface should be treated or roughened so that men will not slip.

Rule 121. Trucks.

(a) Trucks with rollways should be used in handling paper in rolls or full reels, except when loaded from platform same height as truck body. With this equipment lifting is unnecessary. (See fig. 4.)

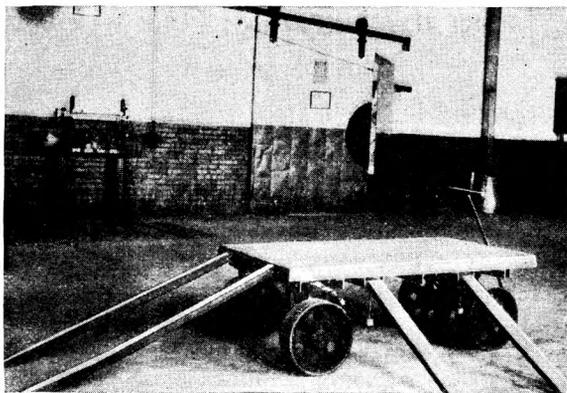


FIG. 4.—Truck with rollways for handling paper

(b) Trucks having four wheels should be equipped with spring clips for holding the handles in an upright position when not used, or the handles should be counterweighted so that they will stand upright.

NOTE.—A wooden block permanently attached to the truck with a chain, and intended to be used as a chock to keep the truck from rolling when not in use has been found very effective.

(c) When two-wheel trucks are used, they should be equipped with brakes.

Rule 122. Clearance.

When piling materials inside buildings and upon platforms, sufficient clearance shall be provided for the safe operation of all trucks.

Rule 129. Operating rules.

(a) *Trucks.*—Trucks shall be frequently inspected and maintained in a safe condition. Wheels with broken rims shall be repaired. Nails shall not be used in lieu of cotter pins for holding wheels on axles.

(b) *Handling empty carboys.*—Before being loaded for return, carboys shall be entirely drained and washed out by inverting over a stream of water.

NOTE.—Many men have been badly burned by handling a carboy which they had every reason to suppose was empty and yet had a little acid remaining in it. It is well to take the same precautions with empty carboys as with full ones.

(c) *Piling pulp*.—Piles of pulp shall be “stepped back” toward the top. Sheets of pulp shall be interlapped to make the pile secure; vertical or inclined wooden braces between piles shall not be used. Employees should be instructed not to pile pulp—

- (1) Over pipe lines to jeopardize pipes, or
- (2) So as to cause overloading of floors, or
- (3) So as to obstruct sprinkler heads.

(d) *Unpiling pulp*.—Employees shall be instructed not to undermine piles of pulp when unpiling, or to change the general shape of the pile when piled as specified in rule 129 (c).

(e) *Wall marks*.—Walls of buildings should be marked to show the safe height for storage of various materials.

PART II.—PREPARING PULP WOOD

SECTION 20. SAWS

Rule 200. Screens for gang and slasher saws.

Screens shall be provided in front of all gang and slasher saws and shall consist of heavy wire mesh or planking 2 inches or more in thickness bolted to 4 by 4 inch posts. This barricade may be either suspended from the roof by chains or cables or may be bolted to the machine frame. The guard should be placed over tail sprockets.

Rule 201. Slasher tables.

Slasher tables shall be not less than 42 inches above the floor or platform or, if such elevation is not practicable, shall be guarded on exposed side or sides with a standard handrail.

NOTE 1.—Unless the table is 42 inches or more above the floor a standard guard rail is required to protect operators in case of slipping or falling.

NOTE 2.—In addition to protecting the operator and oiler the complete inclosure of the drive as required will protect against damage due to bolts thrown by the saw. This is an important economic consideration as the damage done by such accident would probably exceed the cost of the guard.

Rule 202. Slasher drive belts, pulleys, and shafts—

Shall be completely inclosed in accordance with the requirements of the Safety Code for Power-Transmission Apparatus.

Rule 203. The runway to the jack ladder—

From pond or unloading dock to table shall be protected with standard handrail and toe boards.

Rule 204. Guards below table.

Where not protected by the frame of the machine the under side of the slasher saws should be inclosed with expanded metal, attached so as to provide liberal clearance for the escape of sawdust.

Rule 205. Conveyors.

There shall be devices provided for quick stopping of conveyors.

Rule 206. Single circular saws—

Shall be provided with guards specified in the Code for the Safeguarding of Woodworking Plants.

Rule 209. Operating rules.

All oiling should be done at stated periods, at a time when all machinery is stopped.

SECTION 21. HAND BARKERS

Rule 210. Guards.

The machine shall be guarded so that the wood can be securely held in place and revolved for barking and the operator protected.

NOTE.—Each machine can be provided with a lever attached to the top of the barker and extending down so as to hold the wood block against the revolving disc. A gear wheel can be provided to facilitate the revolution of the wood block. (See fig. 5.)

Rule 211. Screens.

Persons passing by the barkers shall be safeguarded from flying particles.

NOTE.—A sheet-metal or fine-wire mesh guard on the side toward the direction of revolution of the disc will secure the above.

Rule 212. Stops.

There shall be a positive stopping device for all hand barkers which can be arranged to be locked disconnected from the power.

NOTE.—This is necessary when sharpening knives on the machine.

Rule 213. Governor.

Where a barker disc is directly connected to a water wheel, a governor should be placed on the wheel to control the speed of the disc within safe limits.

Rule 219. Operating rules.

(a) *Barker knives.*—Hand barker knives shall be sharp and free from nicks.

(b) *Knives*, when renewed, should be of the same weight as those remaining in the disc.

(c) *Barker disc.*—The revolving disc shall be kept in such condition that it will be uniformly revolving in true. The disc shall be periodically inspected and removed from service if cracks develop.

SECTION 22. BARKING DRUMS

Rule 220. Continuous barking drums.

(a) A standard railing shall be constructed around the drum.

(b) Sprockets and chains, gears, and trunnions shall be guarded as specified in the Safety Code for Power-Transmission Apparatus.

Rule 221. Intermittent barking drums.

In addition to motor switch, clutch, belt shifter, or other power-disconnecting device, intermittent barking drums should be equipped with a device that will prevent the drum from moving while it is being emptied or filled.

Rule 229. Operating rule.

When barking drums are driven by chains, the chains shall be frequently inspected for any defects.

SECTION 23. SPLITTERS

Rule 230. Splitter block.

The block which the wood is rested upon, whether on the vertical or horizontal splitter, should have a corrugated surface or other means

should be provided so that the wood will not slip. A hook or bar should also be provided to clean the block of snow, ice, or chips.

Rule 231. Power control.

Power for the operation of the splitter shall be controlled by a clutch or equivalent device.

SECTION 24. CHIPPERS

Rule 240. Chipper spout.

The chipper spout should be at least 36 inches long and the end of it should be protected by either a circular piece of heavy belting fastened over the mouth of the spout, or a swinging baffle (similar to a swing check valve) installed in the spout, to prevent particles flying back from the knives.

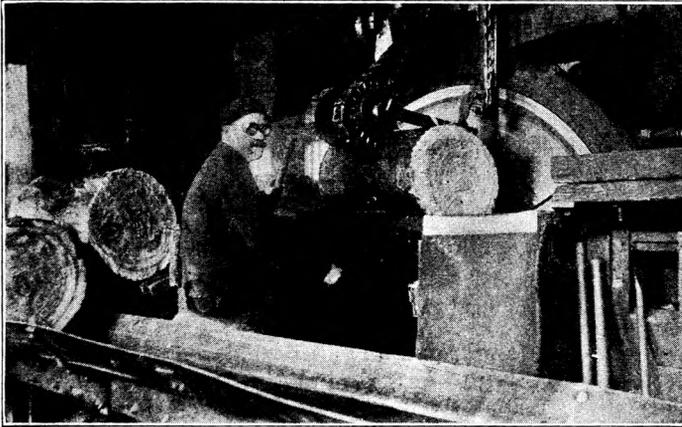


FIG. 5.—Guards on the “barker”

Rule 249. Operating rules.

(a) The revolving disc shall be kept in such condition that it will be uniformly revolving in true. The disc shall be periodically inspected and removed from service if cracks develop.

(b) Chipper knives should be kept sharp at all times to prevent “spitting” of chips.

PART III.—RAG AND OLD-PAPER PREPARATION

SECTION 30. SORTING ROOM

NOTE.—It is recommended that this department be located in a building of fire-resistive construction, as spontaneous combustion is liable to occur in rags. Premises should be kept clean.

Rule 300. Disinfection.

Whenever possible, all rags and old paper should be disinfected before hand sorting by employees.

NOTE.—The most practical and effective method of disinfecting rags is the use of steam for a period of 20 to 30 minutes.

Rule 301. Ripping knives.

Knives for ripping pockets and removing buttons shall be located at a place convenient to the operator. They should be provided with a blunt top end and securely fastened to the table. (See fig. 6.)

Rule 302. Steels for sharpening ripping knives—

Shall be guarded by leather discs set at the junction of the wooden handle and the steel.

Rule 303. Containers of compressed paper or metal—

Should be used in preference to wooden barrels, etc., to eliminate the hazard of projecting nails.

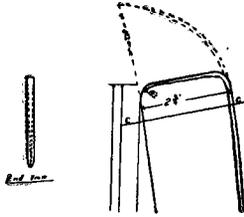


FIG. 6.—Ripping knife

SECTION 31. DUSTING, SHREDDING, AND RAG-CUTTING MACHINERY**Rule 310. Shredders.**

The shredding and cutting tools shall be guarded by a hood of metal completely inclosed to prevent human contact

Rule 311. A smooth idle roll—

Resting on the feed table, shall be set in front of the cutting tools, unless the cutters are 36 inches or more from the edge of the feed table.

Rule 312. Blowers.

Where blowers are used to transport rags, a large-sized hopper should be attached to the blower for feeding the rags. The outer edge should be set at a distance greater than the length of a man's arm away from the blower.

NOTE.—Sometimes the opening to the hopper can be set flush with the floor and to one side of the blower so that rags can be pushed along the floor into the hopper. This opening should be covered when not in use.

Rule 313. Ventilation and removal of dust.

There shall be adequate provision to properly ventilate the dusting department and to remove dirt. Where tables are used there shall be a grated opening with exhaust in front of each worker.

NOTE.—Sometimes a blower system used for transporting rags can be used to ventilate the room also. If room is large, general ventilation should also be provided.

Rule 314. Bleach boiler.

The power control for the bleach boiler shall be arranged to be locked while the boiler is being filled.

Rule 319. Operating rules.

(a) *Dusters*.—If employees use pitchforks for feeding the dusters, they should be cautioned in working with them so that they will not stick one another. For that reason it is better not to have two men feeding the same machine.

NOTE.—It is possible to protect the prongs of forks by covering the end of each prong with a cylindrical or conical cap of wood, fiber, or similar substance one-half inch in diameter and one-half inch long with a hole bored half way through, fitting tightly on the prong.

(b) *Shredders*.—When operating shredders workmen should be cautioned never to get their hands so close as to have them drawn into the feed roll.

(c) *Safety instruction*.—In feeding blowers employees should be instructed to use some kind of hand tool and to remove all heavy foreign objects which, when discharged from the other end of the duct, may injure other persons. In addition, the discharge outlet should be arranged so that material will not fall upon workmen.

PART IV.—ACID MAKING**SECTION 40. SULPHUR BURNING****Rule 400. Sulphur burners.**

Sulphur-burner houses should be ventilated. The method will be determined by the individual location. Where burners are located below the ground level it is necessary to provide proper circulation by means of ventilating fans.

SECTION 41. ACID PLANTS**Rule 410. Protection for employees.**

Suitable gas masks shall be provided for employees of the acid department.

Rule 411. Clothing.

Where lime slacking takes place employees should be provided with rubber boots and gloves, free from holes, and sufficient diluted acetic acid or other suitable reagent shall be provided to counteract any lime burns.

Rule 412. Masks—

Should be available for emergency cleaning, and a man should be stationed outside if sulphur gas is coming through.

Rule 413. Acid tower structure.

Elevators, runways, stairs, etc., for acid towers should be inspected monthly for defects that may occur because of exposure to fumes.

Rule 414. Signal system.

A signal system should be provided between the acid towers and the acid plant, for use in case men are suddenly overcome with gas while at work. This signal should preferably be arranged so that a bell will ring in the acid plant and will call a properly equipped rescue party.

NOTE.—It is advisable to have two entirely separate systems. One should be entirely mechanical, on account of the presence of acid fumes tending to cripple the electrical systems. They should be frequently tested by use in regular work.

Rule 415. First aid.

Water and a saturated solution of bicarbonate of soda shall be provided as first aid for acid burns at all locations where acid is handled.

NOTE.—A drinking fountain can be used to wash acid out of eyes, while a tub or shower bath is needed for body burns.

Rule 419. Operating rule.

Stone should be loaded in trucks when hoisting to the top of the acid tower, or mechanically handled in other ways. When trucks are used they should be blocked in place on the elevator.

SECTION 42. DISTRIBUTING LINES, VALVES, STORAGE TANKS, ETC.**Rule 420. Repairing tanks.**

Men repairing acid tanks should be provided with suitable masks, life belts, and life lines, and a man should be stationed outside to render assistance if necessary. There should be no acid in the tank and the tank should be washed out with water. If portable extension cords are used, they shall be acid proof.

Rule 421. Lead burning.

Fresh air shall be forced into the tanks, if necessary, when this work is done, so there will be no accumulation of lead fumes.

NOTE.—It may sometimes be necessary for lead burners to take the same precautions as recommended in rule 420.

Rule 422. Hoops for acid storage tanks.

Hoops of tanks shall be made of rods rather than flat strips.

Rule 429. Operating rule.

Hoops of tanks shall be frequently inspected to ascertain the extent of corrosion. The hoops shall be renewed when necessary, when inspection reveals corrosion or other weakening factors.

NOTE.—Spare hoops should be kept on hand, so as to be available for use when leakage and spilling occur due to poor hoops that have unexpectedly weakened.

PART V.—CHEMICAL PROCESSES OF MAKING PULP**SECTION 50. SULPHITE PROCESS****Rule 500. Chip bins.**

(a) A ladder or other means permanently attached to the structure shall be provided as means of access and escape from the bins.

(b) Steam, compressed air, a knotted rope, or other facilities should be used for breaking up or preventing arching of chips.

NOTE.—Superheated steam should not be used for this purpose because of the fire hazard.

(c) A grating with mesh of not larger size than 8 by 8 inches, too small to allow a man to fall through, should be installed at the outlet of the chip bin.

Rule 501. Exits.

At least two unobstructed exits at opposite ends of the room shall be provided on each floor of digester buildings. In case there is

but one entrance or exit a fire escape shall be installed at the end farthest from the inside stairway or other exit.

NOTE.—Gas will often accumulate near the exits, especially if there is a draft.

Rule 502. Gas masks.

Individual gas masks should be available within 200 feet of the locations where gas may be encountered. These masks shall be such as to furnish adequate protection against sulphurous-acid gas.

Rule 503. Blow-off valves and piping.

(a) The blow-off valve of the digester shall be arranged so as to be operated from the test-valve floor, the top floor of the building,

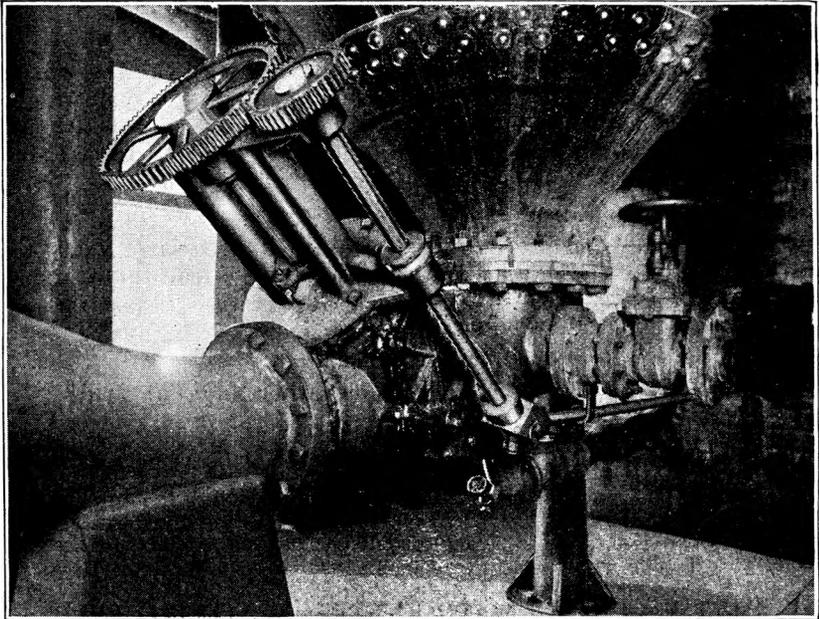


FIG. 7.—Arrangement for blow-off valve

or other location outside the digester room, or at protected points remote from valves.

NOTE 1.—This can be arranged by a system of shafting and gears as shown in Fig. 7. The safest arrangement is to have gears unmeshed when the digester is steaming.

NOTE 2.—The valve stem of the blow-off valve should be extended through a solid wall or to the floor above the digester room.

(b) Through bolts instead of cap bolts shall be used on all digester piping.

(c) Cast-iron (2 inches or more in thickness) or bronze pipe of equivalent resistance should be used between the valve and blow pit, and the pipe should be inspected monthly.

Rule 504. Blow pits.

(a) Blow pits should be safeguarded in one of the following ways:

1. The pit openings shall be as small as possible with raised sides, so that a man can sit outside of the openings; or

2. A high railing shall be provided, so located that the operator may sit on the side of the opening with feet inside of the pit, railing to be the height of 4 feet; or

3. A railing should be provided with a swinging arm which has a locking device.

(b) Openings should preferably be on the side of the pit instead of the top.

(c) A specially constructed ladder should be used for access to blow pits, to be constructed so that the door of the blow pit can not be closed when the ladder is in place, or other means should be provided to prevent the closing of the pit door when anyone is in the pit.

NOTE.—A hasp and padlock may be provided so that the door can be locked open while the man is in the pit.

Rule 509. Operating rules.

(a) When blowing off digesters (this applies equally well to the sulphate and soda process) the following should be observed:

(1) Man operating digester valves should personally see that no one is present on the blow-valve floor and that no one is in the blow pit. He should close and lock the blow-pit doors and then open his valve, after warning by word of mouth or ringing a gong.

(2) After removing the digester head, the workmen operating the valve should unlock and open the blow-pit door. A light should be used to see if the digester has been blown clean. This can be accomplished by opening the steam end slightly. The hand plate should not be opened unless this has been done.

(3) Blow-off valves should be opened slowly.

(b) Openings from chip bins to digesters shall be locked in a closed position or tagged while men are working in chip bins, the cooks notified, and the key to such locks should be in the possession of the men in the bins. Lock or tag shall be removed only by man who placed it.

(c) Men in chip bins shall be provided with life belts and life lines for aid in case of settling of chips.

(d) Digester linings shall be periodically examined by a competent inspector, and the following detailed procedure is recommended:

(1) Fresh air shall be blown into the digester constantly while workmen are inside.

(2) Chain ladders made of long links of steel should be used in preference to rope ladders.

(3) Valves controlling lines leading into the digester shall be locked in the closed position and the keys to the locks shall be in the possession of the person inspecting the digester.

(4) The inspector should never enter the digester unless a life line is securely fastened to his body and at least one other experienced employee standing outside of the digester to give him assistance.

(e) *Lead poisoning.*—The repair of digesters should be conducted so that there will be plenty of ventilation, so as to prevent an accumulation of lead fumes.

NOTE.—Canvas tubes or other means to get air at least to or below level on which men are working should be used.

SECTION 51. SULPHATE AND SODA PROCESSES**Rule 510. Hazards.**

Since the hazards of these processes are similar to those of the sulphite process, the exception being that caustic soda is used instead of acid, the same rules shall govern. A copious supply of running water, boric acid, or vinegar should be maintained as a reagent for caustic soda burns.

Rule 511. Blow lines.

(a) Each digester should have two independent "gas-off" lines and a reducing valve in the high-pressure steam line with safety valve between the digester and the reducing valve.

NOTE 1.—Two gas-off lines are recommended, so that if one of them plugs up with pulp the other may be used and the hazard of unplugging the lines with the digester under pressure overcome.

NOTE 2.—With the installation of a reducing valve and a safety valve, it will be improbable that boiler pressure will be raised above the maximum allowable working pressure of the digester.

(b) Where the blow-off lines from several digesters lead into one pipe, the handles of all cocks should be set uniformly, or some equivalent arrangement should be provided so that a man can see at a glance whether all cocks are set right or not. If valves instead of cocks are provided, a type with a rising spindle shall be used.

Rule 512. Furnace room.

An exhaust system should be used where niter cakes are fed into the rotary furnaces if hydrogen sulphide escapes into the room.

Rule 513. Causticizing tanks.

Niter cake should never be added to the smelt dissolving in the tanks.

NOTE.—There have been several instances where men have lost their lives presumably, from hydrogen-sulphide gas.

SECTION 52. BLEACHING**Rule 520. Bleaching engines.**

Bleaching engines, except the Belmer type, should be completely covered on the top, with the exception of one small opening large enough to allow filling but too small to admit a man. This opening should be either covered by a sliding door or guarded with standard railing and toe boards. Platforms leading from one engine to another shall be guarded to conform with the Code on Floor Openings, Railings, and Toe Boards.

Rule 521. Bleach-mixing rooms.

(a) The room in which the bleach powder is mixed shall be well ventilated, by an exhaust system located at the floor level if necessary, to remove the chlorine gas.

(b) An approved type of gas mask and face protector should be provided for employees working in this room.

(c) The exhaust for removing the chlorine fumes shall be carried away from the work place and breathing area of the workers and shall be rendered neutral or harmless before being discharged.

Rule 522. Liquid chlorine.

(a) *Storage tanks.*—Tanks of liquid chlorine shall be stored in an unoccupied room, well ventilated, where its possible leakage can not affect the workers.

(b) *Neutralization.*—The preparation of the bleaching mixture with liquid chlorine shall be carried out in a room entirely apart from the general workroom. The container for chlorine and its pipe connections should be inclosed in a separate chamber (glass paneled) supplied with a ventilating flue and a fan. Where this is impossible, an exhaust should be installed at the floor level to extract any leaking chlorine.

NOTE.—A stream of water directed on the leak will “freeze” the chlorine and stop the leak.

(c) *Face protection.*—Suitable masks, capable of absorbing or neutralizing chlorine, shall be supplied in sufficient numbers, conveniently placed, and regularly inspected, and the workers who may possibly be exposed to chlorine fumes should be instructed in their use.

(d) *First aid.*—There should be proper facilities for emergency treatments and first aid for men gassed in this work.

NOTE.—Employees should be trained in the prone-pressure method of resuscitation.

PART VI.—PREPARING PULP FOR PAPER MACHINE**SECTION 60. GROUND-WOOD PROCESS****Rule 600. Governors.**

Grinding machines should be equipped with governors which will limit the speed of the machines to that recommended by the manufacturer.

Rule 601. Pulp grinders.

In the case of a three-pocket grinder the door of the center pocket should be provided with a pin or counterweight which will prevent the door from falling on the hands of employees when filling this pocket.

Rule 602. Butting saw.

If this saw is used to cut long blocks, it should be set up permanently and guarded as required for circular saws in the Woodworking Code.

Rule 609. Operating rules.

Blocks should be delivered to the grinding machines in such a way that the blocks can not fall or strike the feet of operators.

SECTION 61. PULP SHREDDERS AND PRESSES**Rule 610. Floor drains.**

Adequate drains to remove all excess water shall be provided.

Rule 611. Feed for shredder.

A slanting table or spout at least 36 inches long should be attached to shredders for protection of employees. A sign should also be displayed, warning the employees to keep their hands out of the shredder.

Rule 612. Wooden paddles.

A wooden paddle should be provided to clear a blockade of pulp in the shredder.

Rule 613. Wet presses.

(a) The cleaning of stock from the felts of the machine when running shall be prohibited. An inclosure shall be provided in front of

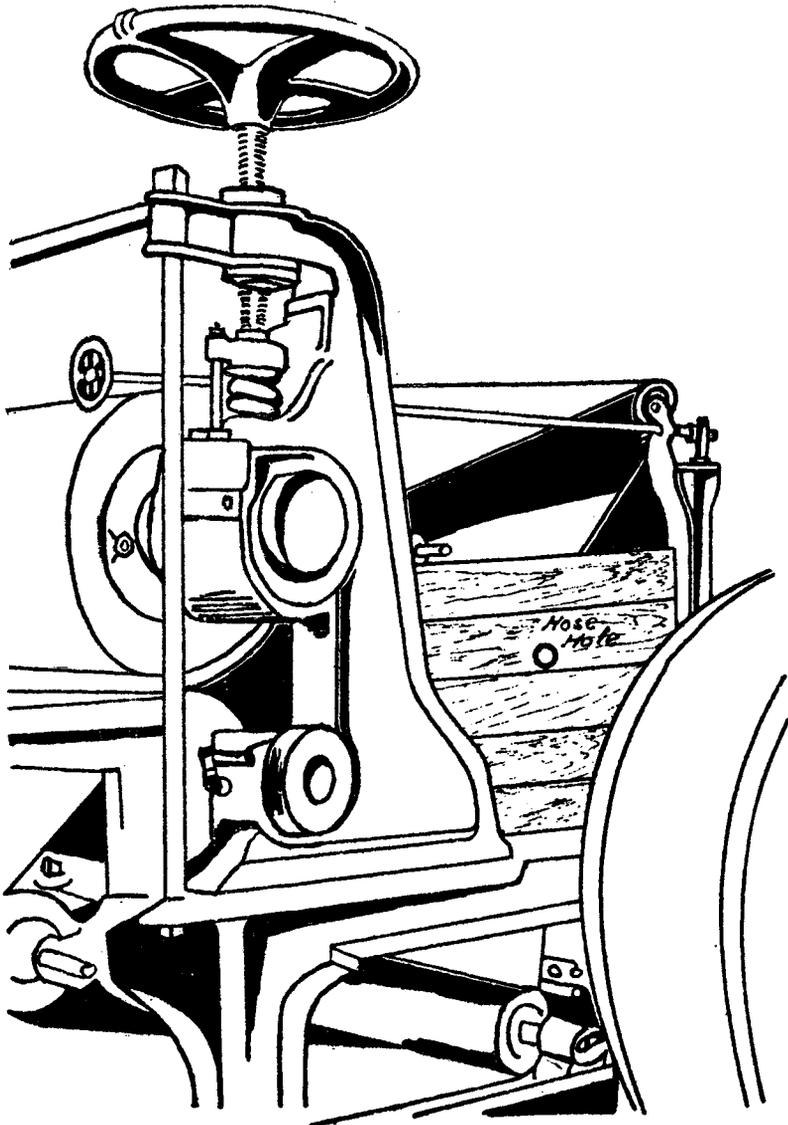


FIG. 8.—Inclosure to prevent contact with rolls

the roll, having an opening so that a stream of water can be directed on the roll, but not large enough to permit the entrance of the operator's hand. (See fig. 8.)

(b) Shafts which extend outside of journal boxes shall be fully inclosed.

Rule 614. Pulp conveyors.

Belt conveyors shall have the point of contact of the belts and pulleys guarded at inrunning bites. The guard should be arranged so that all stock on the conveyors will be automatically removed and not require manual handling at the point of contact. (See fig. 9.)

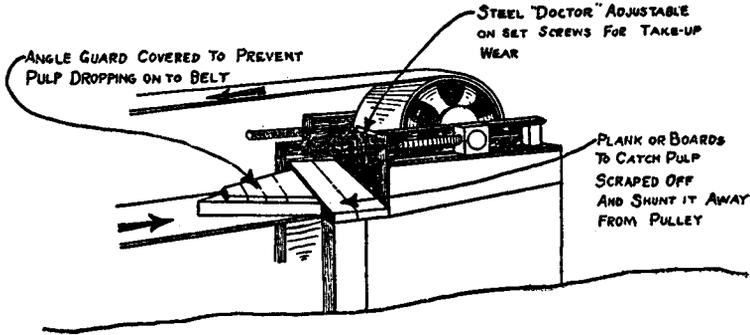


FIG. 9.—Guards for belt conveyors

SECTION 62. BEATERS AND WASHERS

Rule 620. Floors.

Floors around beaters and washers should be provided with inserts of antislip material to safeguard employees when tending congestion in beaters. Sufficient drains should be provided to take care of all surplus and waste water.

Rule 621. Beater dumping devices.

The so-called "automatic" dumping devices should be installed.

NOTE.—This will reduce back strains, etc.

Rule 629. Operating rules.

(a) *Floors.*—Floors should be cleaned daily to remove water, oil, and stock.

(b) *Wooden paddles.*—Wooden paddles shall be provided to remove congestions in front of the beater rolls rather than valve hooks or pieces of wire and iron. Paddles which are damaged shall be resandpapered or planed, so that slivers will not be a hazard.

(c) Employees shall not stand on edge or curbs of the beaters.

NOTE.—If the floor is too low to perform necessary work, platforms to hang on the edges of the beater should be provided.

PART VII.—MACHINE ROOM

SECTION 70. GENERAL

NOTE 1.—In connection with this and following parts it is necessary to refer frequently to the Power-Transmission Code for details on guard construction for machinery and parts.

NOTE 2.—Condensation on ceilings and moisture on hoods can be relieved by a good system of ventilation, which will insure plenty of fresh air from the outside and consequent removal of moist air from within.

Rule 700. Floor drains—

Should be provided of sufficient number and size to carry off excess water.

Rule 701. Emergency stops.

Both the operating and the back sides of the paper machines shall be equipped with devices that will stop the machines quickly in an emergency. The device shall consist of push buttons for electric motive power or electrically operated engine stops, pull cords connected direct to the prime mover, control clutches, etc. The devices shall be tested frequently by making use of them when stopping the machine.

Rule 702. Clothing.

Employees in this department should wear shoes at all times.

Rule 709. Operating rules.

(a) Floors of machine room should be subject to periodical inspection and should be cleaned daily.

NOTE.—In new construction or alterations, sloping of floors to drains or scuppers located at the machine foundation is recommended.

(b) *Hose.*—Water hose shall be kept out of the center of passageways as much as possible.

(c) Extra parts should be stored in cabinets from which they can be quickly and easily removed and should not be stored in a haphazard manner in the machine room.

SECTION 71. PRESSES AND DRYERS**Rule 710. Steps.**

Suitable steps with nonslip surfaces shall be provided at each press, upon which the operator may stand to pull out wet broke.

Rule 711. Plank walkways.

A removable plank of sufficient width shall be provided along each press, with standard handrails installed wherever possible. (See Code on Floor Openings, Railings, and Toe Boards.)

NOTE.—This is to eliminate the necessity of workmen standing on the press ductors.

Rule 712. Dryer lubrication.

If gear bearings must be oiled while machine is in operation, a piping system or equivalent shall be installed.

Rule 713. Automatic feed.

To protect against serious burns when feeding the sheet through the dryers of high-speed machines a rope or air feed or equivalent should be used. Where a rope feed is not used, guards should be placed in front of the rotating dryer if possible.

Rule 714. Stretch roll.

A ductor should be provided at the stretch roll.

Rule 715. Levers.

All levers carrying weights shall be constructed so that weights can not slip or fall off.

Rule 716. First dryer.

Either a permanent railing or apron guard or both shall be installed in front of this dryer.

Rule 717. Steam and hot-water pipes.

All steam and hot-water pipes within 7 feet of the floor or platform in this department shall be covered.

Rule 719. Operating rules.

(a) *Changing and washing felts.*—When changing or washing felts employees should be cautioned of the dangers attendant to the operation, and the foreman should see that employees follow instructions closely. They should stay on the outgoingside to be away from the nip.

(b) Employees should be cautioned against putting hands between stretch rolls and felts to clean roll of stock.

SECTION 72. CALENDER STACK**Rule 720. Feeder belt.**

A feeder belt should be provided when starting paper through a calender stack where the sheet of paper goes over the top calender roll.

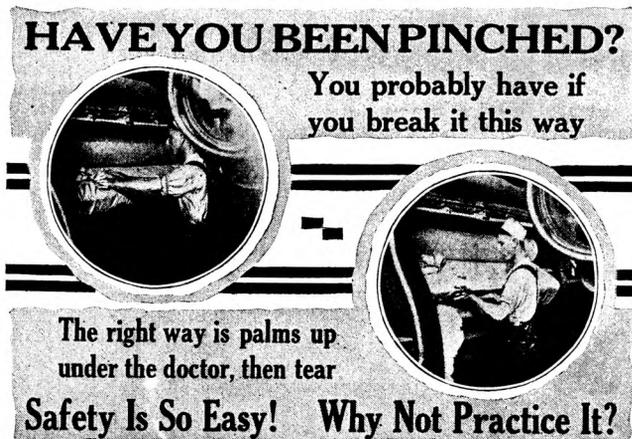


Fig. 10.—Proper position of worker in starting web through calender rolls

Rule 721. Steps.

Suitable steps with nonslip surfaces shall be provided at each press.

Rule 729. Operating rules.

(a) Workmen should use extreme care when throwing paper through the calenders after a break. They should not force a wad of paper through, but hold hands under ductor, palms up rather than palms down. (See fig. 10.)

(b) Weights shall be removed from the lever before throwing the lever.

SECTION 73. WINDING REELS**Rule 730. Rotation.**

Wherever possible, the direction of rotation of two reels should be the same so as to avoid the formation of a nip into which the operator may be drawn if the space between the reels is small. (See fig 11.)

On machines operated at 500 feet per minute and over, drum reels shall be employed with separate rereeling stands.

Rule 731. Space between reels.

If it is necessary to run rolls to a large diameter, a space of at least 8 inches should be left between the reels. To do this a safety

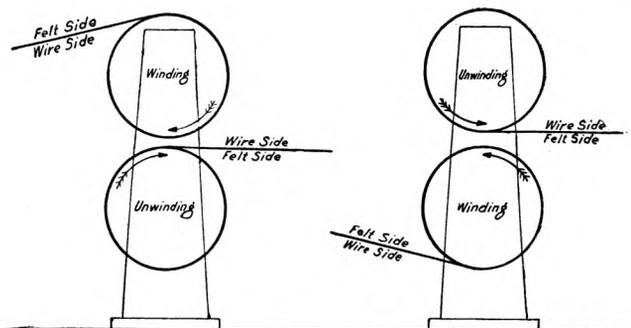


FIG. 11.—Proper direction of rotation of reels

stop can be provided by which the paper coming from the stack is broken off when the reel reaches a certain diameter.

NOTE.—It is also possible to take care of the same hazard by making a frame to which is attached a lever with an 8-inch-diameter wheel at its end. This wheel is placed between the reels and is forced to revolve by contact of either reel surfaces.

Rule 739. Operating rule.

Operators of the revolving type of reel should be prohibited from getting between the frames and the winding part of the reel.

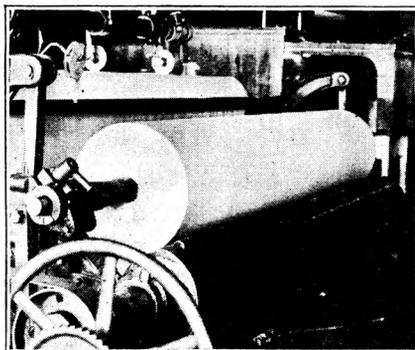


FIG. 12.—Metal plate to guard inrun on rewinders

SECTION 74. REWINDERS

Rule 740. Inrunning nip.

The inrunning nip on the side toward the operator should be guarded by a semicircular metal plate or equivalent protection which incloses the winding drum and is automatically released as the size of the roll increases. (See fig. 12.)

Rule 741. Reel straps.

Where belt straps are used for hoisting loaded reels the steel loops on the ends of the strap should be interlocked before placing on load hook, so that no loop will snap out of the hook when hoisted.

Rule 742. Core collars.

Core collars with projecting set screws shall not be used.

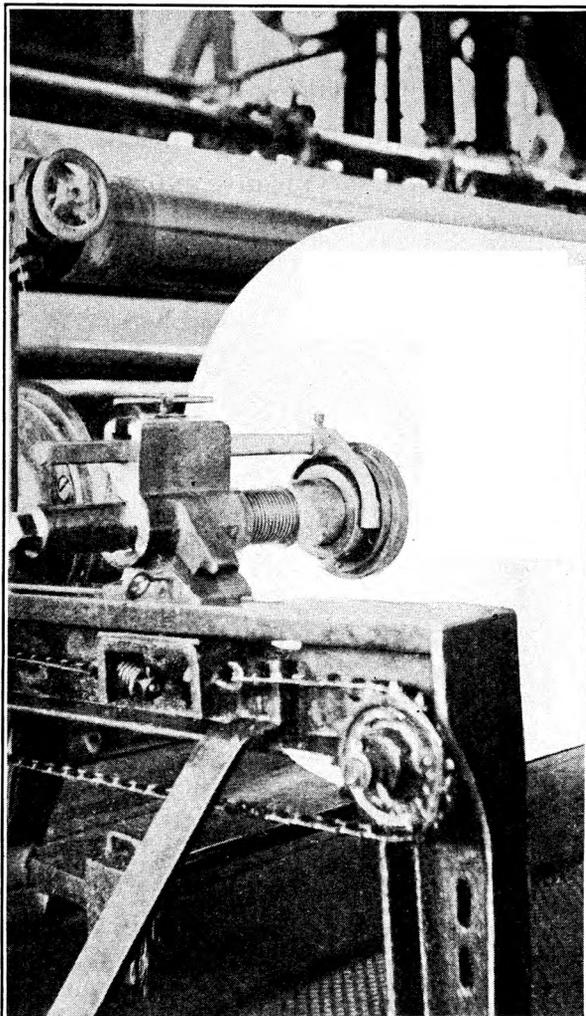


FIG. 13.—Winder-collaring guide

Rule 743. Slitter knives.

Slitter knives should be protected underneath by the use of a sheet-metal guard and above by individual metal guards.

Rule 744. Winder shaft.

In order to avoid the use of ropes all shafts shall be equipped with a winder-collaring guide. (See fig. 13.)

Rule 749. Operating rules.

(a) *Setting slitters.*—In setting slitters it is advised that the smaller and most-worn slitters be placed nearest the winder man, so that in case of paper catching at second or third slitter he will not be cut by the larger slitter nearest him. A stick should be used for letting down the slitter knives.

(b) *Removing rolls.*—The hooks of cranes used for removing the roll from the winder shall not be hooked to the shaft until the winder shaft has stopped.

(c) *Reversing winder drive.*—Wherever possible the winder drive should be reversed so that the nip is outrunning.

PART VIII.—FINISHING ROOM**SECTION 80. SUPERCALENDERS****Rule 800. Supercalender guards.**

Ductors shall be provided for supercalenders at all inrunning nips. (See fig. 14.)

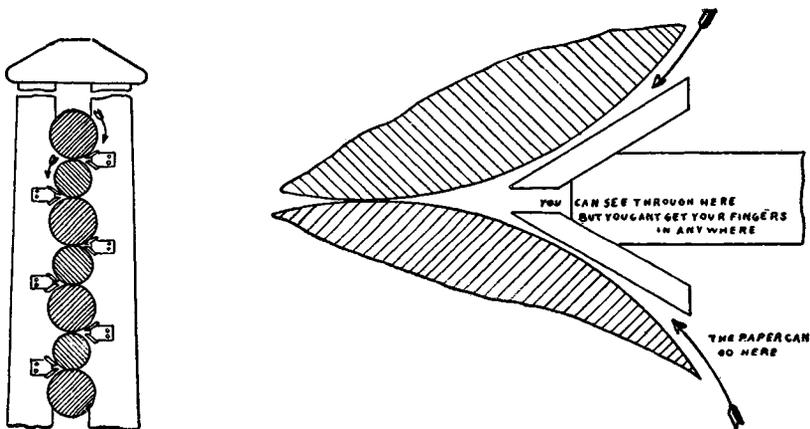


FIG. 14.—Ductors at inrunning nips

Rule 801. Supercalender rolls.

The necks of supercalender rolls shall be inclosed by a solid inclosure extending from the frame of the machine to the production surface of the roll.

Rule 802. Scrubbing blocks.

Wooden blocks faced with sandpaper shall be used for scrubbing supercalender rolls.

Rule 803. Emergency stops.

Push buttons (for electric power) or manually operated quick power-disconnecting devices shall be provided on all sides of the machine within easy reach of all employees.

Rule 809. Operating rule.

Machine operators should be instructed never to try to remedy a blockade while the machine is in motion. The machine should be stopped, and the paper should be removed before starting.

SECTION 81. SHEET CALENDERS**Rule 810. Tape feed.**

Each sheet calender shall be provided with a tape feed.

Rule 811. Inrunning nip

The inrunning nip should be guarded.

NOTE.—This is to prevent injury to fingers when operators incorrectly feed paper.

Rule 812. Emergency stops.

Push buttons (for electric power) or manually operated quick power-disconnecting devices shall be provided on all sides of the machine within easy reach of all employees.

SECTION 82. CUTTING AND TRIMMING MACHINERY**Rule 820. Guillotine cutters.**

(a) All guillotine cutters should be equipped with a two-handed throw which requires the operator to use both hands to engage the clutch and which will stop the knife at any point of the stroke. (See fig. 15.)

(b) All guillotine cutters should be equipped with a nonrepeat device.

NOTE.—This is to prevent a second stroke of the cutter without throwing the clutch a second time.

(c) Carriers shall be provided for knives of guillotine cutters for safe transportation of the knife.

Rule 821. Rotary cutters.

(a) On single-knife machines a guard shall be provided at the bearing of the knife mandrel to prevent employees reaching for paper at a point close to the knife where knife rotates toward the front of the machine. (See fig. 16.)

(b) On duplex cutters the above protection shall be provided for the first knife if the same hazard exists, and a hood shall be provided for the second knife where the machine has a walkway. (See fig. 17.)

(c) *Emergency stops.*—Push buttons (for electric power) or manually operated quick power-disconnecting devices shall be provided on all sides of the machine within easy reach of all employees.

SECTION 83. PLATERS**Rule 830. Machine guards.**

(a) A fixed guard should be arranged across the face of the rolls so that the operator's hand can not be crushed when feeding the machine.

(b) A quick power-disconnecting device should be installed on each machine within easy reach of either hand of the operator.

NOTE.—This device should also permit quick reversing of rolls in case operator's hand is caught.

Rule 839. Operating rules.

(a) Burrs on the edges of the plate zincs shall be removed.

(b) When cleaning and oiling, machines shall be stopped, rolls raised and run so that the nip is outrunning.

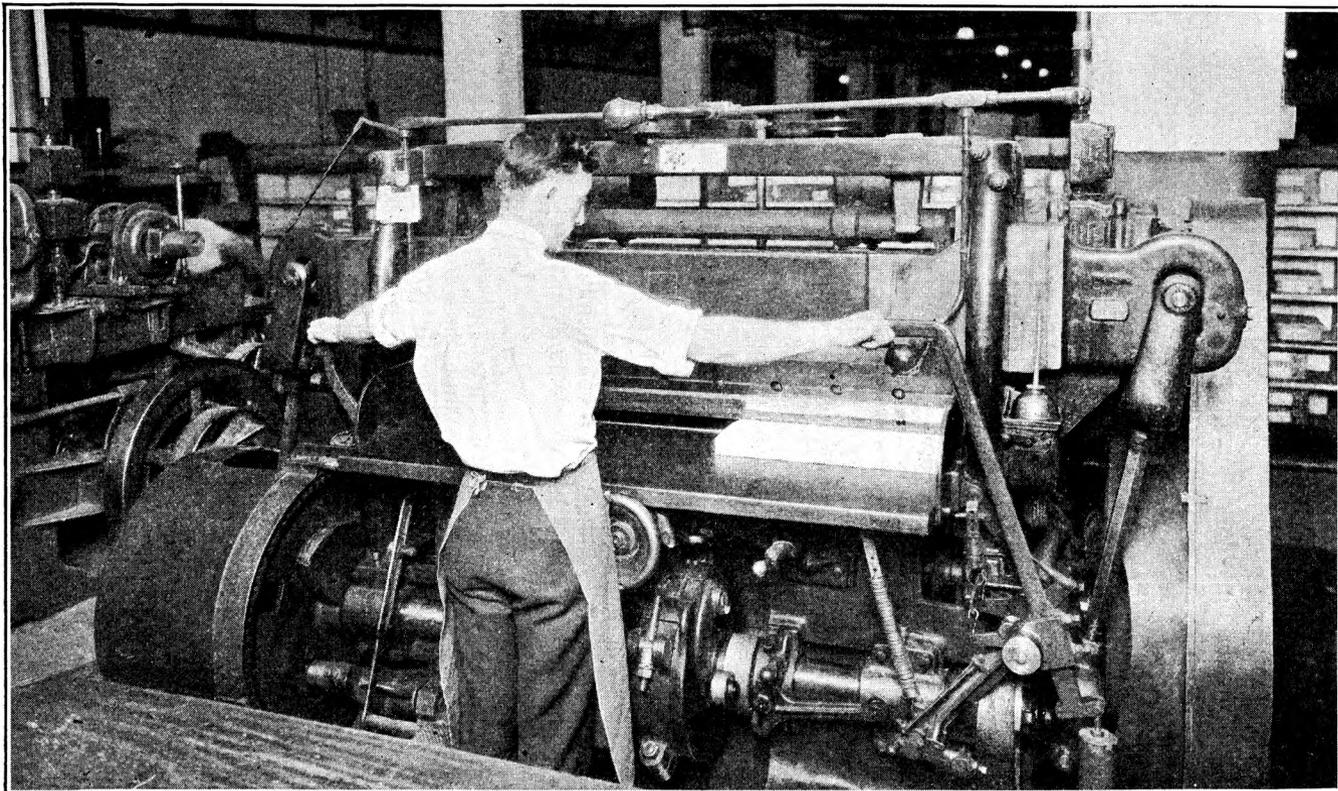


FIG. 15.—Two-handed throw on guillotine cutters

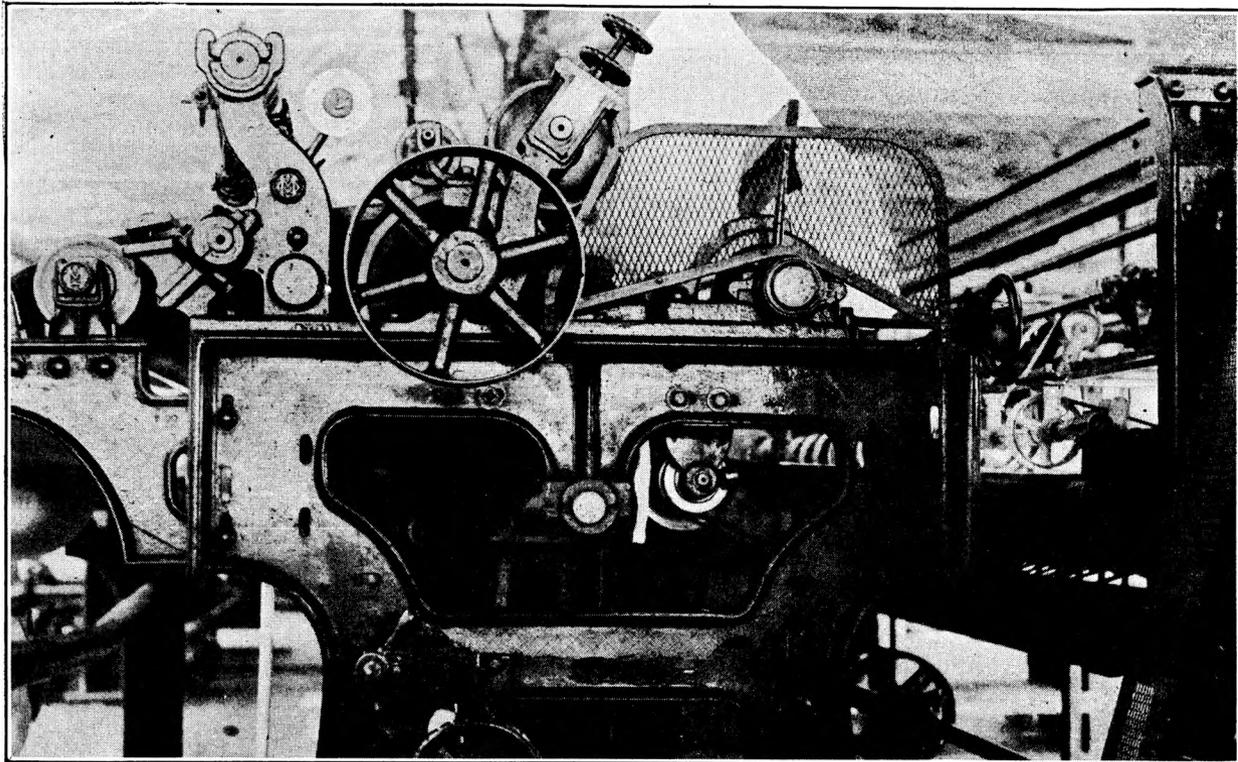


FIG. 16.—Guard to prevent contact with knife

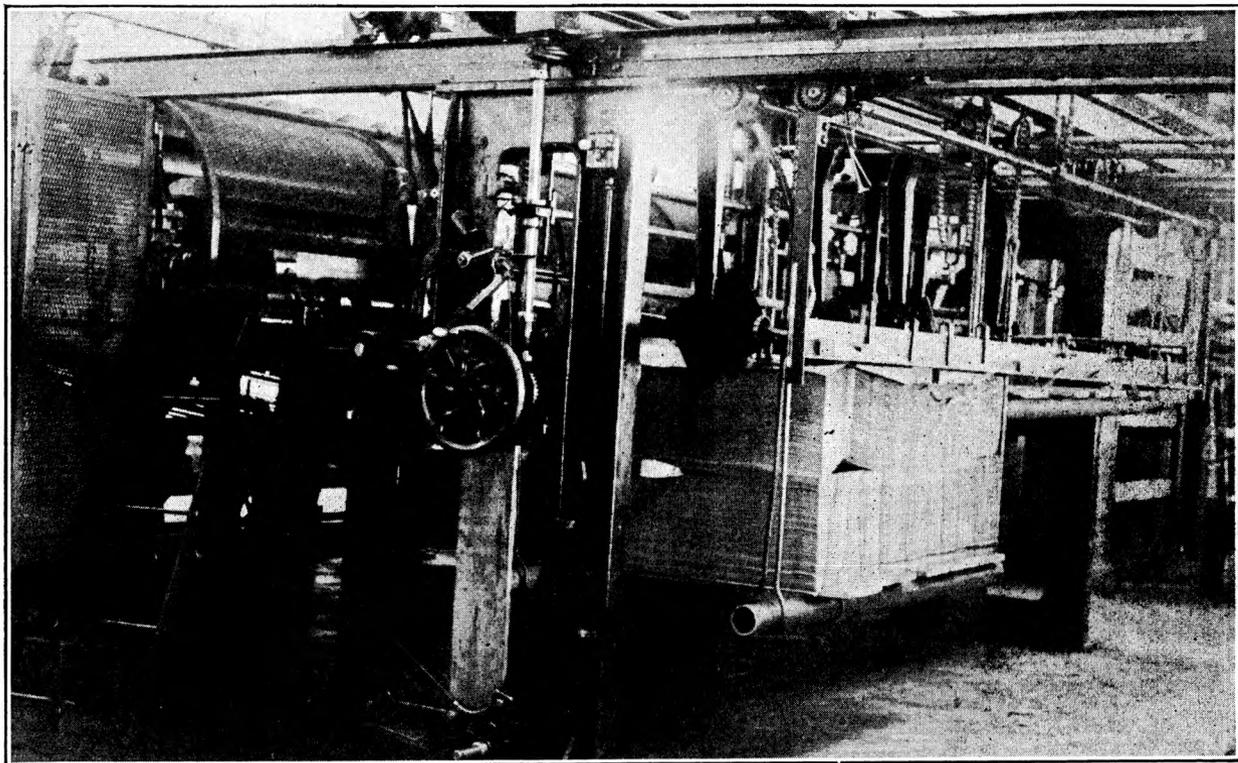


FIG. 17.—Hood over knife on duplex cutter

SECTION 84. PACKING, STORING, LOADING, AND SHIPPING**Rule 849. Operating rules.**

(a) *Truck loads.*—Paper should not be loaded on truck to a greater height than the shoulder of the truck operator or helper.

(b) *Box making.*—Box makers shall be provided with scored or corrugated head hammers. Nails shall be removed daily from floors.

(c) *Tongs.*—Jaws of grapple tongs for piling cranes should be kept sharp to prevent dropping cases.

(d) *Trucks.*—Operators of lift trucks should stand on either side of truck handle when relieving truck of load, so that they will not be struck by handle.

(e) *Preparing cars.*—Before loading cars of finished paper for shipment, they shall be thoroughly inspected and holes in the floor boarded up and all protruding nails removed. Inspection is particularly necessary if the car is already lined with paper. Workmen who line the cars shall remove such hazards.

(f) *Portable bulkheads.*—Portable bulkheads should be constructed and ready for use when partly loaded car is about to be switched. The load should be arranged so that the bulkhead will protect the loaded paper, making it unnecessary for any workman to remain in the car.

(g) *Warning flag or sign.*—A flag or sign should be placed at the end of the car toward the approach to the main-line tracks so that switchmen will know that the workmen are in the car.

APPENDIX

OVERHEAD STRUCTURES AND EQUIPMENT

Periodical inspections shall be made not less than once a month to determine the safe condition of all overhead structures, machinery, and equipment, including shafting, supports, cranes, joists, chain falls, conveyors, etc.

Inspections shall be made by a person competent to do the work, who shall report in writing to the person in charge of the plant any defects, flaws, or other unsafe conditions discovered by such inspection.

Whenever any item in the inspection report indicates the need of repairs, such repairs shall be made forthwith. Whenever any item in the report indicates further operation to be unsafe, the person in charge of the plant shall satisfy himself of the actual condition, and where he finds safe operation requires it, shall cause notice to be posted in such manner as will discontinue the use or operation of the unit referred to until safe conditions have been restored.

Scaffolding, staging, overhead planking, and other supports used as temporary work places shall be inspected both as to material and construction before being put into use and thereafter as often as is needed to see that the materials are not defective and the construction and use of same are safe.

BULLETIN BOARDS

Shall be of strong construction, with hinged glass doors, properly illuminated and so located as to be available to the greatest number of employees. Sufficient number should be provided in each plant to adequately care for bulletin needs.

LOOSE CLOTHING

The wearing of loose, unbuttoned, or torn clothing shall be prohibited. Frequent inspections shall be made in this connection, and habitual violations shall be reported to person in charge of plant for disciplinary action.

BELTS

When necessary to put on or take off power belts the driving machinery or power should be stopped, and when it is necessary to slow down or start up to do the required operation the power should be controlled or regulated by a competent man separated from the party actually handling the belt.

Sticks, pipes, etc., shall not be used to throw off belts while machinery is in motion.

Men not familiar with or competent to take off or put on belts should not be permitted to perform such work except under the personal direction of the department foreman or man in charge.

Frequent inspections of belts, belt fasteners, pulleys, bearings, and shafting shall be made to determine the efficiency in operation and the factor of safety.

Written reports of such inspections shall be made to person in charge of plant, who shall see that reported defects are corrected with the least practicable delay.

USE AND CARE OF TOOLS

All tools of every description ordinarily used by more than one person shall have a permanently fixed location, consisting of shelves, hooks, racks, or other suitable storage place, and shall always be kept in such permanent storage place when not actually in use. The person in charge of the department where tools are being used shall be responsible for seeing that they are returned after their use is completed.

All tools used by employees, whether owned by the company or the employee, shall be kept in repair or permanently taken out of service.

The person in charge of each and every department and the supervisor of safety (at plants where one is located) shall be responsible for seeing that worn-out tools and tools in need of repair are either repaired or replaced. This applies particularly to dull-edged tools, tools the striking surface of which are mushroomed or broken, wrenches with worn jaws or defective in other parts—in brief, all defects in tools that are observed.

SAFETY ORGANIZATION

There should be created and effectively maintained at each plant an efficiently functioning safety organization whose duties shall be along the lines of generally accepted methods of accident prevention, plant and premises sanitation, and housekeeping in all their ramifications.

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