OREGON OCCUPATIONAL SAFETY AND HEALTH DIVISION
DEPARTMENT OF CONSUMER AND BUSINESS SERVICES

PROGRAM DIRECTIVE

Program Directive A-291
Issued November 13, 2013

SUBJECT: Machine guarding: defining mechanical power presses and similarly configured machinery.

AFFECTED CODES/ DIRECTIVES: Division 2/O, 1910.211 Definitions, 1910.212 General Requirements for all Machines, 1910.217 Mechanical Power Presses, and STD 01-12.27 Applicable Standards As They Pertain to Iron Workers and Mechanical Power Presses.

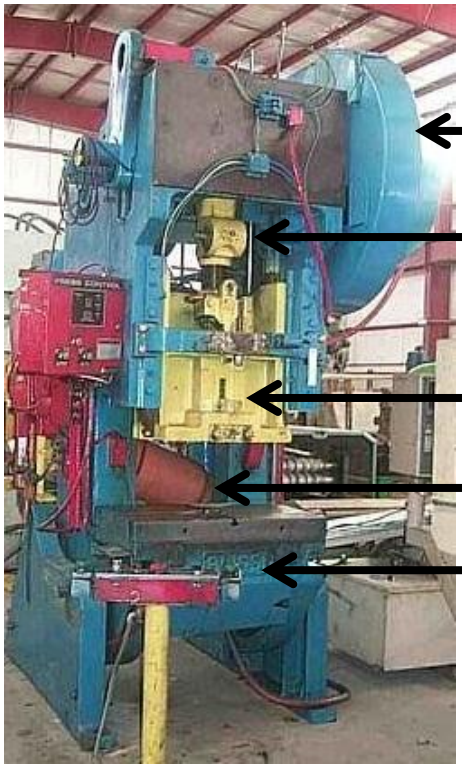
This directive replaces A-13, A-55, A-69, A-87, A-92 and A-172.

PURPOSE: To aid in the recognition and applicability of 1910.212 and 1910.217 as they relate to mechanical power presses, platen presses, iron workers, press brakes, and other similarly configured machinery.
To clarify point of operation guarding requirements for mechanical power presses (including during diesetting operations).

BACKGROUND:

Over the years, employers have been confused regarding the applicability of standards for mechanical power presses and pneumatic or hydraulic presses; in addition to other similarly configured machinery such as press brakes, platen presses, iron workers, shears, and riveting and notching machinery.

Division 2/O defines a "press" (for coverage under 1910.217) as a "…mechanically powered machine that shears, punches, forms or assembles metal or other material by means of cutting, shaping, or combination dies attached to slides. A press consists of a stationary bed or anvil, and a slide (or slides) having a controlled reciprocating motion toward and away from the bed surface, the slide being guided in a definite path by the frame of the press."



Mechanical Power Press
Gap frame design - open back inclined (OBI)

Non-mechanical power presses, press brakes, platen presses, ironworkers, shears, and other machines powered by hydraulic, pneumatic, or electrical means may have similar construction and function to mechanical power presses; however, they do not have the same characteristics of mechanical power presses. Furthermore, 1910.217 is limited in scope to mechanical power presses only. **Hydraulic presses, pneumatic presses, press brakes, ironworkers, platen presses, and other similar machines are covered under 1910.212.**

Note: Federal OSHA proposed to add platen presses to the list of exempted machines under 1910.217. In the meantime, OSHA STD 01-12-007 (1978) clarifies platen presses be covered under 1910.212.

A number of separate ANSI standards apply to various machines and although the following were not adopted by Oregon OSHA, they provide useful guidance in evaluating and correcting hazards associated with the specific machines:

ANSI B11.1 – Mechanical Power Presses
ANSI B11.2 – Hydraulic Power Presses
ANSI B11.3 – Power Press Brakes
ANSI B11.4 – Shears
ANSI B11.5 – Iron Workers
ANSI B11.19 – Performance Criteria for Safeguarding
ANSI B65.5 – Stand-Alone Platen Presses

MECHANICAL POWER PRESSES

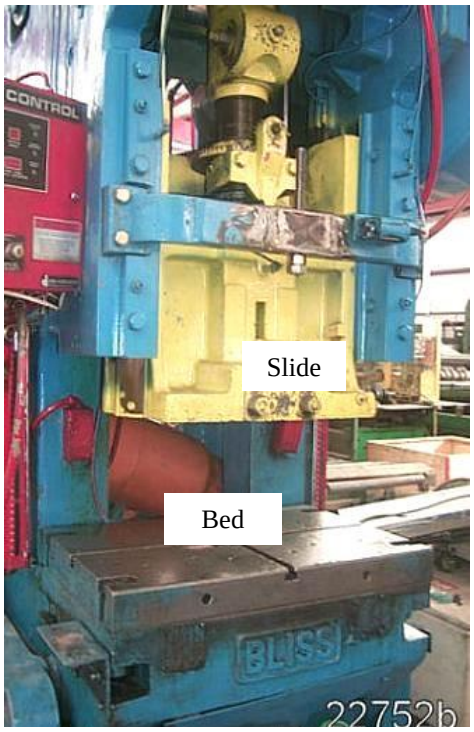
BACKGROUND

On December 3, 1974, final federal amendments to 1910.217(b)(1) through 1910.217(h)(13)(ii) were published in the Federal Register. The statement preceding the amendments noted that while the previous "no hands in die" ruling eliminated an operator to ever have hands in the point of operation, it did not result in hazard-free operation. The installation of redundant guards and devices as backup safeties did not significantly improve safety either. Moreover, questions of technological and economic infeasibility were raised. While it is believed that "no hands in die" should continue to be an industry goal, OSHA decided to revise the absolute "no hands in die" requirement in favor of improving the use of a single means of press safeguarding. *1910.217(c)(5) was added in 1975 to address safeguarding when the operator's hand(s) is in the point of operation.*

For most operations, adequate protection can be afforded by a single guard or guarding device as long as the means of protection is properly designed, installed, maintained, and, most importantly, used under supervision. From an enforcement standpoint, employer adherence to each of these elements of a press guarding program in the workplace takes on increased importance.

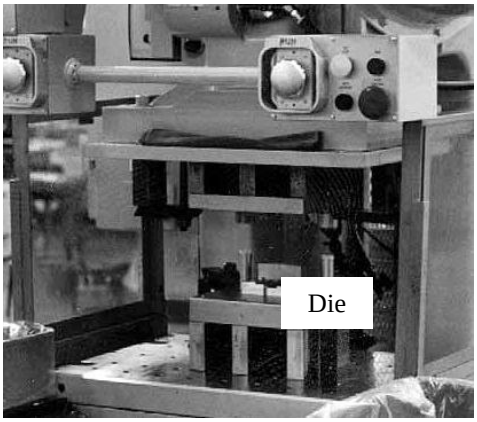
1910.217(b)(1) through 1910.217(h)(13)(ii) covers the protection of press operators, die setters, and maintenance personnel engaged in mechanical power press operations such as stroking, die tryout, die setting and maintenance. Press machines which are not mechanical power presses such as forging presses, press brakes, shears, ironworkers, powder metal presses, die presses, brick presses, dinkers and clickers, engraving, and others are covered by other sections of Division 2/O. Most mechanical power presses work on metal but some are used on materials such as plastic, paper, and fiberboard.

MECHANICAL POWER PRESS RECOGNITION



Slide: Main reciprocating (linearly) press member to which tooling (dies) is attached. Also called a ram or plunger. [1910.211(d)(51) and ANSI B11.1]

Bed: Stationary member of the press that supports the dies and other associated equipment. This picture also shows a bolster plate attached to the top of the bed. The lower dies are attached to the bolster plate. [ANSI B11.1]



Die: Tooling used in a press for cutting or forming material. An upper and lower die make a complete set. [1910.211(d)(18)]
Source: Minster

A. Mechanical Power Press

1. A mechanical power press is defined as a mechanically powered machine that shears, punches, forms, or assembles metal or other material by means of cutting, shaping, or combination dies attached to slides. A press consists of a stationary bed or anvil, and a slide having a controlled reciprocating motion toward and away from the bed surface, the slide being guided in a definite path by the frame of the press. [1910.211(d)(46)]

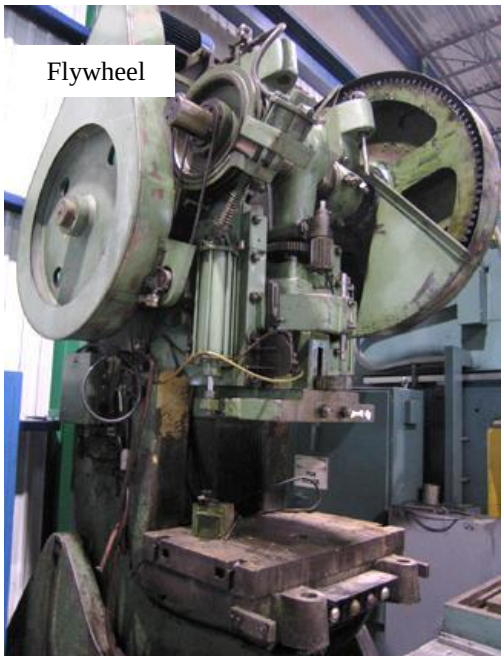
   There are many machines, such as platen presses in the printing industry, clickers and die presses in the shoe industry, ironworkers and shears in fabrication shops, and others that perform these functions but are not power presses.

   The question commonly arises if a machine is a mechanical power press under the 1910.217 standard. There are two important recognition points to consider when determining if the press falls under the scope of the 1910.217 standard:

   a. The press transmits force mechanically via a flywheel, crankshaft, and clutch.

   b. The dies are mounted on a slide operating in a controlled reciprocating motion toward and away from the stationary bed or anvil – the slide being guided in a definite path by the frame of the press.

Mechanical power presses come in a variety of designs. This press has the flywheel on the right and the clutch is inside the flywheel; referred to as a flywheel press.



This design has the flywheel on the left side – transmitting energy to the large main gear on the right. These presses can have the clutch within the main gear or on a driveshaft with the flywheel. They are referred to as geared presses and are usually rated at a higher cycle rate because they are usually used for single stroke operations.

2. The mechanical power presses to which 1910.217(b)(1) through 1910.217(h)(13)(ii) applies can be divided into two categories depending on the type of clutch. The two types are full revolution clutches and part revolution clutches. The clutch is the means of transmitting energy from the flywheel to the crankshaft, which in turn is connected to the slide.

   a. <u>The full revolution type</u>, once tripped, cannot be disengaged until the press has completed a single cycle (stroke). *Think "full" revolution = slide stops <u>after</u> a 360 degree revolution of the crankshaft.*

How to recognize a full revolution press

- The clutch is generally visible between the flywheel and the crankshaft (sometimes it is on the countershaft on larger presses)
- The press will not have a brake monitor system
- The press will not have a dual air control valve or clutch brake
- The press will not have an inch mode
- The press completes a full cycle when tripped
- The press cannot be equipped with two-hand controls or presence-sensing devices (light curtains)
- The brake is usually a continuously applied band-type brake
- The clutch-engaging mechanical linkage is usually visible
- The operating rod is usually visible going down the side of the press frame

This part-revolution press has sensing devices that can only be used on part revolution presses as the slide can stop during any part of the cycle.

This part revolution press depicts the airline going into the flywheel/clutch assembly – an easy way to tell it's a part revolution press.

b. The part revolution type can be engaged and disengaged at any point during the press cycle (stroke). Think "part" revolution = slide stops during any part of the crankshaft rotation.

How to recognize a part revolution press

- The press will have an inch mode for setup and maintenance
- The press will usually have a chain or direct drive from the crankshaft to a limit switch assembly
- The clutch/brake mechanism is one unit mounted on the crankshaft or countershaft and is generally enclosed
- The press will usually have a control panel with a press stroke selector switch
- The press will have an airline going to the clutch/brake or dual air control valve
- The press can have safeguarding such as two-hand controls or presence-sensing devices (light curtains)
- The ram will stop on the downstroke when safeguarding is activated (i.e., when two-hand controls are released)
- The press will be equipped with a friction brake that is applied when the clutch is deactivated
- The press will likely have a red e-stop button

Note: *1910.217(b)(7) provide additional requirements for machines equipped with part revolution clutches only and does not apply to machines with full revolution clutches. 1910.217(b)(3) provide additional requirements for machines using full revolution clutches.*

Direct drive (servo-motor) press

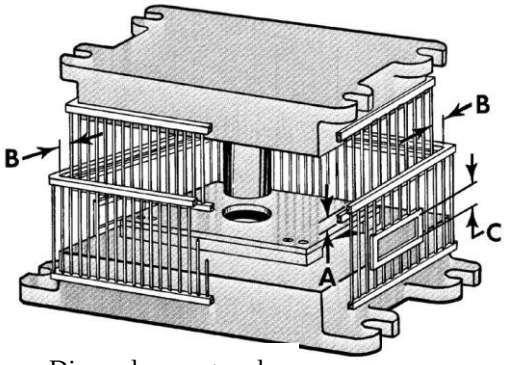
Direct drive presses, i.e., servo-motor technology, don’t have flywheels or clutches but rather a high torque, low rpm servo motor powering a driveshaft, main gear, and crankshaft. They are also capable of being disengaged during the cycle by deenergizing the motor. These direct drives match the operational characteristics of part revolution clutches because the driving power may be disengaged during the cycle of the press. Therefore, they are considered a part revolution press.

B. Guards, Devices, and Other Methods of Protection

This fixed barrier guard allows the operator to safely reach into the die as far as necessary to load a slide feed. Refer to Table O-10 in 1910.217 for acceptable guard openings.
Source: Minster

The following information is intended to clarify the various means of protecting operators from the point of operation hazards.

An employer is required to provide and ensure the use of point of operation guards or properly installed devices on every operation performed on a mechanical power press when the point of operation opening is more than one-fourth inch. [1910.217(c)(1)]



Die enclosure guard
Source: Minster

1. Guards

Guards or fixed barriers are attached to the frame, die, or base of a press and prevent the operator from putting their hands or fingers into the point of operation even when the press is not cycling. [1910.211(d)(32)-(36)]

A guard is the most positive form of protection if designed and constructed to prevent entry of hand or fingers into the point of operation by reaching through, over, under or around the guard. [1910.217(c)(2)(i)(a)]

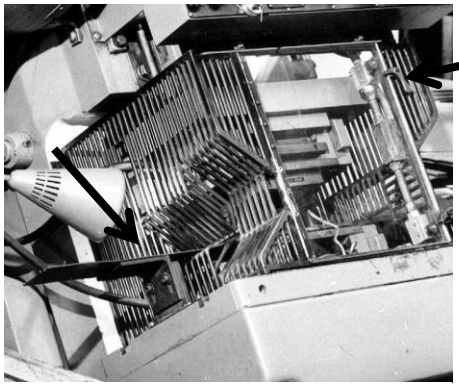
1910.217(c)(2) describes the point of operation guards used to protect the operator.

Fixed barrier guard

a. Every point of operation guard must meet design, construction, application, and adjustment requirements. [1910.217(c)(2)(i)]

b. A die enclosure guard is a barrier attached to the die shoe or stripper, or both, in a fixed position. [1910.211(d)(33) & 1910.217(c)(2)(ii)]

c. A fixed barrier guard is a guard attached securely to the press frame or bolster plate. [1910.211(d)(34) & 1910.217(c)(2)(iii)]


The sides of this interlocked barrier guard are contoured inward allowing the operator to work near the die safely. Source: Minster

d. An interlocked barrier guard is a barrier attached to the press frame or bolster plate and is interlocked with the clutch control so that the clutch cannot be engaged unless the guard itself, or the hinged or movable sections, enclose the point of operation. The interlock also prevents opening the guard or the movable sections as long as the slide is in motion. The hinged or movable sections of the guard are intended for infrequent use such as setup or adjustment and not for manual feeding. [1910.211(d)(35) & 1910.217(c)(2)(iv)-(v)]

Adjustable barrier guarding.
Source: Oregon OSHA

e. An adjustable barrier guard is attached to the frame, press bed, bolster plate, or die shoe and requires adjustment (by authorized personnel only) for each job or die setup. [1910.211(d)(36) & 1910.217(c)(2)(vi)]

f. If guards are installed and function correctly, no other guarding or device is required unless a combination is needed to fully safeguard the point of operation. A point of operation enclosure is inadequate if it does not meet the requirements of (c)(2) and Table O-10 and can only be used in conjunction with point of operation devices. [1910.217(c)(2)(vii)]

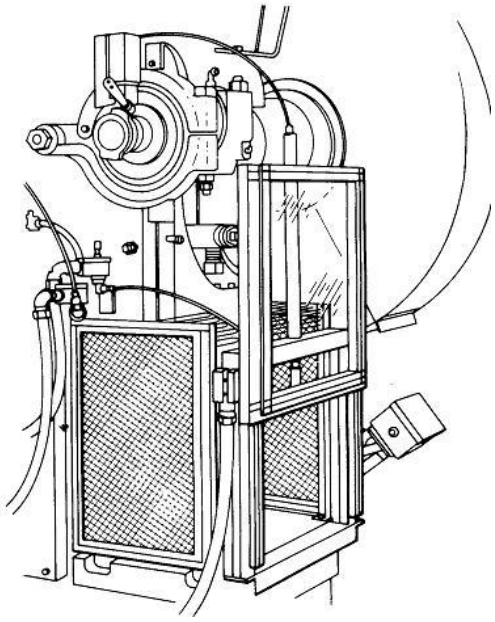
A presence-sensing device, or light curtain, on a straight side mechanical power press.

2. Devices

Devices are press controls or attachments that either stop normal press operation before the operator can reach into the point of operation or automatically withdraw hands before the die closes if the operator's hands are inadvertently within the point of operation. Examples of such devices are two-hand controls, gates or movable barriers, pull-outs, restraints, and presence sensing devices. [1910.211(d)(11)-(17) and 437-002-0242(1)]

Since fixed guarding is not always possible due to the nature of an operation, devices are acceptable as a means of protection against point of operation hazards. If devices are installed and function correctly, no other guarding or device is required unless a combination is needed to fully safeguard the point of operation.

1910.217(c)(3) describe the point of operation devices used to protect the operator.

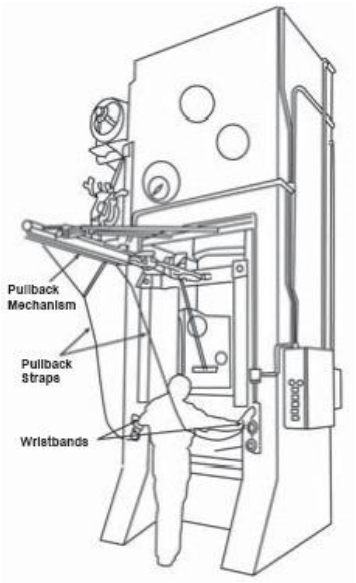


Gate or movable barrier
Source: ANSI B11.1-2009 Annex A

a. A movable barrier or gate device resembles an interlocked barrier guard in appearance since it is interlocked into the press clutch so that slide motion cannot be initiated unless the gate is closed. [1910.211(d)(13)]

A “Type A" gate, found on full revolution presses, encloses the point of operation during the entire 360 degree rotation of the crankshaft (must close before a stroke can be initiated and remains closed as long as the slide is moving). [437-002-0242(1)(a)] and [1910.217(c)(3)(i)(F)]

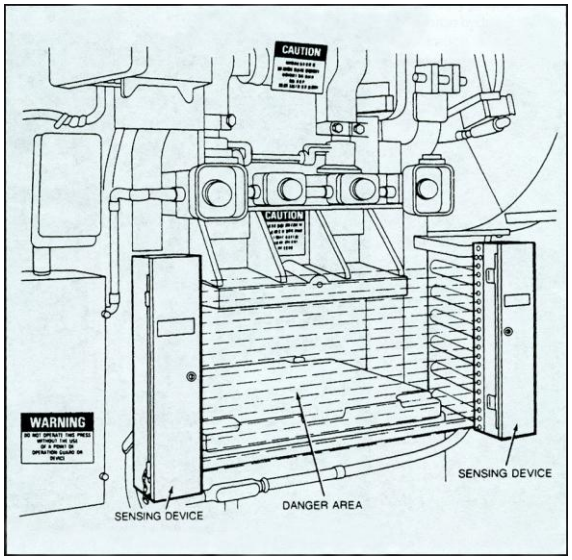
A “Type B” gate, found on part revolution presses, encloses the point of operation for the first 180 degree rotation of the crankshaft (must close before a stroke can be initiated but opens during the slide’s upstroke). [437-002-0242(1)(b)] and [1910.217(c)(3)(i)(G)].



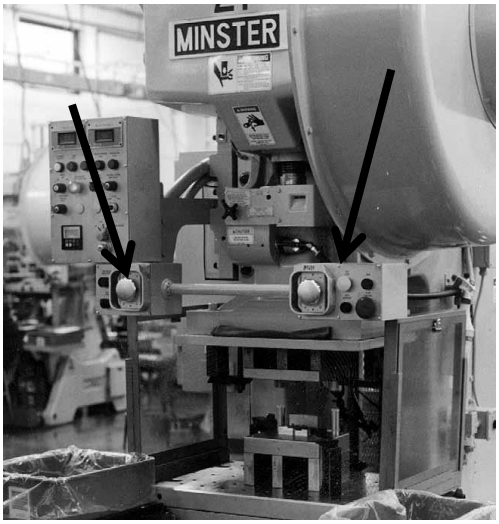
Pull-out device
Source: OSHA

b. Pull-out devices consist of operator wristbands connected by cords and linkage to the slide or upper die so that when the die descends the operator's hands will be automatically withdrawn from the point of operation if not already withdrawn. Close supervision is required to assure their use and proper adjustment. Records must be kept of safety checks. [1910.211(d)(15) & 1910.217(c)(3)(iv)]

c. Holdout or restraint devices consist of attachments, for each of the operator's hands, which are securely anchored and adjusted to prevent the operator from reaching into the point of operation at any time. [1910.211(d)(14) & 1910.217(c)(3)(vi)]



Presence sensing device ("light curtain")
Source: ANSI B11.1-2009 Annex A



Two-hand controls
Source: Minster

d. Presence sensing devices create an invisible plane of light and prevent or stop slide motion if any part of the operator's body breaks the plane. Photoelectric "light curtains" are most common. Areas not protected by the presence sensing devices must be guarded. [1910.211(d)(12) & 1910.217(c)(3)(iii)] This device may not be used on machines using full revolution clutches. [1910.217(c)(3)(iii)(A)]

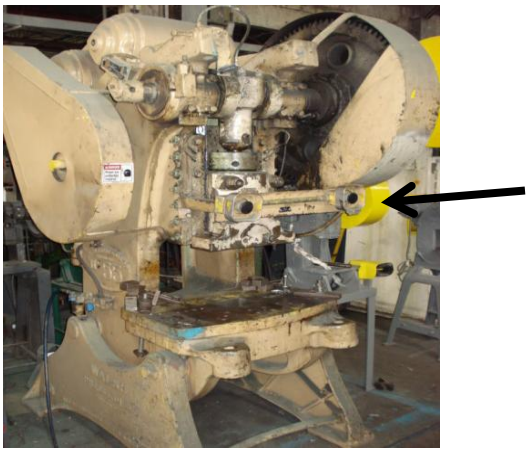
e. Two-hand control/trip devices require concurrent pressure from both hands of the operator during a substantial part of the die-closing portion of the press. [1910.211(d)(17)]

   Two-hand controls differ from two-hand trips by requiring the operator to depress both buttons concurrently and continuously (holding time) on the downstroke or else the clutch disengages and the slide stops. Two-hand controls are found on part revolution presses and two-hand trips can be found on either full or part revolution presses (trips don't require the continuous holding).

   Two-hand controls are explained further in 1910.217(c)(3)(vii) and two-hand trips are explained further in 1910.217(c)(3)(viii).

f. Sweep type devices may not be used for point of operation safeguarding. [1910.217 (c)(3)(v)]

Note: In addition to proper design, installation, and correct operation, it is required that two-hand controls, two-hand trips, and presence sensing devices be located far enough away from the point of operation, depending on the stopping time of the press, that when the operator releases the control buttons or disturbs the presence sensing field, they do not have time to reach into the point of operation before the die closes or slide stops. Safety distance formulas are included in the standard.



These two pictures remind us how important the safety distance is from the controls/trips to the point of operation.

3. Other Methods

a. Control reliability detects a failure within the controls and prevents initiation of a successive stroke until the failure is corrected. [1910.217(b)(13)]

b. A brake monitor system monitors the performance of the brake on each stroke and automatically prevents the activation of a successive stroke if the stopping time or braking distance has deteriorated beyond the predetermined safe stopping distance. [1910.211(d)(60) & 1910.217(b)(14)]

Both control reliability and brake system monitoring must be used with the safeguarding on part revolution presses when the operator feeds or removes parts by placing one or both hands in the point of operation ("hands in die'). Safeguarding includes two-hand controls, presence sensing devices, or a Type B gate or movable barrier. [1910.217(c)(5)]

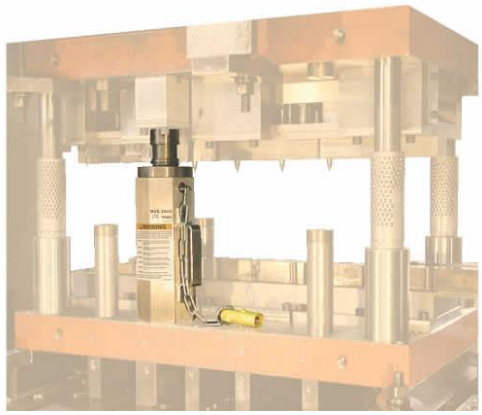
This image shows material being fed (from the right) and ejected (at left). Fixed barrier guarding is installed at the feeding point and front while light curtains safeguard the operator at the ejection point (with the aid of a properly adjusted mirror).

4. Guarding by Location

Occasionally a machine without guards or devices may be adequately safeguarded by reason of its location, the location of other equipment, or the location of the operator's station. To be guarded by location, the hazardous area must be inaccessible to all employees during the operating cycle. For example, the feeding equipment of an automatically fed press may function as a barrier in preventing entry into the point of operation. Such circumstances must be carefully analyzed to determine if additional guards or devices are needed.

5. Hand Feeding Tools

The use of hand feeding tools, regardless of their length or size, does not replace guards or devices. When used, close supervision is essential because of the tendency to put such tools aside to expedite feeding. The use of hand tools also involves other hazards. For example, should the die close while a hand tool is in the point of operation, the operator could have the tool wrenched from their grasp and be struck by it, or forcibly jerked against the machine and injured. [1910.211(d)(38)]



Die safety blocks must also be used to prevent the slide from falling of its own deadweight. 1910.217(d)(9)(iii)-(iv)
Source: Rockford Systems

6. Diesetting - point of operation guarding

An employer is required to use dies and operating methods to control or eliminate hazards. Furthermore, they are required to furnish and enforce the use of hand tools for freeing and removing stuck work or scrap pieces from the die so employees don't have to reach into the point of operation.

a. 1910.217(c)(1)(i) requires protection of employees through the use of point of operation guards or devices, as defined in 1910.211(d)(11) "Device" and 1910.211(d)(32) "Guard," on every operation performed on a mechanical power press. Diesetters working on mechanical power presses are covered by the provisions of 1910.217(c).

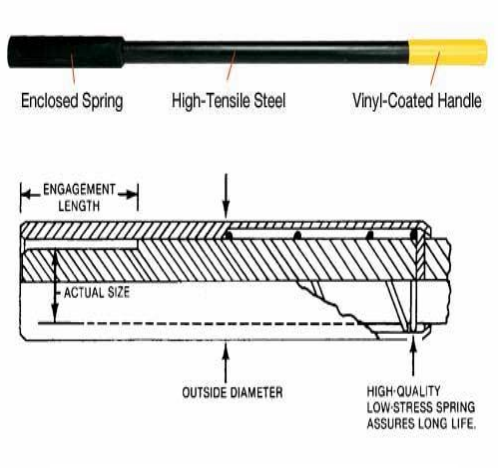
   1910.217(d) covers the design, construction, setting and feeding of dies. 1910.217 (d)(9)(i) was intended to clarify the provisions of 1910.217(c) apply to diesetters and point of operation guarding is required.

b. Mechanical power presses equipped with part revolution clutches comply with point of operation safeguarding for diesetters when an inch mode is installed as specified in 1910.217(b)(7)(iv). Using an inch mode according to 1910.217(b)(7)(iv) constitutes use of a "device" within the meaning of 1910.211(d)(11).

c. Full revolution mechanical power presses cannot normally be safeguarded with guards during diesetting operations. However, in instances when guards are not applicable and for presses provided with barring holes in the flywheel, the diesetter is protected if:

   - The power press is deenergized and the flywheel is brought to rest.
   - The prime mover power to the power press is locked out.
   - The slide is moved by manually turning the crankshaft with the aid of a turnover bard.

d. On some full revolution mechanical power presses, primarily those over 60 tons, the slide cannot be moved manually during diesetting. Safeguarding is provided if:
    - They are equipped with a jog mode of operation.
    - The flywheel is brought to rest and the clutch is engaged before the drive motor is jogged.
    - The jog control requires two-hand operation or the jog control is single control protected against accidental actuation and located so that the worker cannot reach into the point-of-operation.



Spring-loaded turnover bar.
Source: Rockford Systems

e. For full revolution mechanical power presses, safeguarding of the diesetter, as set forth in paragraphs c and d, constitutes a "device" in 1910.211(d)(11).

f. For presses equipped with a turnover bar, the employer must provide means to ensure removal of the turnover bar from the bar hole before the press can be energized. Examples of methods for ensuring the removal of the turnover bar from the bar hole are use of spring action on the end of the bar or bar storage pockets that incorporate an interlock switch. [1910.217(d)(9)(ii) and ANSI B11.1(2001) 9.2.5]

ACTION

For compliance purposes, Oregon OSHA field staff will interpret the requirements of 1910.217 in the following manner:

- Mechanically powered machines that shear, punch, form, or assemble metal or other material by means of tooling or dies attached to slides, as defined by Division 2/O 1910.211(d)(46) and identified by their respective manufacturers as mechanical power presses, are regulated under 1910.217

- When diesetters are operating a mechanical power press, such as running test and production parts, diesetting, or troubleshooting, they must be protected by point of operation guards or devices. Failure to provide such safeguards constitutes a violation of 1910.217(c)(1)(i).

- When diesetters operate a mechanical power press equipped with a part revolution clutch, and the inch mode is not installed per 1910.217(b)(7)(iv), a violation exists and a citation will be issued if no alternative safeguard is provided.

- On mechanical power presses equipped with part revolution clutches, turnover bar operations must comply with 1910.217(b)(7)(xv).

- When pullout and holdout or restraint devices alone are used on mechanical power presses with either a part or full revolution-type clutch, they are sufficient protection within the intent of these standards when they meet all other requirements as set forth in 1910.217(c)(3)(iv) and 1910.217(c)(3)(vi).

MACHINES OTHER THAN MECHANICAL POWER PRESSES

BACKGROUND

Press brakes, ironworkers, platen presses, shears, and other press-like machines powered by hydraulic, pneumatic, or electrical means may have similar construction and function to mechanical power presses but are covered under 1910.212, General Requirements for All Machines. 1910.217 is limited in scope to mechanical power presses only.

Many of these machines have respective ANSI standards – please refer to the list on page two. Although these ANSI standards have not been adopted, they provide useful guidance for compliance officers in evaluating and correcting hazards.

Hydraulic cylinders

Hydraulic press brakes.
Source: Lane Community College

Ironworker with adjustable guarding.
Source: Lane Community College

1. Press Brakes

Press brakes are metalworking machines that bend and form parts through the use of tooling (dies) attached to a ram or slide and a bed. Metalworking occurs by placing stock, primarily sheet metal, on a bottom die and pressing it with a top die attached to the movable ram.

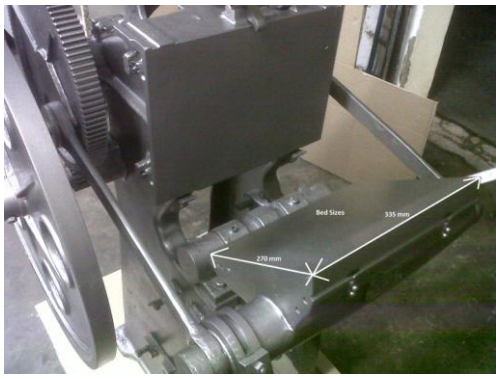
Press brakes are mechanically or hydraulically powered (or both). Mechanical (flywheel) press brakes use either mechanical friction or air friction clutches that can be disengaged at any point before the crankshaft has completed a full revolution and the press slide has completed a full stroke.

By inching and slipping the clutch, these presses allow the operator to drop the slide to the work piece and stop, adjust, or align the work piece and then complete the stroke. Hydraulic press brakes can normally be stopped at any point in their cycle and the force exerted by the dies can be varied.

Operating speeds are normally slower than mechanical presses; however, because of their slower operating speeds they are normally not fully automated. Hydra-mechanical press brakes combine hydraulic and mechanical operations into one system. Refer to P.D. A-217 for safeguarding guidance. Press brakes are regulated under 1910.212.

2. Ironworkers

An ironworker is a machine with multiple work stations where various operations may be performed singly or simultaneously. These functions include punching, shearing, notching, coping, and forming. Ironworkers are regulated under 1910.212.



Platen press.

3. Platen Press

A platen press is a mechanical powered machine that cuts, creases, punches, forms, prints, embosses, or transfers leaf on material such as fiberboard, cardboard and the like, by means of dies attached to the press frame. Platen presses are commonly referred to as cutting or creasing presses.

A platen press consists of a stationary frame and a platen having a controlled oscillating rocking motion toward and away from the frame surface, the platen being guided in a definite path by a platen cam.

Federal OSHA never modified 1910.217 to specifically exclude platen presses since it was deemed to be unnecessary considering the distinct difference between platen presses and mechanical power presses. Platen presses are regulated under 1910.212.

Notching machine with guard.

Shear with guarded holddowns.
Source: Georgia Tech Research Institution

4. Other Machines

Certain single-purpose powered machines are also covered under 1910.212. These machines include, but are not limited to, the following:

a. Single-end punches
b. Double-end punches
c. Structural shearing machines
d. Notching machines
e. Coping machines
f. Beam punches
g. Detail punches
h. Spacing punches
i. Combinations of a through h
j. Shears

ACTION

For compliance purposes, Oregon OSHA field staff will interpret the rule requirements in the following manner:

- Machines such as press brakes, iron workers, shears, hydraulic and pneumatic power presses, and platen presses are regulated under 1910.212

- Consult the respective ANSI standards when attempting to enforce a citation

EFFECTIVE DATE:

This directive is effective immediately and will remain in effect until cancelled or superseded.

Several images in this directive were taken from the Internet and appear to be actual installations. Potential violations may exist in some of these images but are being provided for identification and demonstrative purposes only and should not be relied upon for evaluating proper methods of safeguarding.

The following pages depict various machinery to aid in the proper recognition and applicability of 1910.212 and 1910.217.

Appendix A
Mechanical Power Presses

Airline to flywheel/clutch indicates a part revolution mechanical power press. 1910.217

Control stand in addition to light curtains on a part revolution mechanical power press. 1910.217

Two hand trips can be effective safeguarding but may not be ergonomically correct. Notice the twisting that would occur on this mechanical power press. 1910.217

A good look at the flywheel, crankshaft, and two hand controls/trips on this mechanical power press. 1910.217

Appendix A
Mechanical Power Presses

Gap frame (stationary) mechanical power press. 1910.217

Gap frame mechanical power press. Open back incline (OBI). 1910.217. *Arrows depict where the press can swivel back.*

Adjustable guarding on a gap frame mechanical power press. Open back incline (OBI). 1910.217

Light curtains and fixed barrier guarding on a gap frame mechanical power press (OBI). 1910.217

Appendix A
Mechanical Power Presses

Straight side mechanical power press. 1910.217
Source: Minster

Back view of a straight side mechanical power press. 1910.217

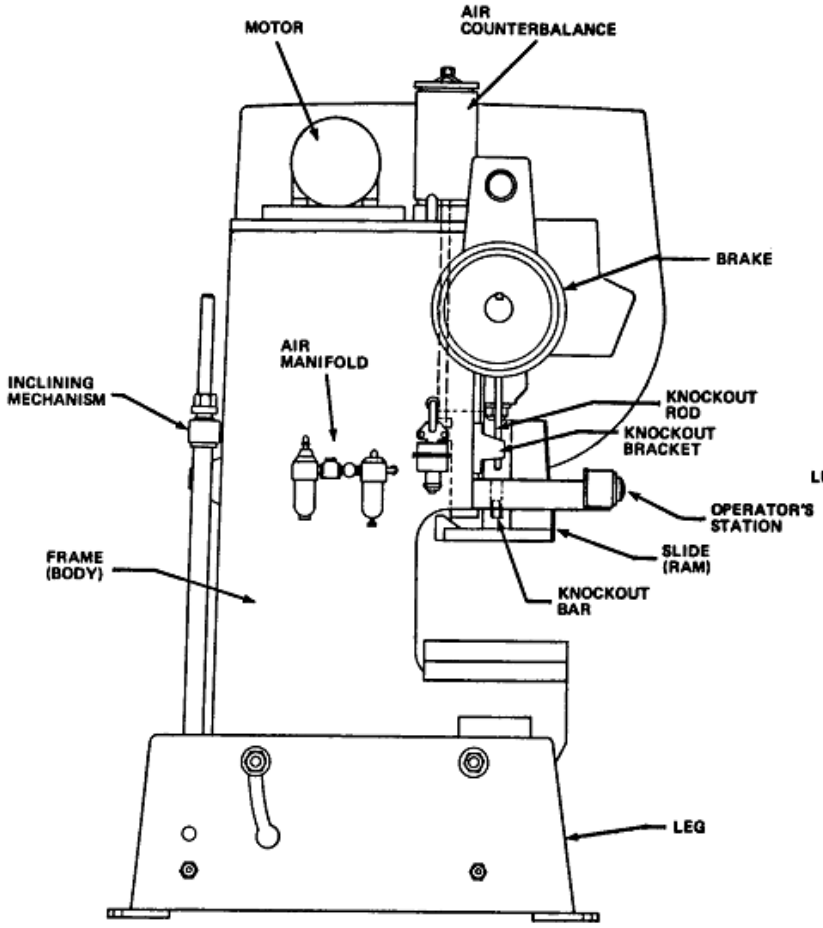
Although this looks like it could be a hydraulic press, it's actually a gap frame – open back stationary (OBS) mechanical power press (mechanical components are inside frame). Light curtains indicate a part revolution clutch. 1910.217

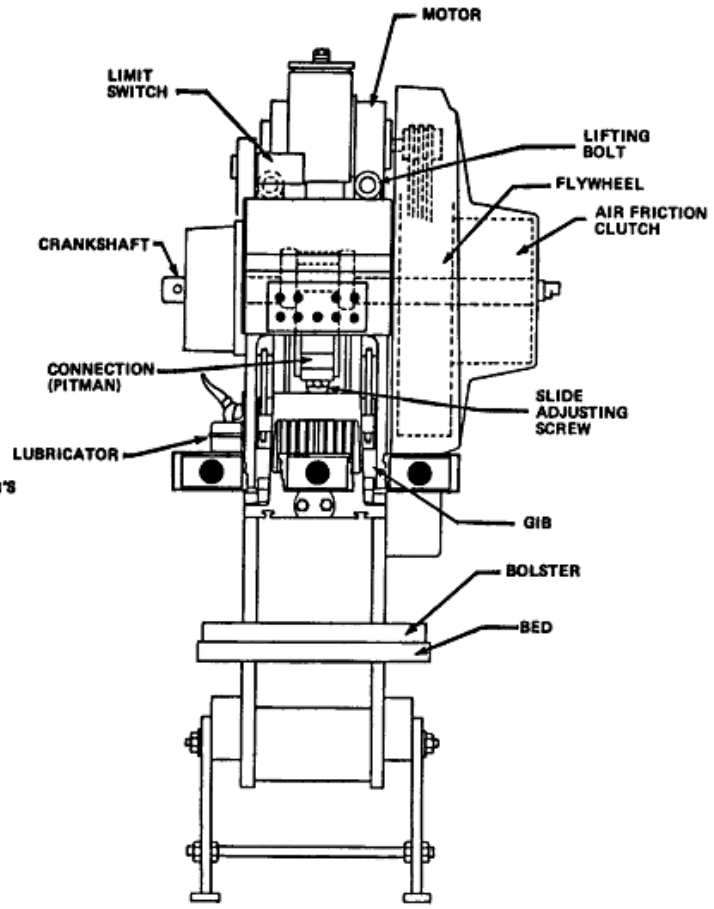
This is a direct drive, servo-motor, straight side power press. Direct drive presses don't have flywheels, belts, or clutches but rather a high torque, low rpm servo motor powering a driveshaft, main gear, and crankshaft. OSHA considers them a part revolution mechanical power press. 1910.217

Appendix A
Mechanical Power Presses

Gap Frame Press

Open Back Inclined (OBI)
Open Back Stationary (OBS)

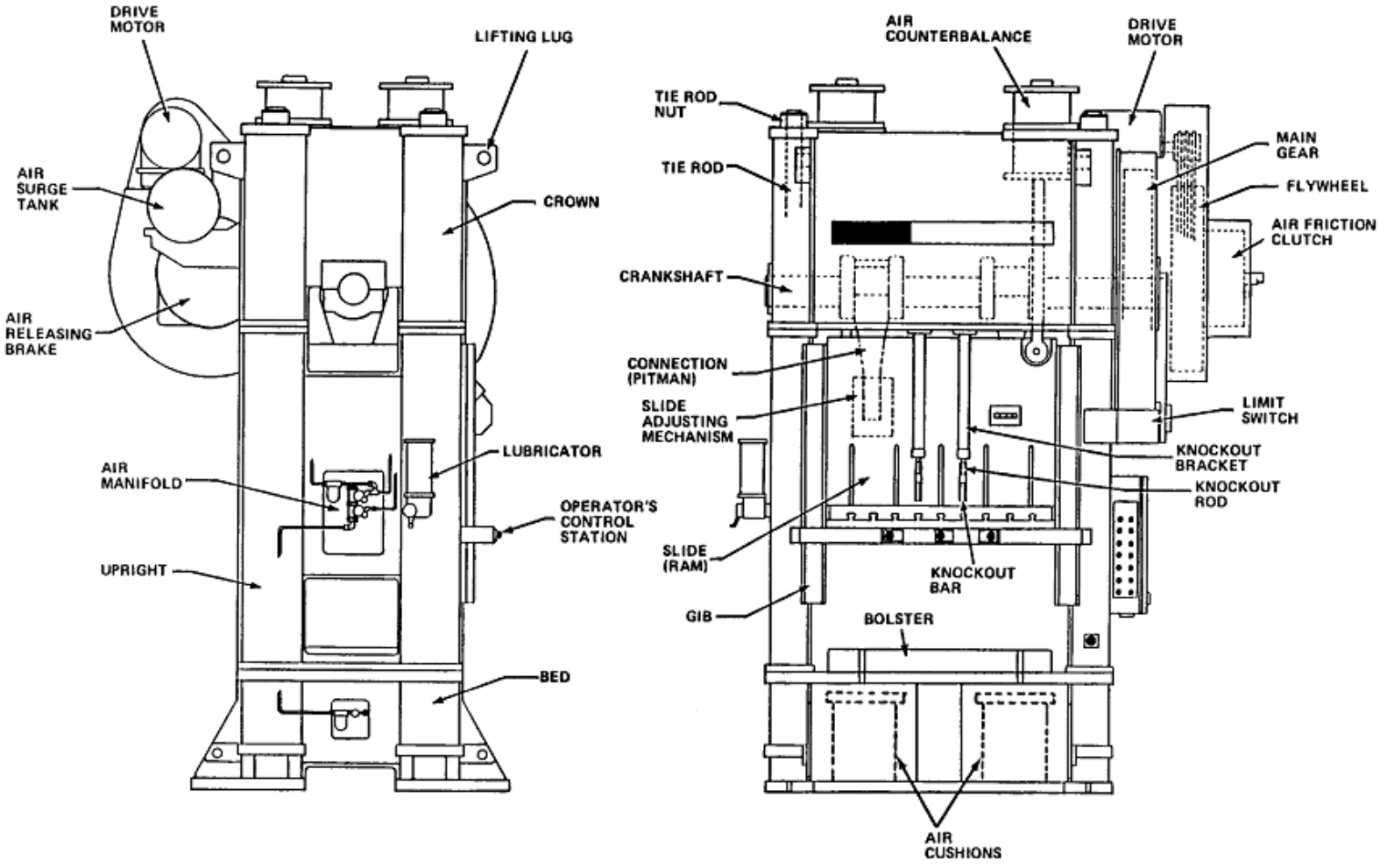




Source: ANSI B11.1-2009 Annex A

Appendix A
Mechanical Power Presses

Straight Side Press



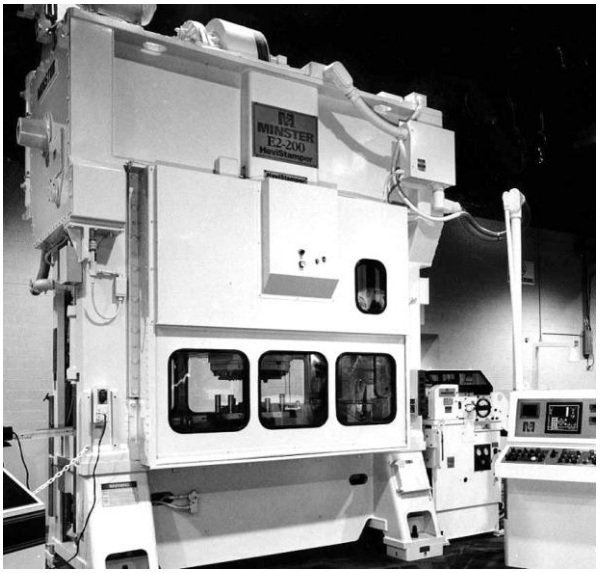
Source: ANSI B11.1-2009 Annex A

Appendix B
Additional Safeguarding Options for Mechanical Power Presses

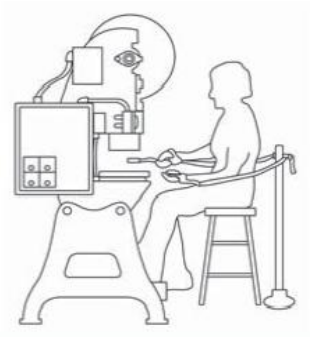
Interlocked barrier guard on a large straight side press. Note the adjustable bottom panel that allows for differing part and scrap discharge points. Source: Minster

Interlocked barrier guard on a straight side press. Source: Minster

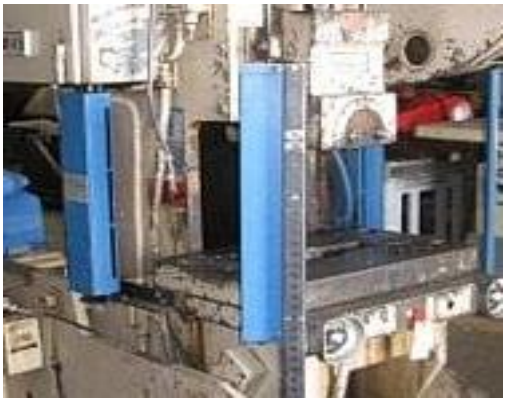
A gap frame press in automatic production mode using an interlocked Lexan barrier guard. Source: Minster



Straight side press with automatic feeding equipment and guards that totally enclose the die area (with Lexan panels). Source: Minster



Holdout or restraint



Light curtains can provide safeguarding around the entire die area by using properly adjusted mirrors.

Appendix C
Press Brakes, Hydraulic Presses, and Pneumatic Presses

Mechanical press brake. Note the arrow pointing to the flywheel. 1910.212 and P.D. A-217

Hydraulic press brake. Note the arrows pointing to the hydraulic cylinders. 1910.212 and P.D. A-217

Mechanical press brake. Note the arrow pointing to the flywheel. 1910.212 and P.D. A-217

Hydraulic press brake. Note the arrows pointing to the hydraulics. 1910.212 and P.D. A-217

Appendix C
Press Brakes, Hydraulic Presses, and Pneumatic Presses

Hydraulic press. 1910.212

Hydraulic press. 1910.212

Pneumatic press. The arrow shows the air ram. 1910.212

Pneumatic press brake. The arrow shows the air cylinder. 1910.212 Source: OSHA