Horizontal Square Wool Press

Instructions to construct a Farm Built Horizontal Wool Press

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**Horizontal Wool Press**

This publication will guide you through the process of constructing a farm built hydraulic square wool press. This design can be created using tools and equipment commonly found in a farm shop. By building your machine to the specifications in this design you will create a machine that will have the capability to package wool in a standard international square wool pack weighing 400 - 450 pounds. Basic safety features are included in this design, make sure you include them in your finished product. The safety features include a safety shield by the hydraulic valve, safety pin on the door latch and a safety chain on the door. This press is designed with sufficient strength to bale fleece wool at shearing time, care should be taken when repackaging wool to ensure that the volume of wool on each press stroke is not so large to cause excess pressure on the front frame work of the pressing chamber that it will become distorted.

Follow the pressing directions included with these plans to ensure that you will have success in creating bales of uniform shape, size and weight. Make sure to provide training to anyone that will be operating this equipment.

All of the materials and supplies can be easily obtained from your steel supplier and a hydraulic supply store. All of the hydraulic and trailer parts are available from [www.Northerntool.com](http://www.Northerntool.com).

**Hydraulic Components**

- 6.5 HP Honda Horizontal Shaft Motor
- 11 GPM 2 stage pump
- Hydraulic Cylinders (2) 3.5”X36” Stroke $180 each
- Motor Bracket and Couplers
- Detent Valve
- Filter holder
- 4.8 gallon tank

- ½” High Pressure Hoses: 1 – 48”, 1 – 36” and 2 – 24”
- 1/2” Black Pipe Nipples:
  - 4 – 5”
  - 2 – 6”
  - 2 – 12”

- ½” Black Pipe Fittings
  - 4 - 90 degree Elbow
  - 3 – Tees
  - 4 – Street Elbow
  - 4 – ½ - ⅜ bushings
  - 1 – ½ - ⅜ bushing
  - 6 - ⅛PT X ⅛FPT Brass Hydraulic elbow with swivel
  - 1 – ½ hose barb
  - 2 feet ¾ suction hose and clamps
  - 2 - ¾ black pipe close nipples
  - 1 – 3000 PSI Hydraulic Gauge

- 7 gallons Universal Hydraulic fluid

**Trailer Components**

- 2000 lb axle torsion bar type
- Hubs
- Wheels and Tires
- Jack
- Coupler
- Light kit
Steel Materials

Steel and parts

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42"X87" Break 2 X @ 29" to form U 29" each side outside dia.
106"X29" shear
32X32 shear
60"X29" shear

4X8 sheet                  | 100.00 | 1.18     | $118.00 |
5X 10 Sheet                | 156.00 | 1.07     | $166.92 |
2 caster wheels            | $ 4.90 | 2        | $ 9.80 |

TOTAL                      | $ 822.88 |

In October 2006 these parts purchased new cost approximately $2800.00. Along with the purchase of these parts tools and equipment you will need to construct this project includes:

Arc Welder
Cutting Torch
Cut Off Saw
Grinder
Drill
Clamps
Tape Measure

Construction Steps

Step 1. Read completely through the instructions and study the drawings and photos.
Step 2. Purchase all parts and supplies
Step 3. Build the base frame work for the machine.

Diagram 1
• Cut and layout the 4” channel iron
  o Cut 2 – 116” with 22½ °<\(\) on one end of each piece
  o Cut 2 – 20½” with 22½ °<\(\) on one end of each piece and 45 °<\(\) on the other end.
  o Cut 1 - 1 ½” square tubing 28 ½” long – trim to fit flush with top of the Channel Iron

![Diagram 2]

  o Set 116” channels parallel at 29” outside measurement. Weld 1 ½” square tubing flush to the top of the channels on the square cut end
  o Set two short channels in place to form a 45 °<\(\) tongue – Weld all sides.
  o Place coupler on front point of tongue – mark to cut out any material that will interfere with the mounting of the jack – use cutting torch to remove this material
  o Weld coupler in place ensuring that the center of the coupler falls on the center line of the frame.
  o Mount the jack using 3 - 3/8 X 1 ½” Bolts

• Bale Chamber Frame Front and Rear
  o 2 pcs - 1 ½” Square tubing 45 °<\(\) on each end - Must be 29” on short dimension
  o 4 pcs - 1 ½” Square tubing 45 °<\(\) on one end, 90 °<\(\) on other end - Must be 32” on short dimension (diagram 3)

![Diagram 3]

  o 1pc - 1 ½” square tubing 28 ½” long – trim to fit flush with top of the Channel Iron (see diagram 2)
  o Weld corner joints at exactly 90 °<\(\) making a 29” X 32” U

• Bale Chamber Ribs
  o 2 pcs – 1X2 tubing 45°<\(\) on each end - Must be 29” on short dimension (diagram 4)
  o 4 pcs – 1X2 tubing 45°<\(\) on one end, 90 °<\(\) on other end - Must be 32” on

![Diagram 4]
short dimension (diagram 5)
- 2 pcs - 1 X 2 tubing 28 ½” long – trim to fit flush with top of the Channel Iron (see diagram 2) weld in frame flush with top of channel iron centered at 14 ½” and 27 ½” from rear of frame
- Weld corner joints at exactly 90 ° making a 29” X 32” U

- Install the floor
  - Cut 8 - 1X1 square tubing at 28 ½” notched to fit flush with top of channel iron similar to diagram 2.
  - Weld in place measured from the rear of the frame to rear edge of each cross piece at 43 ½, 58 ½, 71, 83, 94 and 105 inches (diagram 6)

- Use remaining 2 - 28 ½ pieces to span the frame on the bottom to mount the stub axels. Weld in place to bolt stub axels so that center of the hub is 39” from rear edge of frame. Use grade 8 - 3/8” bolts (requires 8 - 2” and 4 - 1 ½” bolts nuts and lock washers).
- Grind all welds flush with top of frame.
- Place 29 X 106” 14 ga plate flush with edges of frame – weld in place – turn frame over and weld plate to cross pieces.
- Turn frame back upright and install the hubs and wheel assemblies.

- Construct the bale chamber
  - Position the 42” X 29” 14 ga U on the rear end of the press frame so that the back edge is flush with the end of the frame rails, tack weld in place
  - Drill 3/8 holes in front frame U as shown in Diagram11.
  - Position the front 1 ½” tubing U flush with the front of the bale chamber tack in place.
  - Position the rear 1 ½” tubing U flush with the rear of the bale chamber tack in place.
  - Place each of the 1X2 ribs in place and tack weld
  - Recheck all measurements and ensure that the chamber is square.
  - Weld all 4 ribs to the frame.
  - Weld each rib to the plate chamber.
  - Weld the joint where the 14 ga U meets with the floor
• Cut Pieces for the Door and Bale Chamber Door
  o 4 pcs - 1 ½” Square tubing 45 ° on each end - Must be 29” on short dimension

[Diagram 7]

  o 2 pcs – 1 ½” Square tubing 29” - 90 ° on each end

[Diagram 8]

  o 6 pcs – ½” Sch 40 pipe 4.75” long – cut one piece in ½ to make end pieces for the hinge (Diagram 8)
  o 1 pc – 5/8 rod 29.5” long
  o Weld the 4 pieces together to form a square exactly 29” inside dimension
  o Weld the two 29” pieces so that they are centered 10 ¾ inch from each side. Grind the welds flush on the front surface and position the 32X32 inch 14 ga. plate so that it can be welded to for the front surface of the door. Clamp the door in place to the rear end of the bale chamber. Position the hinge along the bottom edge so that it can be welded and the door will swing down freely. Tack weld the hinge in place starting at the ends which are attached to the baler frame and the alternating hinge pipes attached to the door frame. Unclamp the door and weld each hinge pipe solid. (Diagram 9)

• Door Latch
  o Cut 2 -½” X 2 straps 16 inches long Weld to the end of each piece a 2 inch X 1 ½ inch piece of the same strap. This makes the end 3 ½ inches wide.

Using the cutting torch notch the straps so that they form the angle for the
latch hook. (Diagram 10) The notch is an angle with sides of 1 ¾ inch by 3 ½ inches.

- Cut 2 -½” X 2 straps 11 inches long. Weld these to the top side of the latch hook pieces as shown. 4 ¾ inch from one end.

- Cut 2 -½” X 2 straps 12 ¼ inches long and weld to the top edge a 2 ½ inch piece of the same strap to form the bracket for the latch bolt (diagram 10)
- Install a 30 inch piece of 1 inch pipe in the center of the cross pieces to form a handle
- Drill a ½ inch hole in the brackets and the latch side pieces as shown in diagram 10. Weld the brackets in place 11 inches inside measurement on the rear bale chamber frame and rib. Install using 2 – ½” X 3” bolts and lock nuts.
- Fabricate the safety latch using scrap angle iron or strap iron (see photo 1).
- Weld a 2 foot section of ¼ inch chain to the top of the door. Install a piece of ½ X 2 Strap with a ¼ inch slot cut in it as a chain hook at the top of the rear bale chamber frame.
- Weld 3/16 chain sections to each side of the door and rear bale chamber frame so that they will support the door in a level open position. Photo 2.
- Install the pack restraining mechanism
  - Cut 3 1X1 tubing 29” long
  - Drill ¼” dia holes in each piece at 3 ½, 11, 18, 25 ½ inches on center
  - Sharpen 12 – ¼ X 2 bolts so that they are pointed and ¼ inch protrudes through the tubing when installed in the holes you have drilled. Weld sharpened bolts in each hole
  - Drill 3/8 dia hole centered 5/8 from the end and 90° offset from the pointed pins
  - Cut 3 2” – 1 ½ X 1/8 strap – ½” from one end cut a slot 1 1/8 deep by 1/8 wide – weld to ends of tubing as shown in Photo 3.1
  - Cut 3 6” - 1 ½ X 3/16 strap – drill 5/16 hole centered at ¾ from end. Grind end corners round at ½” radius.
  - Drill 5/16 hole through 1 layer of the front frame 1 ½” tubing centered at 1” from the outside corner. Cut the hex end from a 5/16 bolt and weld in the drilled hole. Grind so weld is flush with surface of bolt and tubing. Install drilled 6” piece of strap to form a latch to slide into the slot created on the tubing as in photo 3.1. Use a lock nut to install the latch.
  - Cut 1 28 ½” - ¼ X 2 strap and 2 - ½” - ¼ X 2 strap. Weld the ½ inch pieces to each end of the 28 ½” piece as spacers. Position on the bale floor centered 10” from the face of the bale chamber. Weld in place.
  - Construct a restraining bar 21” long ¼ X 1.5” strap with three sharpened ¼ inch bolts 2” long welded in place one at the center and the other two 2.5 inches from the end. Drill corresponding 5/16” holes in the strap welded to the floor, and through the floor. This will allow the pack flap to be passed under the 2” strap and the restraining bar will fit through the holes puncturing the flap to hold the flap in place.

- Build the Wool Hopper
  - Use 1X1 tubing cut
    - 2 @ 31 ½ 45° on one end square on the other
    - 2 @ 32 45° on one end square on the other
    - 4 @ 31 Square ends
    - 1 @ 29 Square ends
- Weld the 45° ends of one 31 ½ and one 32 inch piece to form a 90° corner
- Weld one of the 31 inch pieces 1 ½” from the square end of the 31 ½” leg and one of the 31 inch pieces at 16 inches
- Make 2 (Diagram 13)
- Attach to the front framework of the bale chamber lining up the inside corners – tack each member to the frame and span the upper front corners with the 29” piece.
- Ensure all corners are square and weld in place
- Notch 1X1 inch square from top corner of the 29X30 14 ga. plates. Fit to for sides of hopper and weld in place.

![Diagram 13]
• Build Corner Pins
  o Refer to Corner Pin Detail for hole placement
  o 4 pcs 1X3 tubing 30” – drill holes as indicated on detail
  o 4 pcs ½” X 2 Strap 14.75” Cut ends to angle shown in detail
  o 8 pcs 1/8 X 1 ½” Strap 2” - Weld as spacers to thicken pin at ½” hole –
    drill as indicated on detail
  o Cut top section from one end of each tubing 1/8” down by 2.75” long
  o Cut the top from a fence staple or 1/8” chain link to weld to the top of the
    pin for attaching the 6” twisted link chain. Attach 4 ½” from bottom tip of
    pin.
  o Attach the spring to the free end of the chain – slide assembly into tubing
    – line up spring loop with 5/16” hole and insert 5/16 X 1 ½” bolt – pull pin
    toward front of tubing to line up ½” holes and insert ½” X 1 ½” bolt –
    Install self locking ½” nut – do not over tighten as this will restrict the
    movement of the pin.
  o Build 4 assemblies (photo 4)

Photo 2
  o Install so that each is mounted at 45°3 in each corner of the hopper. Ends
    of the 3 inch tubing should be flush with the hopper frame work and pins
    should extend 4 inches into the bale chamber. Tack weld in place to enable
    adjustment once the plunger is installed.

• Build the Cylinder mount.
  o Using the remaining 3”
    X 1” tubing 29” long. Drill 2 1” holes for the
    solid end of the
    hydraulic cylinder to
    attach to exactly 13
    inches on center and 6
    ½ inches from the

Diagram 14
center line of the tubing (diagram 14) Weld a 1” washer to one side of the tubing providing a shim to improve the fit of the cylinder end.
  o Cut 1 ½” tubing – 1 - 29” 45°<) each end and 2 @ 15 ¼” 45°<) on one end square on the other. Weld into a U shape and center the 3” tubing created above on the face of the top cross piece. Ensure that the center line of the tubing is located 14 ½” above the baler floor. Weld in place.
  o Attach the bottom legs of the U to the Baler frame at the joint where the tongue angle forms.

• Build the Front cylinder brace
  o Cut 1 ½” tubing 1 - 29” 45°<) each end and 2 @ 12 ¾” 45°<) on one end square on the other. (adjust these measurements for your specific cylinder to ensure that the center line of the cylinder stays at 14 ½” above the baler floor). Weld into a U shape.

Diagram 15
  o Attach the legs to the baler frame 3 ¾” from the hopper tubing
  o Bend 12” piece of 1 ½” X 1/8” strap to form a U bracket to hold cylinders down to the brace. (Diagram 15)
  o Do not attach the hold down brackets at this time.

• Brace the Cylinder mount to the Bale Chamber
  o Use 1X2 tubing and cut two to fit from each top rear corner of hopper chamber to the end of the cylinder mount
  o Use 1X2 tubing and cut two to fit from bottom of bale chamber front frame to the end of the cylinder mount.
    o Using 1 ½ X 1 ½ tubing span from the front cylinder brace to the center of the cylinder mount providing a structural brace between the center of the two braces. See Photo 5

• Cut Pieces for Plunger
  o Cut 4 pcs ½ X 2 strap 23 ¼” long 45°<) on each end (diagram 16)
- Cut 8 - 3/16 X 4 strap 5 ½” cut one corner off at 45° W/ 1 ½” legs (diagram 17)

![Diagram 17](image1.png)

- Cut 8 - 1/8 X 6 strap 9 ¼” long Chamfer two corners as shown (diagram 18)
- Cut 2 – ½ X 2 strap 26 ½” long
- Cut 6 - 1/2 X 2 strap 12” long
- Assemble plunger as shown in plunger detail
- Weld the 1 ¼ fine thread nuts in place before attaching the 2 26” braces to the back of the plunger. It is very critical that these nuts are welded in exactly square and 13” on center for the cylinder rams to attach to. It is suggested that the nuts be tacked in place and the cylinders “dry fitted” before final welding is done. Weld nuts solid to one piece of strap and then attach the other to allow for access to weld along side of nuts.
- Use a cutting torch to cut the notches for the corner pins to pass through
- Install a piece of ¼ X 2 strap for each caster wheel to ride on. (Photo 6)
- Install the caster wheels so that they just touch the bottom piece as the plunger is carried by the cylinder rams. (Photo 7)

![Photo 4](image4.png)

- Install the plunger by screwing the cylinder rams into the 1 ¼” nuts. Take care not to mar the surface of the ram. Tightening can be accomplished
through the use of a piece of leather and a pipe wrench or vice grip chain wrench. (Photo 8)

- **Bale Push Bar:**
  - A bar is needed to provide extension from the plunger face to the cap of the finished bale to push the bale from the press.
  - Create a cross by welding two 7 ½ inch pieces of 1x1 tubing to a 16 inch piece of 1x1 tubing. Brace each cross member back to center bar by installing 45 degree gussets.
  - To the center of this cross weld a 25” piece of 1x1 tubing
  - Cut another 25” piece of 1x1 tubing and using an 8” piece of 1 ¼ square tubing create a ferrule to allow the two pieces to slide together on creating an extension bar for the Bale Push Bar

![Bale Push Bar and Extension](image)

- **Assemble Motor and Pump Unit**
  - Use bolt kit purchased with mounting flange
  - Mount flange to motor using 4 - 5/16 X 1 NFT bolts
- Slide ¾" Lovejoy coupler on motor shaft
- Install spider insert and ½" Lovejoy coupler in motor coupler
- Slide pump shaft into ½" coupler through opening in mounting flange making sure the moon key is properly installed and lined-up.
- Install 4 - 5/16 X 1 NCT Bolts into mounting flange
- Position the Lovejoy coupler assembly on each shaft ensuring that there is space allowance between the shaft face and the rubber spider insert, tighten the set screws on each coupler half.
- IMPORTANT: Do not run the engine after the pump is mounted and before it is plumbed in – Damage will occur if the pump is operated without oil!!
- Fill and check the engine oil as indicated in the engine manual.

- Using a piece of 14 ga. Plate left from the shearing process 29 X 17 create a mounting surface for the motor. Cut 1X1 tubing to span the inside of the baler frame at the 106” mark. Weld this flush with the bottom surface of the frame.
- Cut 1X1 tubing 29” weld across the bottom of the frame at the point where the angle for the trailer tongue begins. Clamp the 14 ga. Plate to the bottom of the frame work and weld to the two cross pieces you just installed. This forms a shelf for the motor to mount 3 inches lower than the rest of the baler floor.
- Using the drilling template position the motor so that the gas filler cap is accessible between the two cylinders and the pump clears the frame work. Drill 4 5/16 holes and mount the motor using 1 ½ inch 5/16 bolts.
- Cut 1X1 tubing 29” position the tubing on the bottom of the frame between the motor mounting bolts. Weld in place to provide additional support for the motor. Cut 2 - 1x1 brace to fit as shown in Photo 9 to support the motor front to back.

- Mount the Hydraulic tank using 4 - 3/8 X 1” bolts on the baler floor as shown in Photo 11.
Build the Valve Mounting Bracket

- Using the remaining \( \frac{1}{4} \times 4 \) strap cut 1 – 4 inches long and one 11 inches long weld at a 90 degree angle. Drill to accept valve mount bolts.
- Cut 2 - 1X1 tubing 12 inches long. Weld to bottom of valve bracket so that they attach to the Cylinder Brace and the Valve Bracket so that 4 inch side attaches to the back of the hopper frame. See Photo 11

Cut a 29 X 6 inch piece of 14 ga. – weld it across the hopper just in front of the valve as a safety shield to prevent the plunger from pinching your hand on the back stroke.

At this time items such as spare time mounts and tail light mounts can be fabricated.

Plumb the hydraulics

- T together the cylinders using black pipe fittings and nipples.
- Connect the Valve to the cylinders making sure that the out stroke of the cylinders corresponds with the valve position that is not held by the detent. Properly plumbed the hydraulic valve will return to neutral on it’s own when the return stroke is finished.
- Attach the pressure side of the pump to the valve. Mount the filter fitting at the valve and connect the return flow to the return fitting on the tank.
- Install the suction screen fitting in the tank and a barbed fitting to attach the \( \frac{3}{4} \) inch suction hose to. Cut the hose to fit and install with hose clamps to the tank and suction side of the pump.
- Fill the reservoir with 4 ½ gallons of universal hydraulic fluid.

  **The Test Run**
  - Ensure that all tools, bale holding mechanisms and any obstructions are clear from the hopper area.
  - Start the engine and let it warm to operating temperature.
  - Watching closely to ensure that nothing is binding – move the plunger forward by moving the valve handle toward the hopper chamber.
  - With the plunger extended fully – position the plunger so that equal clearance is achieved around each of the corner pins. You may need to adjust the angle of the corner pin assembly. As these are just tacked in place minor angle adjustment can be made simply by bending the tack welds using a large wrench. Once the clearance and the extended plunger position is set tighten the cylinder hold down straps on the cylinder support brace to hold the cylinders in place. Retract the plunger and final weld the corner pin assemblies in place.
  - Place a wool pack in the bale and run the plunger stroke to ensure that all parts will clear and are functional.

- Paint the project
  - Remove the engine by disconnecting the pump coupler.
  - Remove the bolts holding the Hydraulic tank and secure it to the bottom of the cylinders with wire or duck tape.
  - Remove the bolts holding the valve in place and place the valve on top of the cylinders.
  - Mask off all of the hydraulic components
  - Remove the wheels and tires and mask the hub assemble.
  - Using a good solvent such as lacquer thinner wipe down all surfaces of the baler.
  - Prime the baler using a good quality equipment grade primer followed by a compatible equipment enamel.

**Operating the Press:**

  - **Inserting the Wool Pack**
    o Open the Pack restraining bars
    o Place the pack in the bale chamber with the top flap laying on the top of the baler. Ensure that pack corners are placed behind the corner pins.
    o Align the top corners so that they are symmetrically even with the top corners of the bale chamber
    o Close the top pack restraining bar forcing this pointed pins through the top flap of the pack.
    o Align the bottom corners so that they are even with the top corners and close each of the side pack restraining bars.
    o Slide the bottom flap under the ¼ X 2 strap welded to the floor of the hopper chamber, leaving a slight amount of slack to ensure that the corners lay properly, fold the flap over the strap and install three hooks though both layers of the pack flap to secure the flap around the ¼ X 2 strap.
- Note – It is important to that the corners are placed symmetrically within the bale chamber to avoid tearing the pack when pressing heavy weight bales.

- Filling the Press with Wool
  - Fill only the hopper chamber – do not push wool into the bale chamber by hand as this will cause a soft rounded bottom on your bale. When filling the hopper chamber do not over fill, pack the fleeces in the chamber so that they are tight but not spilling out the top.
  - Overfilling the hopper will cause excessive side pressure and this will cause the front of the bale chamber to distort as well as the corner pins to become misaligned.
  - Once the hopper is filled move the valve lever to the forward position moving the plunger into the bale chamber
    - Using your free hand, Make sure the wool does not roll up to the top causing excess pressure at the top entrance to the bale chamber.
    - Press the plunger into the bale chamber until all of the corner pins snap back clearing the wool.
    - Move the lever to the rear to retract the plunger, the detent will automatically put the lever in the neutral position when the stroke is finished.
    - Repeat this process until a pressure reading of 1200 – 1500 psi is observed on the pressure gauge or one full hopper press after the hydraulic pump is forced to drop into the second slower stage to complete a pressing cycle. This pressure should give a bale weight of around 425 pounds depending on the wool type. As you gain experience you will find that you may need to stop at more or less pressure to create the weight bale you desire. **Note:** This press design is built to withstand the pressure and stress required to make up to 450 pound bales – trying to press larger heavier bales will cause structural failure of the machine.
• Capping off the Bale
  o The wool will be mounded in the center when the required pressure is reached, pull the wool out of the center of the wool mound and pull it to the top 1/3 of the bale, while holding the wool in place activate the plunger and complete the stroke.
  o If the bale is still not flat remove the remaining wool from the center and place it so that it will be pressed at each corner (holding the top two corners in place with your free hand until the plunger provides enough pressure to hold it). Complete the press stroke ensuring that each corner pin snaps back to the center behind the wool.
  o Release the flaps by opening the flap restraining bars and pulling the bottom clips out utilizing a bale hook.
  o Using 3 bale staples – fasten the side flaps together pulling them as tight as possible.
  o Using 4 bale staples equally spaced across the flap – fasten the top and bottom flaps together using the Bale Hook to ensure that they are as tight as possible.

• Removing the Bale from the press
  o Make sure that the safety chain is in place with 18 – 24 inches of slack
  o Ensure that the front of the Press is clear of all obstructions, people, pets, etc.
  o Pull the latch pin and move the latch handle to cause the door to open. Note: the door is under extreme pressure and will open with considerable force make sure that the door path is clear as impact with the door will cause injury!!
  o Pick the door up to allow for slack in the safety chain and unhook the chain from the hook. Allow the door to rest in the horizontal position.
  o Using the Bale Push Bar – insert the bar between the bale and the front of the plunger – activate the hydraulic valve to push the bale out of the bale chamber. Once the plunger stroke is complete the Bale Push Bar extension will need to be utilized to provide enough reach to completely remove the bale from the chamber.
  o Before removing the bale from the Pressing area ensure that the bale is properly identified as to the type of wool and line.
Corner Pin Detail

4 required

Spring - 9/16 X 0.072 X 6” Forney # 10-231