



# 3 IN 1 SHEET METAL MACHINE



## WARNING LABELS



Read this manual before use.



Wear eye protection when using the machine.



Keep fingers clear of break, dies, rollers and blade.

## INTRODUCTION

Thank you for purchasing this **GARVIN** 3 in1 Sheet Metal Machine.

Before attempting to use this product, please read this manual thoroughly and follow the instructions carefully. In doing so you will ensure the safety of yourself and that of others around you, and you can look forward to your purchase giving you long and satisfactory service.

## FEATURES

- Shear Table Front Guide
- Shear & Brake Adjustable Rear Stop
- Hardened Steel Brake Fingers
- Precision Ground Hardened Steel Shear Blade

## SAFETY INSTRUCTIONS FOR MACHINERY

1. **READ THE ENTIRE MANUAL BEFORE USE.** Machinery presents serious injury hazards to untrained users.
2. **ALWAYS USE APPROVED SAFETY GLASSES WHEN OPERATING MACHINERY.** Everyday eyeglasses are NOT safety glasses.
3. **ALWAYS USE HEARING PROTECTION WHEN OPERATING MACHINERY.** Machinery noise can cause permanent hearing loss.
4. **WEAR PROPER APPAREL.** DO NOT wear loose clothing, gloves, neckties, rings, or jewelry that can catch in moving parts. Wear protective hair covering to contain long hair and wear non-slip footwear.
5. **NEVER OPERATE MACHINERY WHEN TIRED OR UNDER THE INFLUENCE OF DRUGS OR ALCOHOL.** Be mentally alert at all times when in use.
6. **ONLY ALLOW TRAINED AND PROPERLY SUPERVISED PERSONNEL TO OPERATE MACHINERY.** Make sure operation instructions are safe and understood.
7. **KEEP CHILDREN AND VISITORS AWAY** from the work area.
8. **MAKE WORKSHOP CHILDPROOF.** Use padlocks, master switches, and remove start switch keys.
9. **DO NOT USE IN DANGEROUS ENVIRONMENTS.** DO NOT use machinery in damp, wet locations, or where any flammable or noxious fumes may exist.
10. **KEEP WORK AREA CLEAN AND WELL LIGHTED.** Clutter and dark shadows may cause accidents.
11. **MAINTAIN MACHINERY WITH CARE.** Keep blades sharp and clean for best

and safest performance.

12. **MAKE SURE GUARDS ARE IN PLACE AND WORK BEFORE USING MACHINERY.**
13. **REMOVE ADJUSTING KEYS AND WRENCHES.** Make a habit of checking for keys and adjusting wrenches before turning machinery ON.
14. **CHECK FOR DAMAGED PARTS BEFORE USING MACHINERY.** Check for binding or misaligned parts, broken parts, loose bolts, and any other conditions that may impair machine operation. Repair or replace damaged parts before operation
15. **USE RECOMMENDED ACCESSORIES.** Refer to the instruction manual for recommended accessories. Improper accessories increase risk of injury.
16. **DO NOT FORCE MACHINERY.** Work at the speed for which the machine or accessory was designed.
17. **DO NOT OVER REACH.** Maintain stability and balance at all times.



**WARNING: LIKE ALL MACHINERY THERE IS POTENTIAL DANGER WHEN OPERATING THIS MACHINE. ACCIDENTS ARE FREQUENTLY CAUSED BY LACK OF FAMILIARITY OR FAILURE TO PAY ATTENTION. USE THIS MACHINE WITH RESPECT AND CAUTION TO DECREASE THE RISK OF OPERATOR INJURY. IF NORMAL SAFETY PRECAUTIONS ARE OVERLOOKED OR IGNORED, SERIOUS PERSONAL INJURY MAY OCCUR.-**

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**CAUTION: NO LIST OF SAFETY GUIDELINES CAN BE COMPLETE. EVERY WORKSHOP ENVIRONMENT IS DIFFERENT. ALWAYS CONSIDER SAFETY FIRST, AS IT APPLIES TO YOUR INDIVIDUAL WORKING CONDITIONS. USE THIS AND OTHER MACHINERY WITH CAUTION AND RESPECT. FAILURE TO DO SO COULD RESULT IN SERIOUS PERSONAL INJURY, DAMAGE TO EQUIPMENT, OR POOR WORK RESULTS.**

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## SITE CONSIDERATIONS

### FLOOR LOAD

Refer to the Specifications for the weight and footprint specifications of your machine. Some workbenches or stands may require additional reinforcement to support the machine, workpiece, and the forces applied during operation.

### PLACEMENT LOCATION

Consider existing and anticipated needs, size of material to be processed through each machine, and space for auxiliary stands, work tables or other machinery when establishing a location for your new machine. See Figure 4 for the minimum working clearances.

### MOUNTING

The base of this machine has holes that allow it to be mounted to a workbench. For a safe and smooth operation of this machine, it **MUST** be securely mounted to an appropriate workbench or stand.

The strongest mounting option is a “Through Mount” (Figure 5) where holes are drilled all the way through the workbench, and hex bolts, washers, and hex nuts are used to secure the machine to the workbench.

Another option for mounting is a “Direct Mount” (Figure 6) where the machine is simply secured to the workbench with a lag screw.

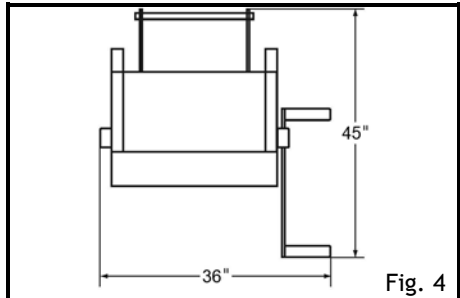


Fig. 4

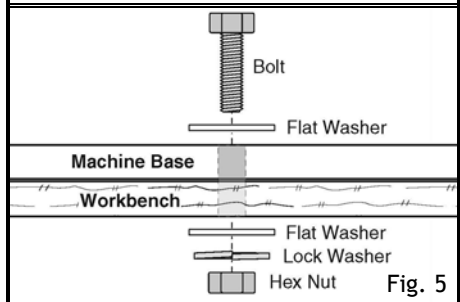


Fig. 5

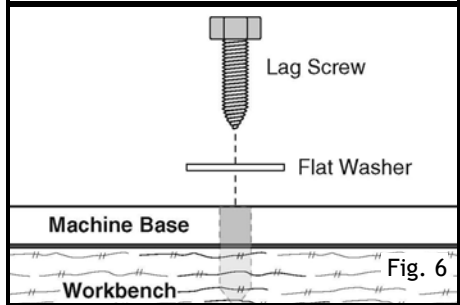


Fig. 6



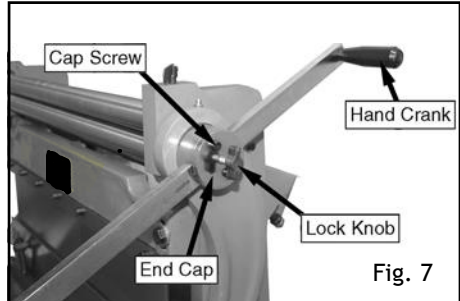
**CAUTION: DUE TO THE CONSIDERABLE FORCES EXERTED ON THIS MACHINE WHEN IN OPERATION, YOU MUST SECURELY MOUNT IT TO A STABLE AND STURDY WORKBENCH OR STAND. OTHERWISE, THE MACHINE COULD TIP OR FALL AND RESULT IN PERSONAL INJURY OR PROPERTY DAMAGE.**

## ASSEMBLY

In addition to the assembly procedures below, some disassembly is required to remove storage grease and re-lubricate the cleaned parts.

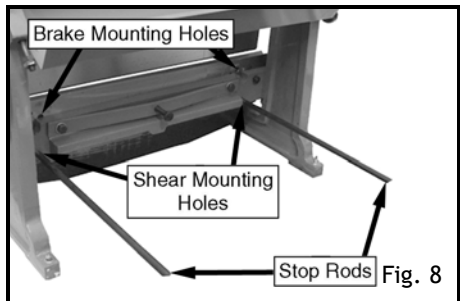
### TO ASSEMBLE YOUR MACHINE:

1. Remove the end cap screws from the end cap.
2. Rotate the lock knob out until it is flush with the rear of the end cap.
3. Insert the hand crank into the slot (see Figure 7).
4. Replace the end cap and cap screws and tighten the lock knob.

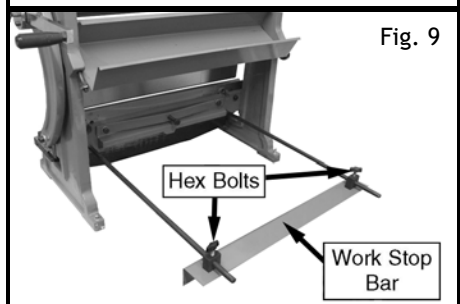


**NOTE:** It is your preference which side of the machine you install the hand crank.

5. Thread the rods into either the brake or shear mounting holes, as shown in Figure 8. Only hand-tighten the rods.



6. Loosen the hex bolts on the stop bar and slide it onto the rods.
7. Position the stop bar as required and secure using the hex bolts as shown in Figure 9.



## OPERATING - SLIP ROLLERS



CAUTION: THE ROLLERS OF THIS MACHINE PRESENT A PINCHING HAZARD. MAKE SURE NO BODY PART OR CLOTHING IS NEAR THE ROLLERS DURING OPERATION. FAILURE TO FOLLOW THIS WARNING MAY RESULT IN FINGERS, HAIR, OR CLOTHING BEING PULLED INTO THE MACHINE, CAUSING PERSONAL INJURY.

### SLIP ROLLER OVERVIEW

The slip roller is used to form cylinders, cones, and arcs in sheet metal up to 1 mm in thickness and 760 mm wide, as well as wires and rods. Three steel rollers are configured to draw the workpiece through a path that will produce the desired results (see Figures 10-11).

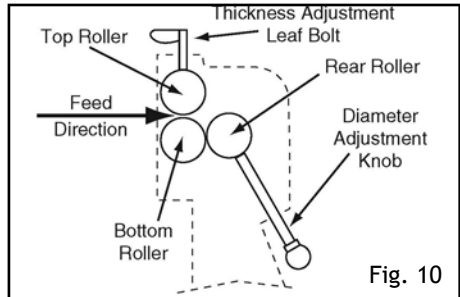


Fig. 10

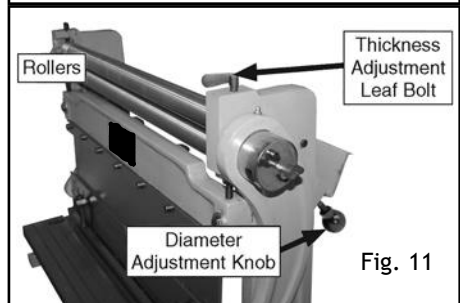


Fig. 11

### SLIP ROLLING TIPS

- Due to the many variables of different sheet metal types, no single configuration of the rollers will create the same curve on all materials. Rolling sheet metal to achieve an exact radius is a trial-and-error process.
- Performing multiple passes through the machine with gradual reductions in the curve radius produces better results than trying to make the curve in one pass.
- To avoid pitted workpieces and damage to the roller surfaces, always make sure the workpiece and the rollers are free of grit and any foreign material before every use.
- Unless the operation requires a cone-type curve, always keep the rear roller parallel to the front rollers by rotating the diameter adjustment knobs the same amount.

## CREATING CURVES

Your sheet metal machine can easily create constant radius curves in sheet metal up to 1 mm in thickness (mild steel).

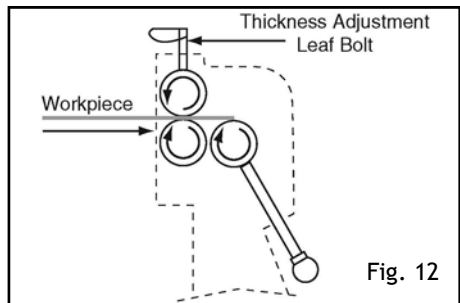
The method of creating a specific radius is a trial and error process. Due to the many variations among metal workpieces, no single configuration of the rollers will reproduce the same curve in all materials. We recommend testing your roller configurations on scrap pieces that are the same dimension and material as your final workpiece.

### TO CREATE A CURVE IN THE WORKPIECE:

1. Use the diameter adjustment knobs to fully lower the rear roller below the level of the bottom roller, then rotate the thickness adjustment leaf bolts counterclockwise until the upper roller can be lifted with enough clearance for the workpiece.

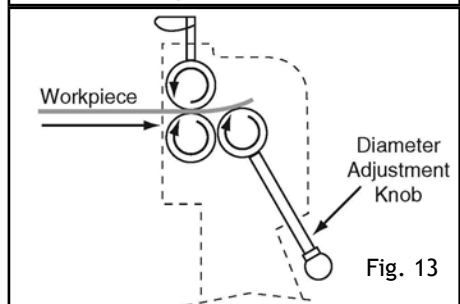
**NOTE:** Performing multiple passes through the machine with gradual reductions in the curve radius produces better results than trying to make the curve in one or two passes.

2. Insert the workpiece between the upper and lower rollers and just over the rear roller, as illustrated in Figure 12, then tighten the thickness adjustment leaf bolts down to hold the workpiece securely. Make sure you tighten the leaf bolts exactly the same amount.



3. Use the diameter adjustment knobs to raise the rear roller, then use the hand crank to pass the workpiece through the machine (see the illustrations in Figure 13-14).

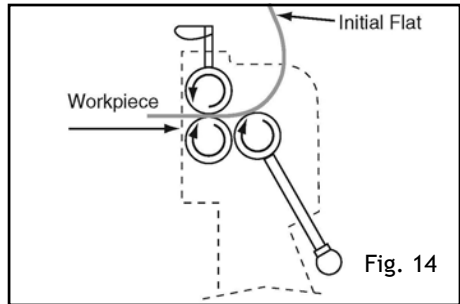
**NOTE:** For good results, make the first bend about 25% of the the final radius, then slightly increase the bend by 25% with each successive pass until the final radius has been reached.





**NOTE:** If your workpiece has an undesired initial flat, as illustrated in Figure 14, you can remove it by flipping the workpiece around and pass it through the front of the machine so that the initial flat enters last.

4. Slightly tighten the diameter adjustment knobs the same amount, then pass the workpiece through the rollers again.



**NOTE:** To make a cone, tighten one adjustment knob more than the other.

5. Repeat Step 4 until you have produced the desired curve.

## CREATING CYLINDERS

If you know the diameter of the cylinder you want to create, use the formula below to calculate the length of material needed.

$$C = \pi D$$

C = Circumference (Length of Material Needed)

$\pi$  = Pi (Approximately 3.142)

D = Diameter

Example: Suppose you want to create a 150 mm diameter cylinder. You would use the above formula as follows:

$$C = \pi D$$

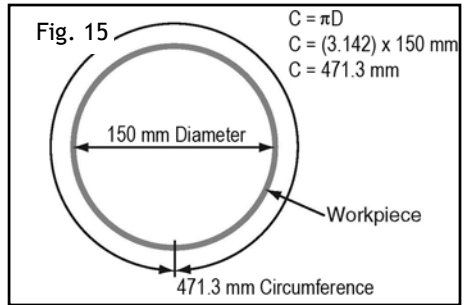
$$C = (3.142) \times 150 \text{ mm}$$

$$C = 471.3 \text{ mm}$$

The result of 471.3 mm indicates that you need to start with a piece of sheet metal that is approximately 471.3 mm in length in order to create a 150 mm diameter cylinder.

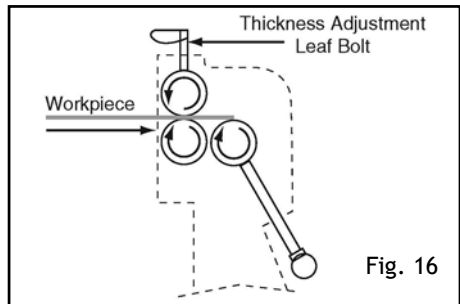
You can use the slip roll to create a bend with the correct radius so that the two ends meet, forming a 150 mm diameter cylinder (Figure 15).

**NOTE:** Performing multiple passes through the machine with gradual reductions in the curve radius produces better results than trying to make the curve in one or two passes.

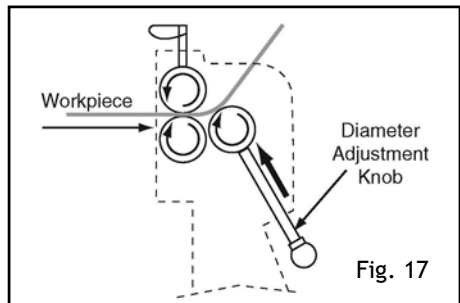


#### TO CREATE A CYLINDER:

1. Use the diameter adjustment knobs to fully lower the rear roller below the level of the bottom roller, then rotate the thickness adjustment leaf bolts counterclockwise until the upper roller can be lifted with enough clearance for the workpiece.
2. Insert the workpiece between the upper and lower rollers and just over the rear roller, as illustrated in Figure 16, then snug the thickness adjustment leaf bolts down to secure the workpiece. Make sure you tighten the leaf bolts the same amount.
3. Turn the hand crank clockwise to feed the workpiece through the machine until it is approximately half way through the upper and lower rollers.

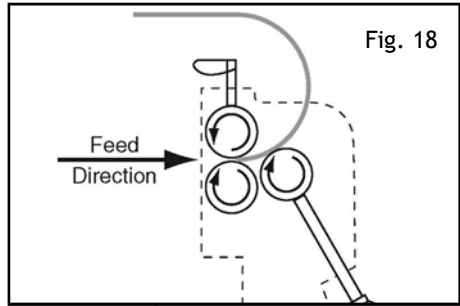


4. Turn the diameter adjustment knobs clockwise to lift the rear roller until the desired radius bend is reached, as illustrated in Figure 17. Make sure to turn the knobs equal amounts so the rear roller is always parallel with the other rollers. Failure to do so will create a larger radius on one end than the other, resulting in a cone shape.

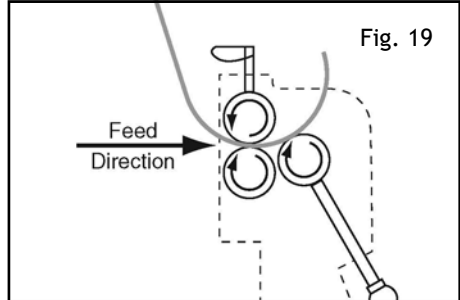


**NOTE:** Always err on the side of making the radius too large rather than too small. It is easy to decrease the radius but very difficult to increase the radius later.

5. Turn the hand crank to process the material through the slip rollers. Continue turning until the workpiece is completely through the upper and lower rollers, as illustrated in Figure 18.



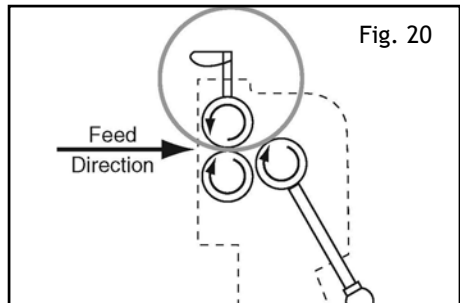
6. Rotate the workpiece 180°, insert the curved end into the rollers, then process it through the machine, as illustrated in Figure 19.



7. Reduce the radius of the curve by raising the rear roller, then repeat Steps 4-7 until you have produced the desired cylinder (see the illustration in Figure 20).

- If the ends of the cylinder do not meet, lift the rear roller equally at both ends, then process the entire cylinder through the slip roller again. Repeat as necessary.

- If the ends of the cylinder overlap, remove the cylinder as described in "Removing the workpiece from the rollers" on page 15. Then, either attempt to increase the radius by manually bending it, or scrap the workpiece and start this procedure again with a new blank.



8. When the cylinder is complete, refer to "Removing the workpiece from the rollers" on page 15 for detailed instructions on removing the cylinder from the top roller.

## REMOVING THE WORKPIECE FROM THE ROLLERS

### TO REMOVE THE WORKPIECE FROM THE TOP ROLLER:

1. Rotate the thickness leaf bolts anticlockwise until they no longer apply pressure to the top roller.



CAUTION: THE SHARP EDGES OF SHEET METAL CAN QUICKLY CUT YOUR HANDS. ALWAYS USE CAUTION AND HEAVY LEATHER GLOVES WHEN HANDLING SHEET METAL.

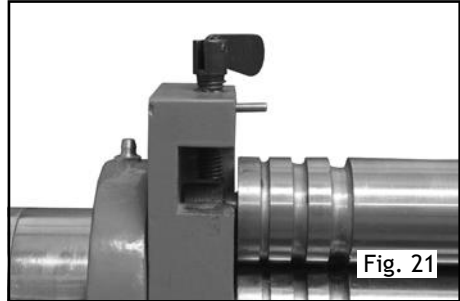


Fig. 21

2. Protect your hands from the sharp edges of the workpiece, then grasp the top roller and use moderate force to pull it forward, as shown in Figure 22.
3. Remove the workpiece, slide the top roller back into place, then secure the roller by rotate the thickness leaf bolts clockwise to apply the required pressure to the top roller.

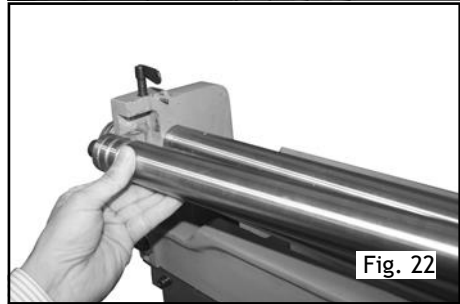


Fig. 22

## BENDING WIRE

Your sheet metal machine can bend wires, rods, and small-diameter tubing with diameters of 3.97 mm, 4.37 mm and 5.56 mm (see Figure 23).

To ensure even pressure on the material, place the workpiece in the smallest possible groove on the rollers.

Process the material through the machine in the same manner described on the previous pages for sheet metal.

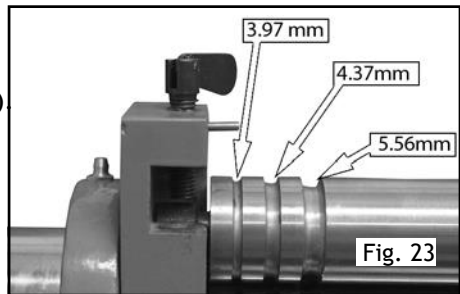


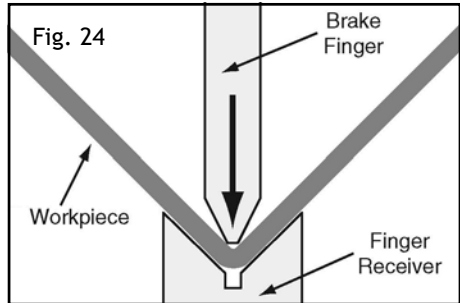
Fig. 23

**NOTE:** The wire grooves can also be used when rolling sheet metal that has a wire bead on the side.

# OPERATING - BRAKE

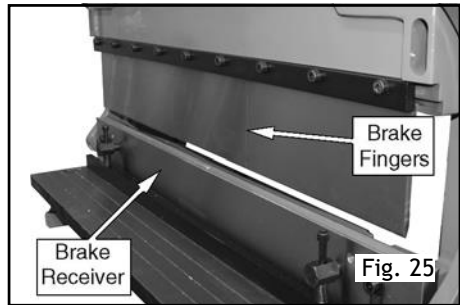
## BRAKE OVERVIEW

The brake is used to make bends of 0°-90° in sheet metal up to 1 mm in thickness and 760 mm in width. When you use the hand crank, the brake fingers force the workpiece into the groove of the finger receiver to make the desired bend (see Figures 24-25).



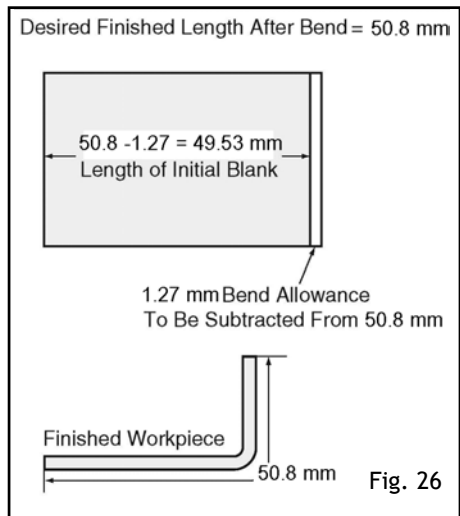
## BEND ALLOWANCE

When metal is bent, the outside overall dimension increases from its original length—this amount is called the bend allowance. A typical bend allowance for a 90° bend in a 1 mm mild steel workpiece is approximately 1.27 mm. That means you need to start with a workpiece that is approximately 1.27 mm shorter than the desired outside length of the finished workpiece, as illustrated in the example of Figure 26.



Calculating the bend allowance for your operation requires many variables, such as metal thickness, type of material, radius of the bend, etc. Detailed information for calculating the bend allowance can be found in metalworking handbooks and on the internet.

An easy way to find the correct dimension of your initial blank is to measure a piece of scrap of the same material as the workpiece, make the bend, then measure the piece again. The difference between the two measurements is the bend allowance, which you subtract from the dimension of the workpiece blank before the bend.



## BENDING SHEET METAL

Tip: To reduce the chance of scoring your workpiece when using the brake, always keep the fingers and receivers clean and free of burrs or other blemishes. Also, apply a strip of sturdy tape along the top and bottom of the bend line.



**WARNING: THE BRAKE FINGERS ON THIS MACHINE PRESENTS A PINCHING HAZARD. MAKE SURE NO BODY PART OR CLOTHING IS NEAR THE AREA WHERE METAL BENDING OCCURS. FAILURE TO FOLLOW THIS WARNING MAY RESULT IN SEVERE PERSONAL INJURY.**

### TO BEND SHEET METAL:

1. Mark a line along the width of the workpiece where the bend is to take place.
2. Use the hand crank to lower the finger receiver until you can position the workpiece underneath the fingers with the bend line aligned with the tips, as shown in Figure 27.

**NOTE:** When performing the same bending operation on multiple parts, use the rear work stop to save time positioning the workpieces.

3. While holding the workpiece steady, use the hand crank to raise the finger receiver to perform the desired bend (see Figure 28 for an example), then lower the receiver and remove the workpiece.



Fig. 27

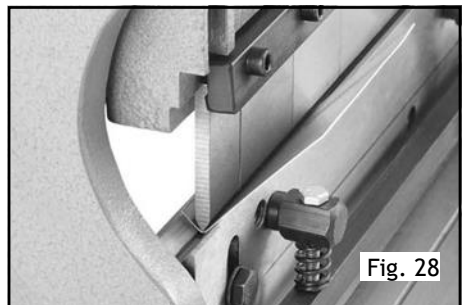


Fig. 28

- If a reverse bend is required, re-install the workpiece upside-down, as shown in Figure 29, and repeat Steps 2-3. The minimum reverse bend possible is 9 mm.

**NOTE:** When performing a pan and box bending operation, loosen the cap screws on the brake finger gib and configure the fingers for your operation. Remove the fingers you do not need.

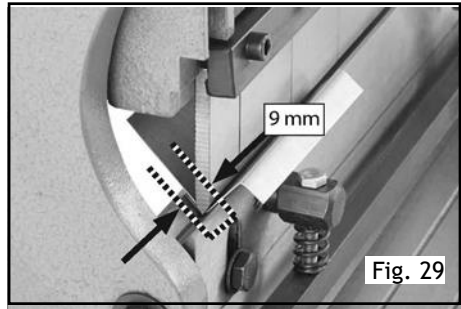


Fig. 29

## OPERATING - SHEARING

### SHEARING OVERVIEW

Set of reversible blades that shear mild steel up to 1 mm in thickness and 760 mm in width. When you use the hand crank to perform a shear, the upper movable blade is lowered past the fixed table blade, creating a shearing action (see Figures 30-31). For repetitive cuts, use the adjustable rear work stop.

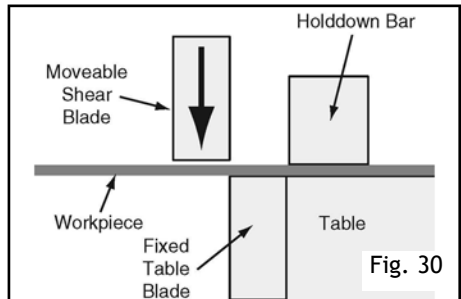


Fig. 30

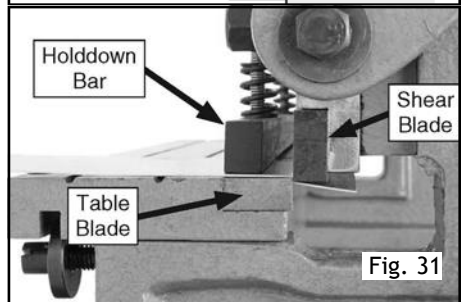


Fig. 31

## CUTTING SHEET METAL



**WARNING: THE SHEARING BLADES ON THIS MACHINE PRESENT A HAZARD. MAKE SURE NO BODY PART OR CLOTHING IS NEAR THE AREA WHERE METAL SHEARING OCCURS. FAILURE TO FOLLOW THIS WARNING MAY RESULT IN SEVERE PERSONAL INJURY.**

### To cut sheet metal:

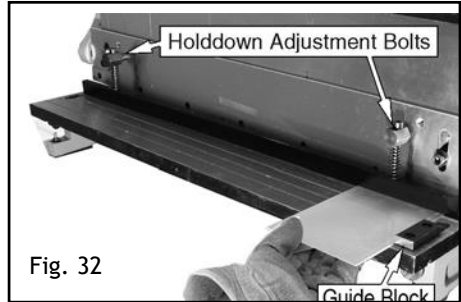
1. Mark the cut line across the width of the workpiece.
2. Make sure the gap between the shearing blades is correct for the workpiece material (refer to “Shearing Blade Gap Adjustment” on page 25 for detailed instructions).
3. Position the workpiece up against the guide block on the right side of the table, then align the cut mark with the upper shear blade, as shown in Figure 32.

**NOTE:** The shearing action begins on the right side of the workpiece and moves to the left.

**NOTE:** If you need to adjust the gap between the shearing blades to accommodate your workpiece, refer to the “Shearing Blade Gap Adjustment” on page 25 for detailed instructions.

**NOTE:** If you are using the rear work stop, adjust the stop so that at least one square edge of the workpiece is against it.

4. Use the hold down adjustment bolts to adjust the holddown bar so that it firmly holds the workpiece in place without marking or denting it.
5. Keeping all body parts away from the blades, rotate the hand crank with an even and steady pressure to complete the cut.



### MATERIAL THICKNESS

Designed to bend and shear mild steel sheet metal up to 1 mm in thickness.



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## **MAINTENANCE**

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### **SCHEDULE**

For optimum performance from your machine, follow this maintenance schedule and refer to any specific instructions given in this section.

#### **DAILY MAINTENANCE:**

- Clean the machine.
- Tighten loose mounting bolts.
- Check/replace damaged rollers.
- Check/replace cracked or damaged brake fingers or receiver.
- Sharpen/replace dull or nicked shearing blades.
- Any other unsafe condition.

#### **MONTHLY MAINTENANCE:**

- Lubricate the gears and hand crank bushings.

#### **SEMI-ANNUAL MAINTENANCE:**

- Lubricate the roller bushings.

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## **CLEANING**

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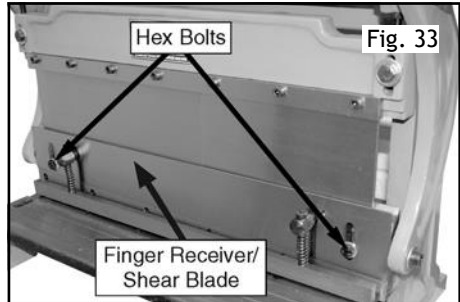
Cleaning is relatively easy. Use cloth and degreasing spirits to wipe down the machine.

### **LUBRICATION**

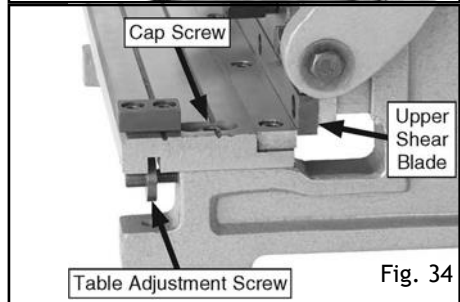
Keep properly lubricated to help ensure long life and smooth operation of the machine.

## CLEAN THE MACHINE FINGERS

1. Loosen the two hex bolts securing the finger receiver/upper shear blade to the frame (see Figure 33).



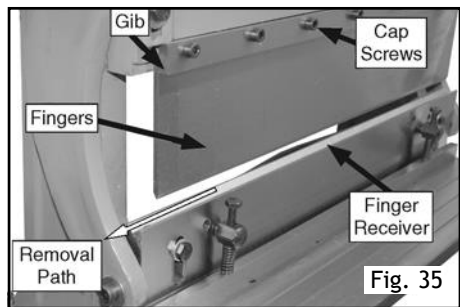
2. Move the table back until the upper shear blade can pass down behind the table blade by loosening the two cap screws securing the shear table to the frame and rotating the table adjustment screws counterclockwise (see Figure 44).



**NOTE:** Operational adjustment of the shearing blades is covered in the “Shearing Blade Gap Adjustment” on page 25.

3. Make sure the finger receiver and upper shear blade move up and down smoothly, retighten the hex bolts just until they are snug, then back them off approximately  $\frac{1}{4}$  turn.

4. Use the hand crank to position the brake finger receiver close to the brake fingers, as shown in Figure 35.



5. Loosen the gib cap screws to release the fingers, then remove the fingers from the side of the finger receiver, as shown in Figure 35.

6. Use cloth and a degreaser to remove the storage grease from the fingers, gib, and receiver. Thoroughly dry the parts, then apply a thin coat of an anti-rust lubricant to all the parts.

7. Place a thin piece of wood on the finger receiver, as shown in Figure 36, then reinstall the fingers so that they rest on the wood. Make sure the tops of the fingers are between the gib and the casting.

**NOTE:** Install the widest finger to the right, then repeat with each smaller finger.

8. Make sure the fingers are slightly loose between the gib and the casting, then use the hand crank to raise the receiver to fully seat the fingers up against the casting behind the gib, as shown in Figure 37.

9. Re-tighten all of the gib cap screws.

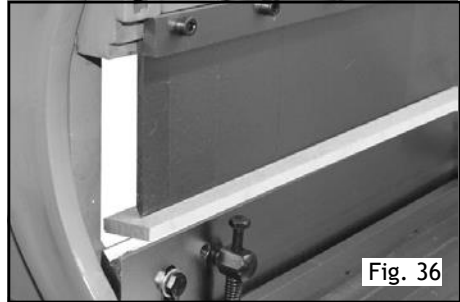


Fig. 36

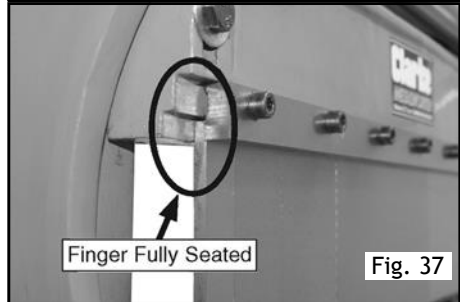


Fig. 37

#### GEARS

Clean away grease and built-up grime from the top and bottom roller gear teeth, as shown in Figure 38, with a stiff brush and degreasing spirits.

When dry, apply a small amount of grease to the teeth, then use the hand crank to rotate the rollers and distribute the lubricant.

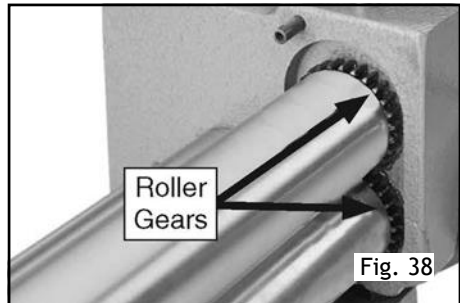


Fig. 38

#### HAND CRANK BUSHINGS

Wipe off the grease fittings next to each hand crank hub (see Figure 39), then use a grease gun to add a small amount of multi-purpose grease to the hand crank bushings.

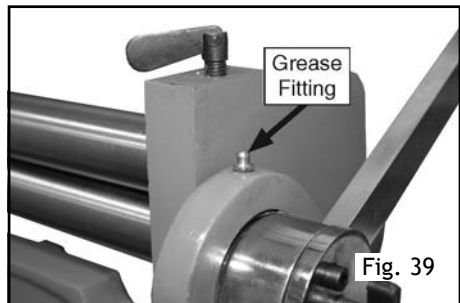
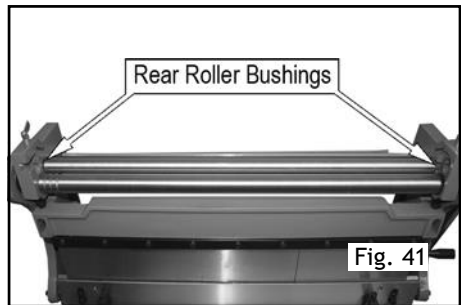
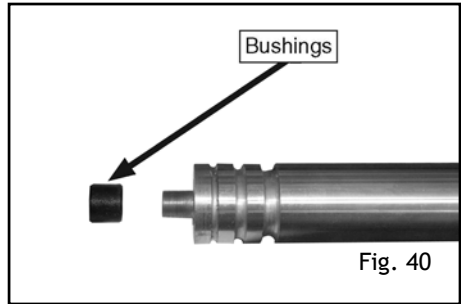


Fig. 39

## ROLLER BUSHINGS

1. Remove the top roller from the machine, then remove the bushings from the ends of the roller (see Figure 40).
2. Use a shop rag and degreasing spirits to clean the bushings and the ends of the roller,
3. Apply a thin coat of multi-purpose grease to the roller ends
4. Re-install the bushings.
5. Use a stiff brush and degreasing spirits to clean the rear roller bushings (see Figure 41),
6. Apply a small amount of multi-purpose grease to them.
7. Re-install the top roller and close the cover.



## SERVICE

### SHEARING BLADE REVERSAL/REPLACEMENT

The shearing blades are reversible, so when the first cutting edge becomes dull, the blades can be rotated to use the second cutting edge.

When both cutting edges of the blade become dull, use wet grinding techniques for SK-4 metal or better to sharpen the cutting face of the blade.

The upper shearing blade uses a 5° relief edge and the lower table blade does not

#### Tools Needed

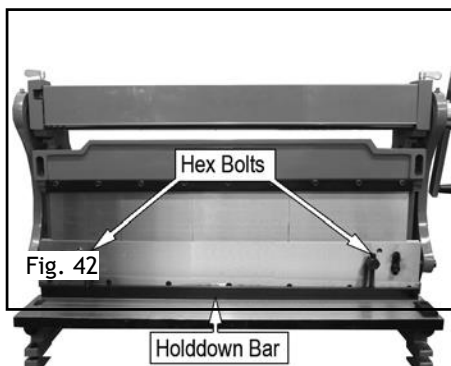
| Tools Needed           | Qty |
|------------------------|-----|
| Wrench or Socket 10 mm | 1   |
| Hex Wrench 5mm         | 1   |

#### TO REVERSE OR REPLACE THE SHEARING BLADES:

1. Remove the hex bolts and springs that secure the shear holddown bar (see Figure 42).

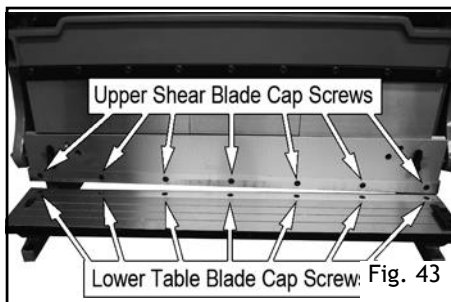


**CAUTION: THE SHEARING BLADES ARE SHARP AND CAN QUICKLY CUT YOUR HANDS. ALWAYS WEAR HEAVY LEATHER GLOVES WHEN HANDLING THE SHEARING BLADES TO AVOID THIS CUTTING HAZARD.**



2. Remove the six cap screws that secure the blade, then carefully remove it from the machine (see Figure 43).

**Tip:** When removing or installing the upper shear blade, remove the cap screw at one end, then insert a small hex wrench or similar tool through the



hole to keep the blade in place as you remove the rest of the cap screws.

3. Inspect the blade cutting edge that was in use, for wear, nicks, or burrs.
  - If the cutting edge shows wear or nicks and the other cutting edge has not been used, rotate the blade and re-install it.
  - If both cutting edges are worn or nicked, either properly sharpen the cutting face or replace the blade.
4. Re-install the hold down bar, then check that the shearing blade gap adjustment is correct as instructed in “Shearing Blade Gap Adjustment” below.

## **SHEARING BLADE GAP ADJUSTMENT**

The shearing blade gap adjustment determines the accuracy of the cut.

Follow the procedures below to make sure this adjustment is correct for the workpiece material being processed.



**WARNING: THE SHEARING BLADES ON THIS MACHINE PRESENTS AN HAZARD. MAKE SURE NO BODY PART OR CLOTHING IS NEAR THE AREA WHERE METAL SHEARING OCCURS. FAILURE TO FOLLOW THIS WARNING MAY RESULT IN SEVERE PERSONAL INJURY.**

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## **PERFORMING THE SHEAR TEST**

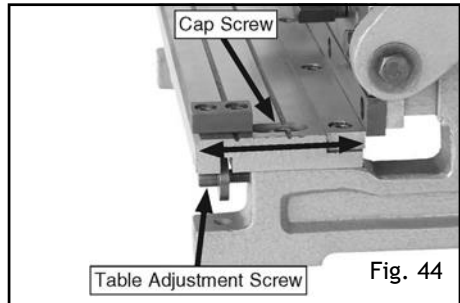
1. While keeping your fingers clear of the shear blades, shear a piece of scrap material that is the same as your workpiece along the full length of the blade, then inspect the cut.
  - If the machine correctly cuts to your satisfaction along the entire length of the blades, no adjustments are necessary.
  - If the cut is clean at one end and not the other, perform the following **ADJUSTING THE SHEAR TABLE** procedure on page 26.
  - If the condition of the cut on the ends is different from the cut in the middle, perform the following

## ADJUSTING THE SHEAR TABLE.

| Tools Needed            | Qty |
|-------------------------|-----|
| Hex Wrench 6mm          | 1   |
| Standard Screwdriver #2 | 1   |

### TO ADJUST THE BLADE GAP BY MOVING THE TABLE:

1. Loosen the cap screws on either end of the shear table that secure it to the machine (see Figure 44).
2. Evenly rotate the table adjustment screws to adjust the position of the shearing table until the blade gap is even, then re-tighten the cap screws to secure the table in place.



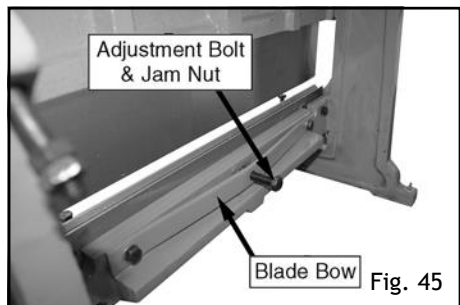
**NOTE:** Rotating the table adjustment screws clockwise moves the table toward the upper shear blade.

3. Perform the previous shear test.
4. If necessary, repeat Steps 1-3 until you are satisfied with the shear test cut.

### ADJUSTING THE BLADE BOW

The adjustment bolt of the blade bow is used to remove any slight bow in the cast iron cross beam that the brake finger receiver and upper shear blade are attached to (see Figure 45).

| Tools Needed | Qty |
|--------------|-----|
| Wrench 14mm  | 2   |



### TO ADJUST THE BLADE GAP WITH THE BLADE BOW:

1. Hold the adjustment bolt still, then turn the jam nut to adjust the center of the cross beam in or out (see Figure 48).
  - If the shear test cut was clean on the ends of the shear table but not in the middle, turn the jam nut counterclockwise to force the adjustment bolt against the cross beam, moving it in toward the front.
  - If the shear test cut was clean in the middle but not on the ends, rotate the jam nut clockwise to allow the cross beam to move back.
2. Perform the previous shear test.
3. If necessary, repeat Steps 1-2 until you are satisfied with the shear test cut.

### BRAKE ALIGNMENT



**WARNING: THE BRAKE FINGERS ON THIS MACHINE PRESENTS A PINCHING HAZARD. MAKE SURE NO BODY PART OR CLOTHING IS NEAR THE AREA WHERE METAL BENDING OCCURS. FAILURE TO FOLLOW THIS WARNING MAY RESULT IN SEVERE PERSONAL INJURY.**

During the life of your machine, you may need to align the brake fingers with the finger receiver from side-to-side.

| Tools Needed   | Qty |
|----------------|-----|
| Hex Wrench 6mm | 1   |
| Wrench 16mm    | 1   |
| Heavy Flat Bar | 1   |

### TO ALIGN THE BRAKE:

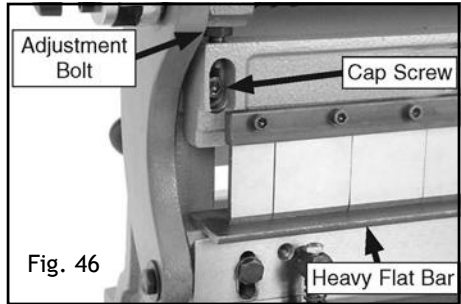
1. Remove, clean, and de-burr all of the finger tips and the receiver groove, then inspect the fingers and receiver for any cracks or damage.
  - If any of the brake fingers or the receiver are damaged in any way, DO NOT use the brake until you have replaced these parts with new ones.
2. Replace the fingers and properly seat them (refer to Steps 8-13 beginning on page 21 for detailed instructions).



**CAUTION: OPERATING THE BRAKE WITH CRACKED OR DAMAGED BRAKE FINGERS OR RECEIVER COULD CAUSE THESE PARTS TO SHATTER AND FLY APART, WHICH COULD RESULT IN PERSONAL INJURY.**



3. Place a piece of heavy flat bar stock or a heavy metal ruler across the finger receiver, as shown in Figure 46.
4. Lower the brake fingers until one just rests on the metal bar, as shown in Figure 46.
5. Starting at one end, visually check the gap between the brake fingers and the metal bar.



6. If you find a gap at one end of the brake, loosen the cap screw shown in Figure 46 on that end, then turn the adjustment bolt counterclockwise until the gap disappears.
7. Re-tighten the cap screw, remove the metal bar and use the hand crank to cycle the machine 2-3 times.
8. Repeat Steps 3-7 until the brake fingers rest evenly on the metal bar along its entire length.

## TROUBLESHOOTING

### Slip Roll Operation

| PROBLEM   | CAUSE                                      | SOLUTION  |
|---|--|---|
| Slip roll creates cones when trying to make a cylinder. | Top and rear rollers not parallel.         | Use the diameter adjustment knobs to make the rollers parallel.   |
| Creases or wrinkles in the workpiece.                   | Excessive pressure applied when rolling.   | Reduce the radius and perform the bend in several light passes.   |
| Workpiece is pitted or scratched.                       | Workpiece or rollers are dirty or damaged. | Thoroughly clean the workpiece and rollers. Polish out any nicks/burrs in the rollers, or replace them. |

### Brake Operation

| PROBLEM   | CAUSE                             | SOLUTION  |
|---|-----------------------------------|---|
| Heavy resistance during bending.                | Machine capacities are exceeded.  | Operate within the listed capacities of the machine.                              |
| Bend radius is not consistent across workpiece. | Machine capacities are exceeded.  | Operate within the listed capacities of the machine.                              |
|   | Fingers and receiver not aligned. | Properly align the fingers and receiver   |
| Tips of brake fingers are chipping or rolling.  | Fingers and receiver not aligned. | Properly align the fingers and receiver   |
|   | Workpiece is too thick.           | Operate within the listed capacities of the machine.                              |
| Workpiece has scoring marks.                    | Fingers or receiver scratched     | Polish out scratches, and apply tape at the bend locations for further protection |

# Shear Operation

| <b>PROBLEM</b>                                | <b>CAUSE</b>                            | <b>SOLUTION</b>                                      |
|---|---|--|
| Machine will not cut workpiece.               | Cut exceeds machine capacities          | Operate within the listed capacities of the machine. |
|   | Not enough gap between blades.          | Increase blade gap.                                  |
| Cuts are not square.                          | Uneven contact with guide or work stop. | Maintain proper contact with guide and work stop.    |
|   | Blade gap unequal across length.        | Properly adjust blade gap for material.              |
|   | Too much bow in blade                   | Properly adjust blade bow                            |
|   | Inadequate holddown pressure.           | Properly adjust holddown pressure.                   |
| Poor quality of cuts with ripping or tearing. | Dull blades.                            | Reverse/sharpen/replace blades.                      |
|   | Incorrect blade gap setup.              | Properly adjust blade gap for material.              |
|   | Loose blades.                           | Remove blades, clean thoroughly, and re-install.     |