

# NO. 412

## COMBINATION BENDING BRAKE

### OPERATIONS & PARTS MANUAL



**ROPER WHITNEY OF ROCKFORD, INC.**

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## NO. 412 OPERATIONS MANUAL

**CARE:** Occasional oiling of moving parts with machine oil will ease operation and extend the life of the brake. Occasionally check and tighten the lower beam bracket gib screws (see figure 1) at each end of the brake. These screws are accessible when the apron is raised. These should be kept snug to reduce excess front to back play in the lower beam.

**CAUTION:** Do not form wire, nails, rods or pipe in this brake. This brake will form a 1" flange over the entire length in it's rated capacity.

Brake is reduced in capacity by 2 gauges when:

1. Apron angle iron work support (see figure 2) is removed.
2. Box fingers are used.

Brake is reduced in capacity by 4 gauges when:

1. Apron angle iron work support and apron filler plate are removed.
2. Brake is used on stainless steel.

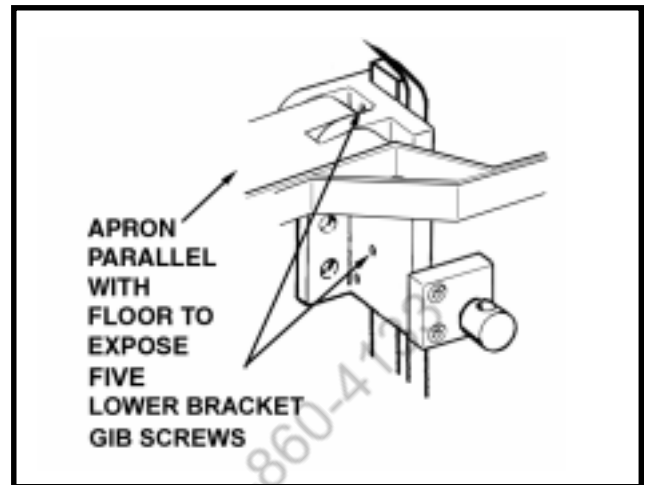


Figure 1. Lower Beam Bracket Gib Screws

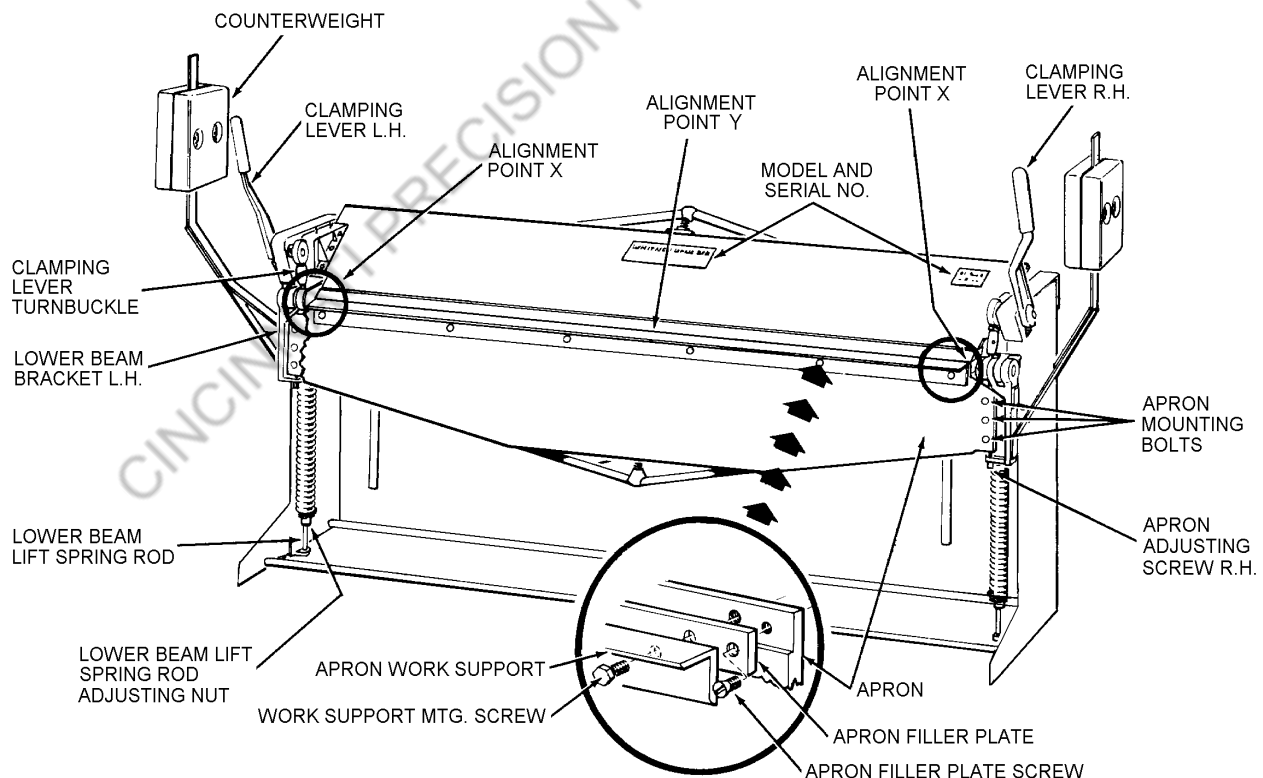


Figure 2. Front View of Brake

# NO. 412 OPERATIONS MANUAL

## ADJUSTMENTS - BEFORE OPERATION

1. Apron must be flush with lower beam jaw before beginning operation. To adjust loosen apron mounting bolts slightly and turn apron adjusting screws as necessary. After adjustment, retighten apron mounting bolts. If alignment cannot be achieved, follow major brake alignment procedure following.

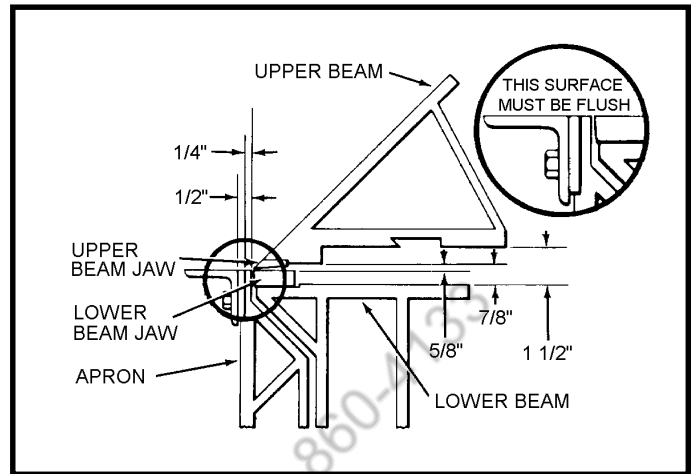


Figure 3. Reference Dimensions

## CLAMPING PRESSURE ADJUSTMENT

2. Check gauge of material to be formed to be sure it is within rated capacity of your brake. Place small sample of work piece on Lower Beam Jaw and clamp in position by moving the Clamping Lever forward. Sample should now be held firmly in position. To adjust for more or less clamping pressure, move Clamping Lever to unlocked (up) position, loosen the Clamping Lever Turnbuckle Lock Nut (figure 4) on both ends of brake and adjust the Clamping Lever Turnbuckles as necessary to achieve firm clamping pressure. Retighten the lock-nuts.

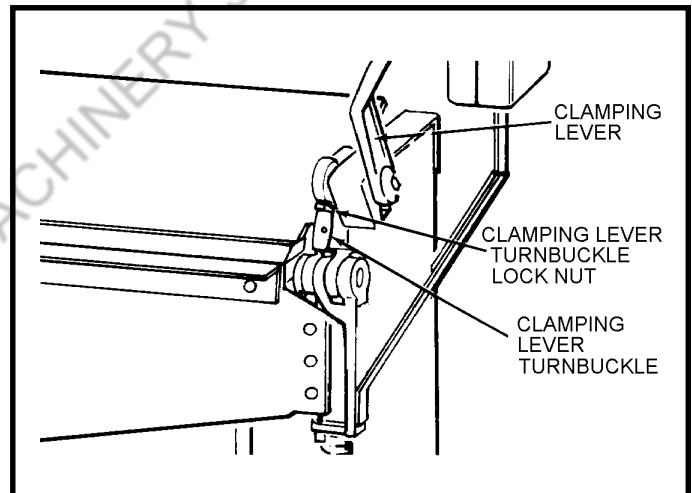


Figure 4. Regulating Clamping Pressure

## THICKNESS OF MATERIAL ADJUSTMENT

3. Loosen the Upper Beam Slide Clamping Screws (figure 5) and Upper Beam Adjusting Screw Lock Nuts at both ends of brake. Set entire front edge of Upper Beam Jaw back from the Lower Beam Jaw the thickness of the metal to be bent by turning the Upper Beam Adjusting Screws back as necessary. Retighten all screws and nuts.

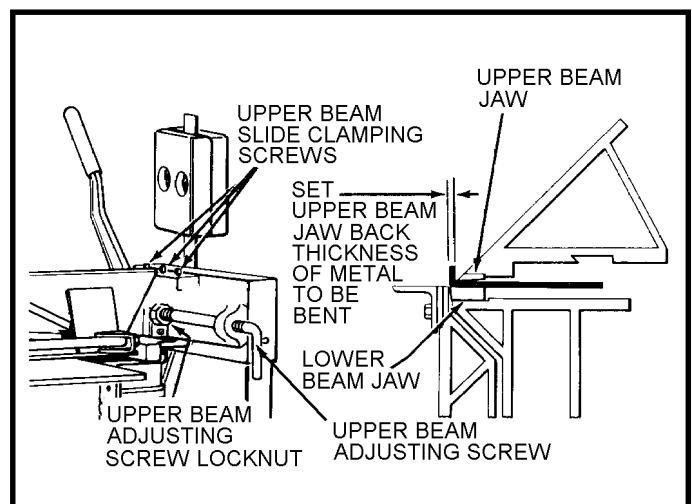


Figure 5. Adjustment of Brake Jaws for Material Thickness

## NO. 412 OPERATIONS MANUAL

### ADJUSTMENTS - FINE ALIGNMENT

1. A sample work piece, the entire length of the brake, should be clamped in place. Make a test bend by lifting the Apron a full 90°. Release metal from brake jaws and check for straightness.

### 2. ADJUSTMENTS FOR BOWING

(Refer to figure 7 for location of Truss Nuts).



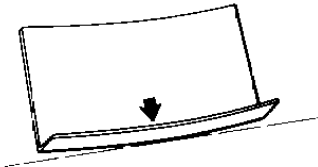
**PROBLEM:** Bows up.

**SOLUTION:** Release tension on Truss Nut (B).



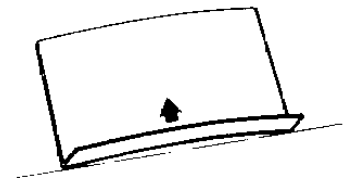
**PROBLEM:** Bows down.

**SOLUTION:** Tighten Truss Nut (B). Level the Apron with the Lower Beam Jaw (see figure 3).



**PROBLEM:** Bows toward operator.

**SOLUTION:** Release some tension on Truss Nut (A) (depending on your brake).



**PROBLEM:** Bows away from operator.

**SOLUTION:** Tighten Truss Nut (A) (depending on your brake).

### 3. ADJUSTMENT FOR UNEVEN ANGLE OF BEND

If 90° sample bend is true at both ends but less than 90° at center of piece, loosen Apron Mounting Bolts (figure 2) and lower the Apron approximately 1/32" by unscrewing the Apron Adjusting Screws. Retighten the Apron Mounting Bolts and tighten Truss Nut (C, figure 7) until both jaws of brake are flush at brake center (see figure 3).

### INCREASING JAW OPENING

The opening between the brake jaws may be increased to a maximum of 1 5/8". With the Clamping Levers in the unlocked position, turn the Lower Beam Lift Spring Rod Adjusting Nut (figure 2) at each end of brake downward until the desired opening is obtained.

### CAUTION

The lower beam lift springs support the weight of the entire lower beam assembly when the brake is unclamped. Always adjust the lower beam spring adjusting nuts with the brake in the unclamped position. If adjusted with the brake in the clamped position the beam, when unclamped, will drop rapidly downward causing the clamping handles to snap backwards.

## NO. 412 OPERATIONS MANUAL

### MAJOR BRAKE ALIGNMENT

Follow the procedure listed below if brake is badly out of alignment. A 30" length of one inch pipe will help attain necessary leverage when applied to the end of the wrench supplied with the brake.

1. Loosen all Truss Nuts (A, B, C, E, figure 7).
2. Tighten Truss Nut (B) until snug. Tighten an additional three complete turns.
3. Check Apron at the alignment points (X, figure 2) to see if it is flush with top of Lower Beam Jaw (see inset, figure 2). Up and down movement of the Apron is controlled by turning the Apron Adjusting Screw (figure 2) at each end of the Apron.
4. Tighten Truss Nut (C, figure 7) until Apron is flush with Lower Beam Jaw at alignment point (Y, figure 2).
5. Tighten Truss Nut (E, figure 7) as tight as possible.
6. Tighten Truss Nut (A) until the Upper Beam Jaw is straight and parallel in relation to the Lower Beam Jaw.

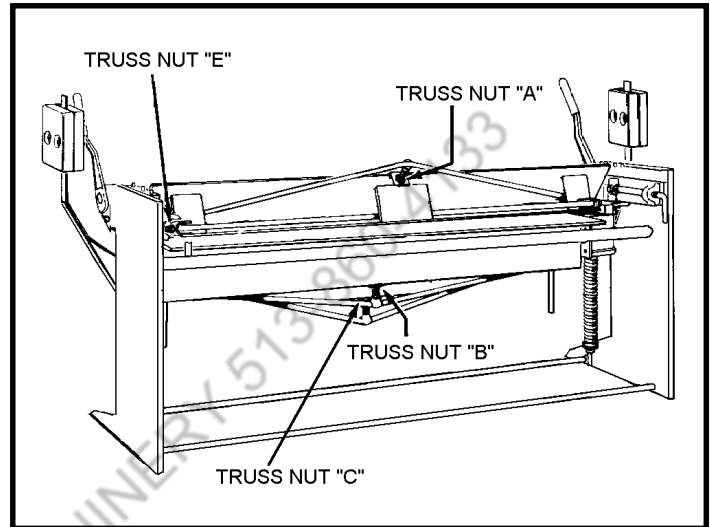


Figure 7. Rear View of Brake Showing Tension Adjustment Points

## NO. 412 OPERATIONS MANUAL

### STRAIGHT BENDING

Set Upper Beam Jaw back to thickness of metal to be bent. (See figure 5). Bends up to 135° may be achieved by raising the Apron until the desired angle of bend is obtained. (See figure 8).

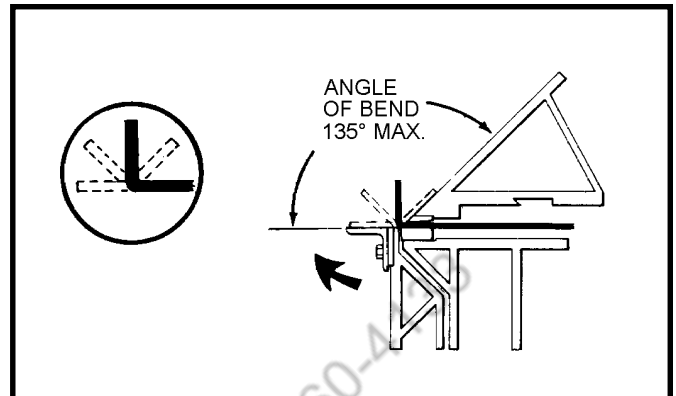


Figure 8. Straight Bending

### FLATTENED SEAM BENDING

Bend metal to full 135° angle as explained above (figure 8). Remove metal from between the jaws and reposition it against the Upper Beam as shown in figure 9. Lift Apron to flatten seam.

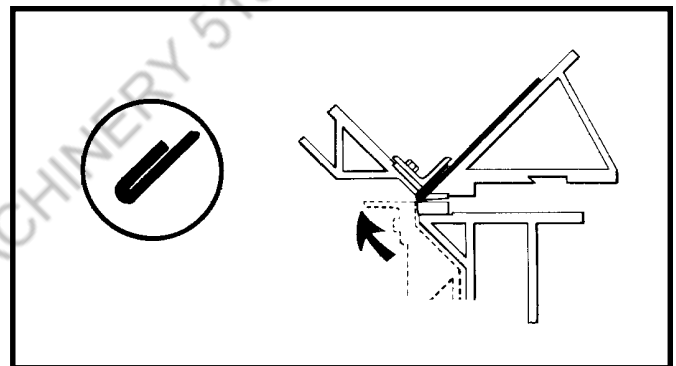


Figure 9. Flattened Seam Bending

### JOINTING

Bend metal piece to full 135° angle. Remove metal from between the jaws and reposition it against the Upper Beam in same manner as explained above. Lift Apron to complete bend. Do not flatten seam; but, allow for thickness of metal piece to be jointed.

The Roper Whitney No. 9 Button Punch Tool may be used to lock the two pieces together securely.

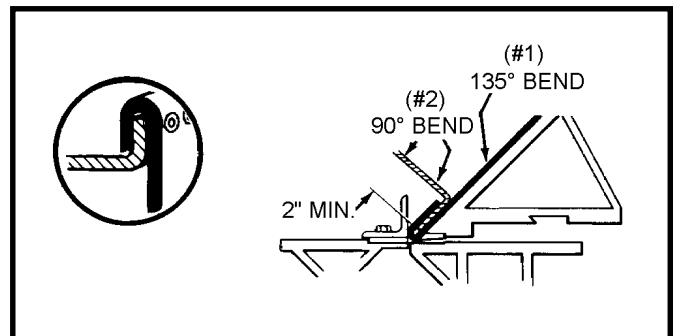


Figure 10. Jointing Two Metal Pieces

## NO. 412 OPERATIONS MANUAL

### MINIMUM REVERSE BENDING

Remove Apron Angle Iron Work Support and Apron Filler Plate (inset, figure 2). This permits 1/4" reverse bends to be made on all brakes except Model Nos. 812, 1012, and 1214 will make a reverse bend of 3/8".

### NOTE

When the Apron Angle Iron Work Support and Apron Filler Plate is removed, the brake capacity is reduced by 4 gauges.

To accomplish a minimum reverse bend, a metal lip is first bent to a 90° angle. Metal piece is removed and repositioned between the jaws as shown in Step 1 (figure 11). Raise Apron 90° to complete bend, Step 2 (figure 10).

### REPEAT BENDS

Repeat bends can be made easily by using the apron gauge illustrated in figure 12. Make the first bend to the desired degree and clamp apron gauge bar stop collar using set screw in position. Apron will contact stop and insure accurate repeatability of bend.

### TINNER'S MOULDING FORMS

One set of five standard sizes of Tinner's Mould; 5/8", 1", 1 5/8", 2 1/2", and 3" is available for all sizes of Combination Bending Brakes. Remove the Apron Angle Iron Work Support and position the forming mold on the lip of the Apron (see figure 13). Use a hammer to tap the moulding form clamps through the holes in the Apron of the brake. Metal piece part is wiped over the moulding form manually to obtain desired radius.

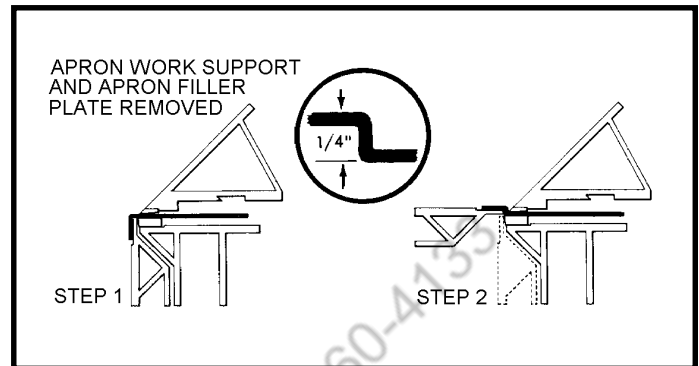


Figure 11. Minimum Reverse Bending

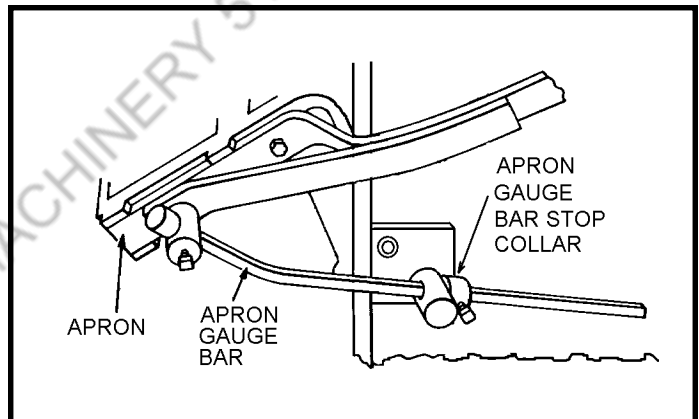


Figure 12. Apron Gauge

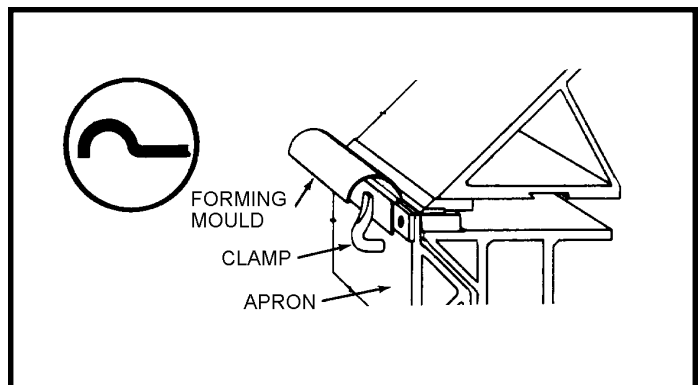


Figure 13. Standard Tinner's Forming Mould

## NO. 412 OPERATIONS MANUAL

### RADIUS FORMING

Radius Former Bars are available for all sizes of Combination Bending Brakes. These bars are available in sizes from 3/32" to 1" in increments of 1/32". Sizes 1", 1 1/2", 2", and 2 1/2" are available. The number of Radius Holder Fingers required depends upon the length of the brake; 3 Holder Fingers are required for a 4 foot brake, 4 are required for a 6 foot brake, 5 are required for an 8 foot brake, and 6 for a 10 foot brake. Holder Fingers are all alike for all brake lengths. Shorter Radius Former Bars may be installed on longer brakes if desired.

### INSTALLING RADIUS FORMER BARS:

1. Assemble the necessary number of Radius Finger Holders to the Radius Forming Bar as shown in figure 14.
2. Increase the distance between the brake jaws by turning the Lower Beam Lift Spring Rod Adjusting Nut (figure 2) at each end of brake downward as far as it will go.

### CAUTION

The lower beam lift springs support the weight of the entire lower beam assembly when the brake is unclamped. Always adjust the lower beam spring adjusting nuts with the brake in the unclamped position. If adjusted with the brake in the clamped position the beam, when unclamped, will drop rapidly downward causing the clamping handles to snap backwards.

3. When using a 1 1/2" or larger Radius Forming Bar, an Auxiliary Lower Beam Jaw is required and should be inserted in position behind the lower Beam Jaw (figure 15).
4. Loosen the Upper Beam Slide Clamping Screws (figure 5) and Upper Beam Adjusting Screw Lock Nuts at both ends of brake. Move the entire Upper Beam back far enough to accommodate the assembled Radius Former Finger and Bar (figure 15).

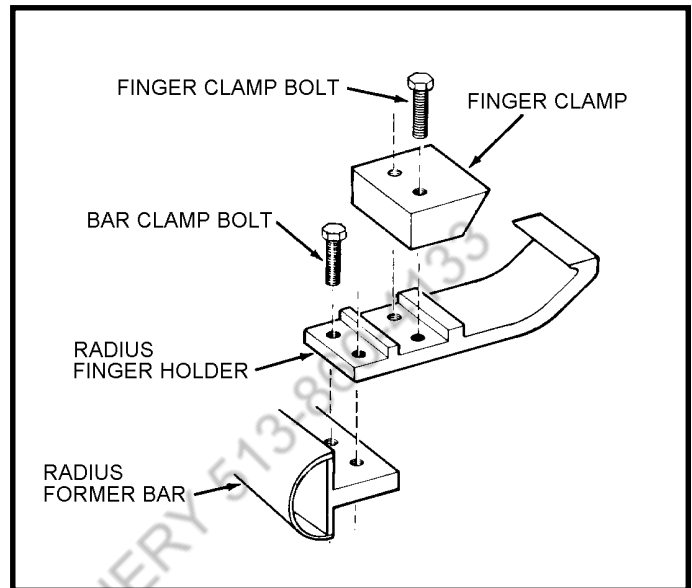


Figure 14. Assembling Radius Formers

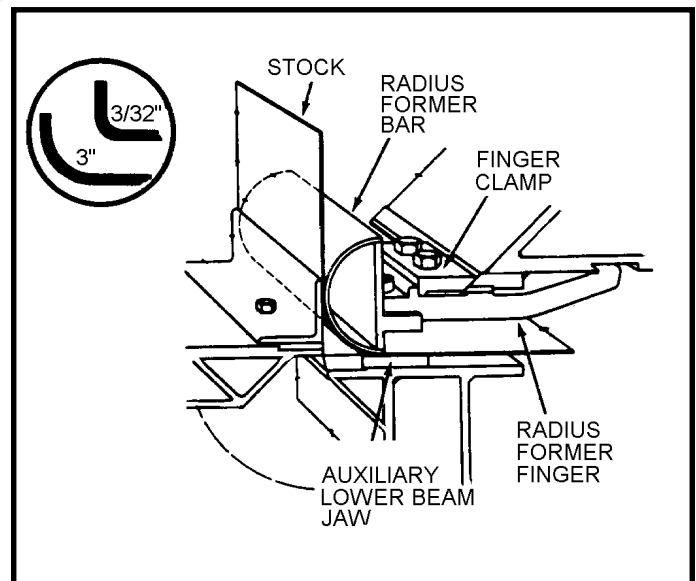


Figure 15. Radius Bending



## NO. 412 OPERATIONS MANUAL

5. Loosen Finger Clamp Bolts and hook Holder Finger into dove tail in Upper Beam. Position lip of Clamp over Upper Beam Jaw and tighten Finger Clamp bolts securely.
6. Move Upper Beam back or forward as necessary until front edge of Radius Former Bar is back from the Lower Beam Jaw the thickness of the metal to be bent. (see figure 15). Tighten all Upper Beam Slide Clamping Screws and Adjusting Screw Lock Nuts.
7. With Clamping Lever in unlocked (up) position, adjust Clamping Lever Turnbuckles (figure 4) and Lower Beam Lift Spring Rod Adjusting Nuts as necessary to obtain desired clamping pressure. Pressure should be firm enough so metal will not slip when clamped.

### CAUTION

The lower beam lift springs support the weight of the entire lower beam assembly when the brake is unclamped. Always adjust the lower beam spring adjusting nuts with the brake in the unclamped position. If adjusted with the brake in the clamped position the beam, when unclamped, will drop rapidly downward causing the clamping handles to snap backwards.

### BOX AND PAN BENDING

Box Fingers are available for all Combination Bending Brakes in widths from 1" through 6" in increments of 1/2", and an 8" width. They are made in 6" and 8" depths. The size and number of Box Fingers required can easily be determined as follows:

1. Largest dimension of box or pan determines the quantity of Box Fingers required.
2. Depth of box or pan determines the Box Finger depth.

Example: To make a box 10" wide x 15" long x 7" deep; use 8" deep Box Fingers in following combinations:

2-4" wide Box Fingers (or 1-8" wide)

1-2" wide Box Finger

10" bend can now be made.

Add 1-5" wide Box Finger

15" bend can now be made.

Any combination of Box Fingers that add up to the required total may be used.

### INSTALLING BOX FINGERS

With Clamping Lever in unlocked position, proceed as follows:

1. Turn Lower Beam Lift Spring Rod Adjusting Nuts (figure 2) down to bottom at both ends of brake.
2. Loosen all Upper Beam Slide Screws and Upper Beam Adjusting Screw Lock Nuts. Move Upper Beam to the rear by turning Upper Beam Adjusting Screws back to accommodate either 6" or 8" depth fingers.

## NO. 412 OPERATIONS MANUAL

3. Open Clamping Lever Turnbuckles (figure 4). A rod may be inserted through holes in Turnbuckles for ease in turning.
4. Loosen Finger Clamp Bolts (figure 16) and hook finger into dove tail of Upper Beam. Position lip of Clamp over Upper Beam Jaw and tighten Finger Clamp Bolts securely.
5. Move Upper Beam back or forward as needed so that finger bending nose is  $1/64$ " back from front edge of Lower Beam Jaw (figure 17). Use Upper Beam Adjusting Screws (figure 5).
6. Tighten Upper Beam Slide Clamping Screws and Upper Beam Adjusting Screw Lock Nuts.
7. Adjust Clamping Lever Turnbuckles and Lower Beam Lift Spring Rod Adjusting Nuts to attain proper clamping pressure. Pressure should be firm enough so metal will not slip when clamped.

### NOTE

When using partial quantities of fingers, always mount fingers in the middle of brake to equalize strain. When bending with fingers, capacity is 2 gauges lighter. A 14 gauge brake with Box Fingers installed will handle 16 gauge or lighter material only.

### FINGER ALIGNMENT

If bottom of Box Fingers are not flush, align as follows:

1. Choose a 4" to 6" width finger and set the Finger Leveling screws (figure 16) until end of each screw protrudes  $1/64$ " above mounting surface of the finger. Lock the screws in this position by securely tightening Finger Leveling Lock Nuts.
2. This finger is now the master finger and should be mounted in the center of the Upper Beam. Be sure that finger is square when tightening Finger Clamp Bolts. All other fingers are now adjusted to this master finger.

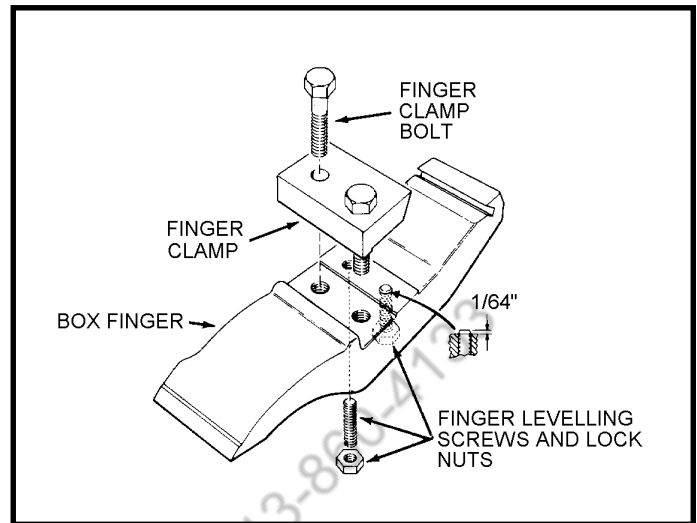


Figure 16. Box and Pan Finger

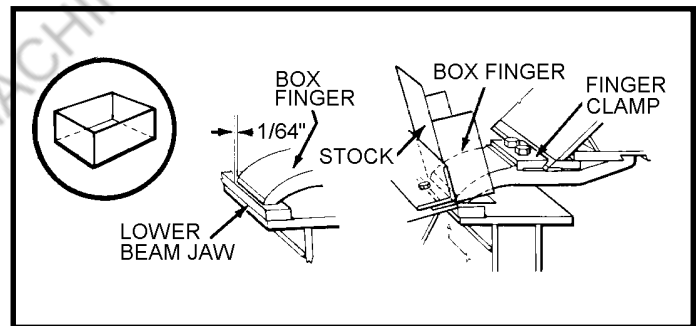


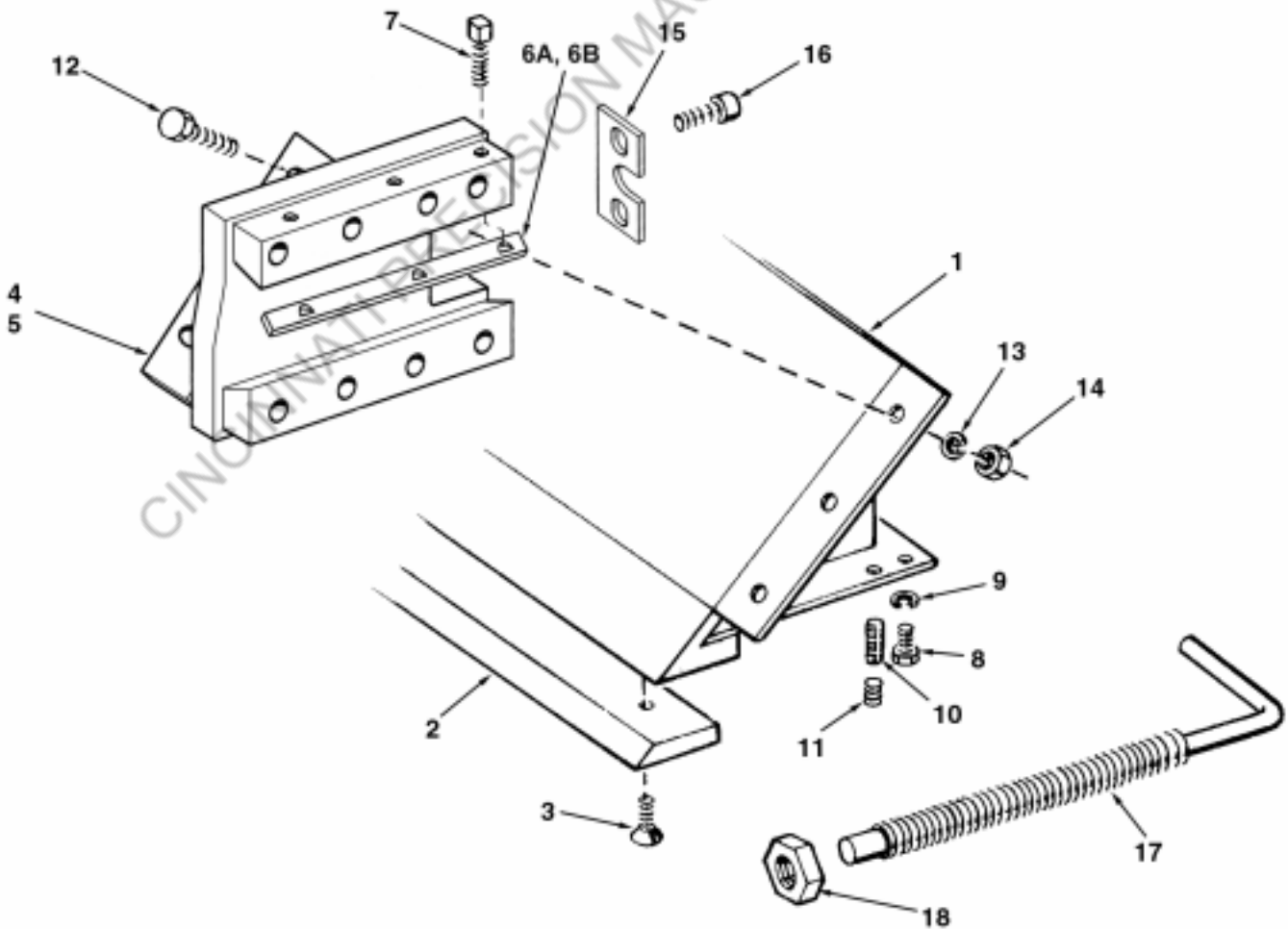
Figure 17. Box and Pan Bending

## NO. 412 OPERATIONS MANUAL

3. Set Finger Leveling Screws of remaining Box Fingers approximately the same as master finger. Mount finger on brake on right side of master finger. Do not allow side of finger to touch side of master finger (allow about 1/32"). Tighten Finger Clamp bolts and check to see if bottom of finger is flush with bottom of master finger. Adjust up or down as required by turning Finger Leveling Screws in or out. This can be done from rear of brake while finger is clamped in place. Finger Clamp Bolts may require slight loosening at times while Finger Leveling Screws are turned. Be sure Finger Clamp bolts are securely tightened before checking new adjustment.
4. When adjustment is correct, remove finger and remount on left side of master finger and check again. If bottom edges are not level, correct as in step 3. Tighten Finger Leveling Lock Nuts securely.
5. Remove this finger and set aside. Then proceed to adjust all other fingers in the same manner.
6. When all fingers have been adjusted to master finger, they may be assembled on nose of brake in any combination and they will all align with each other.

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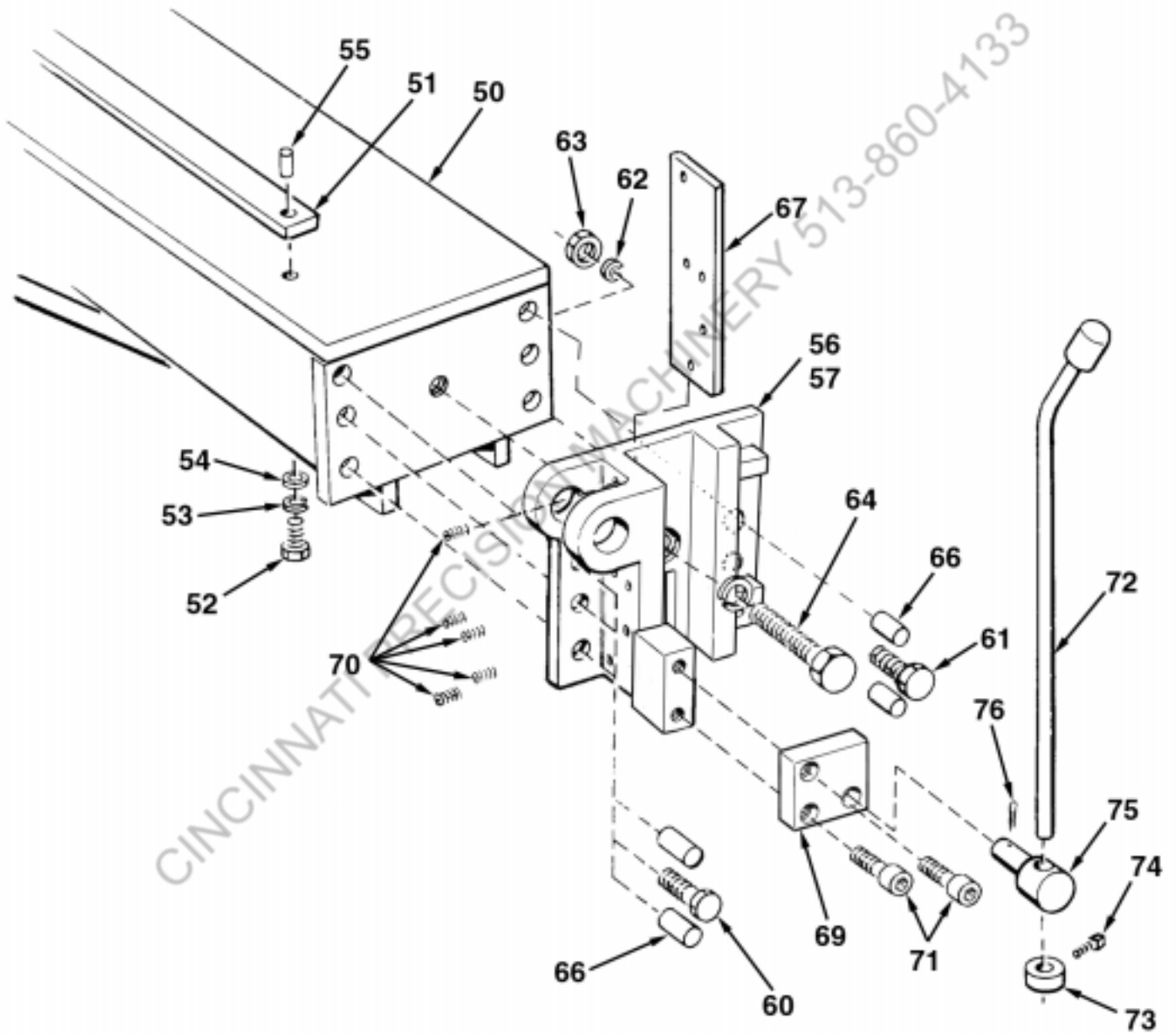
### NO. 412 UPPER BEAM ASSEMBLY PARTS IDENTIFICATION CHART



**NO. 412**  
**UPPER BEAM ASSEMBLY**  
**PARTS IDENTIFICATION LIST**

ITEM NO.	PART NAME	PART NO.	OLD PART NO. (Ref. Only)	QTY.
1	Upper Beam	756020371	412-1M	1
2	Upper Beam Jaw	756020200	416-13	1
3	Upper Beam Jaw Mounting Screws 5/16-18 x 3/4 Flat Hd Soc Cap	613012131	WS2529	9
4	Upper Beam Slide, RH	756730355	412-6	1
5	Upper Beam Slide, LH	756730356	412-7	1
6A	Upper Beam Slide Gib, RH	756400357		1
6B	Upper Beam Slide Gib, LH	756400358		1
7	Upper Beam Slide Set Screws 1/2-13 x 2 1/4 Square Head	627012280		6
8	Upper Beam Bottom Plate Screw 1/2-13 x 2" Hex Head	601012279	WS67	4
9	Upper Beam Bottom Plate Screw Washer 1/2 Lock	679033107	WS1731	4
10	Bottom Adjusting Screw 3/8-16 x 1" Socket Set	621012175	WS850	6
11	Bottom Adjusting Screw Lock Screw 3/8-16 x 3/16 Socket Set	656012621	WS1926	6
12	Upper Beam to Slide Mounting Screw 5/8-11 x 2 1/4 Hex Head	601012372		6
13	Upper Beam to Slide Mnt Screw Lock Washers	679033109	WS1733	6
14	Upper Beam to Slide Mounting Screw Nuts 5/8-11 Hex Jam	643023009	WS1358	6
15	Upper Beam Adjusting Screw Plates	756060263	416-29	6
16	Upper Beam Adjusting Screw Plate Mnt Screws	601012173	WS31	4
17	Upper Beam Adjusting Screw	756650261	416-35	2
18	Upper Beam Adjusting Screw Nut	756560262	416-67	2

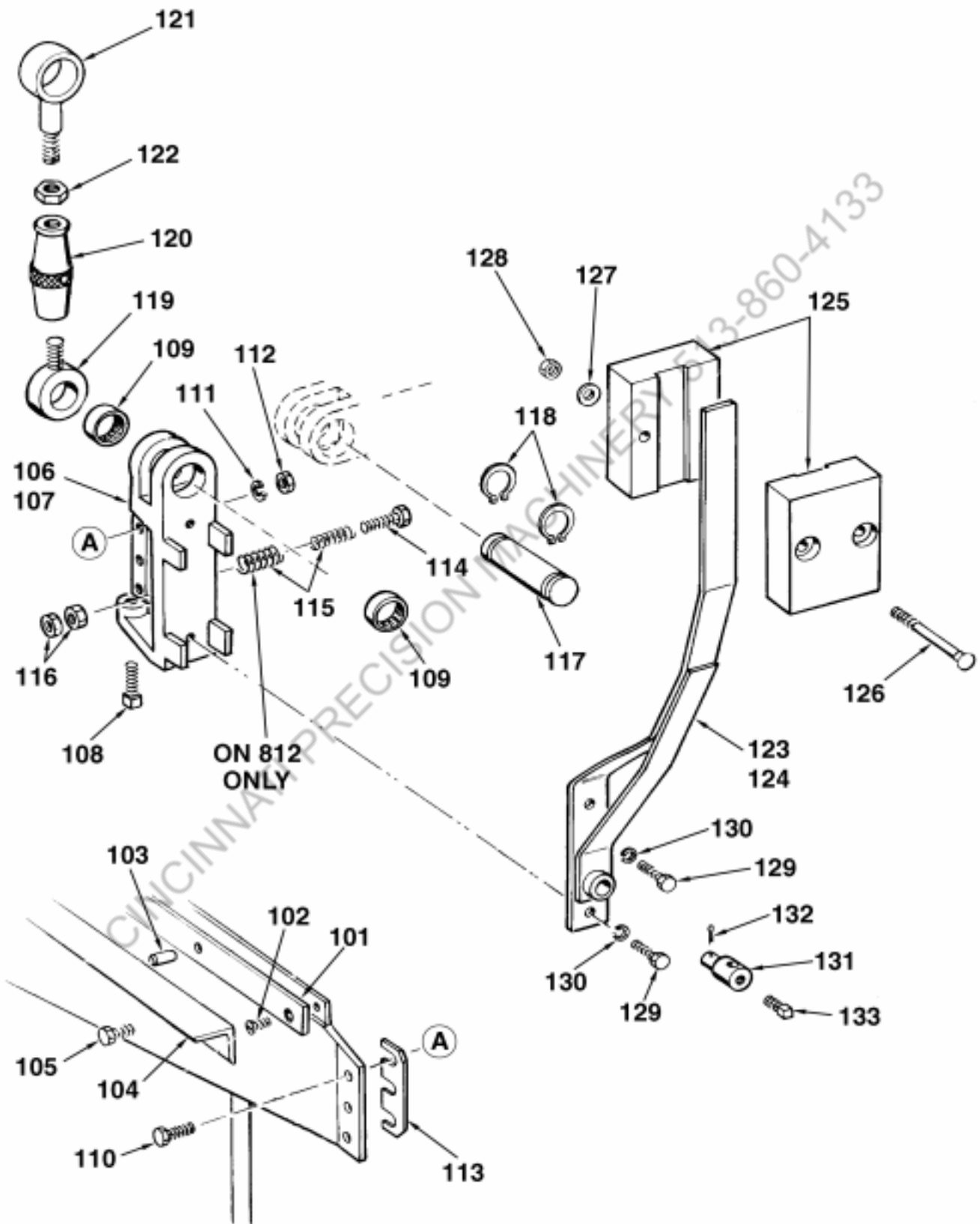
NO. 412  
LOWER BEAM ASSEMBLY  
PARTS IDENTIFICATION CHART



**NO. 412**  
**LOWER BEAM ASSEMBLY**  
**PARTS IDENTIFICATION LIST**

ITEM NO.	PART NAME	PART NO.	OLD PART NO. (Ref. Only)	QTY.
50	Lower Beam	756020372	412-2M	1
51	Lower Beam Jaw	756020213	416-27	1
52	Lower Beam Jaw Mounting Screw 5/16-18 x 1 1/8	601012134	WS153	9
53	Lower Beam Jaw Mnt Screw Lock Washer 5/16 Lock	679033104	WS1728	9
54	Lower Beam Jaw Mnt Screw Flat Washer 5/16 Flat	678033104	WS1703	9
55	Flat Head Rivet	600000267		4
56	Lower Beam Bracket RH	756200359	412-29	1
57	Lower Beam Bracket LH	756200360	412-30	1
60	Lower Beam Bracket Mounting Screw	756650250	416-88	2
61	Lower Beam Bracket Mounting Screw 5/8-11 x 2 1/2 Hex Head	601012373	WS96	2
62	Lower Beam Bracket Mnt Screw Lock Washer 5/8 Lock	679033109	WS1733	2
63	Lower Beam Bracket Mounting Screw Nut 5/8-11 Hex Full	643023009	WS1358	2
64	Lower Beam Bracket Mounting Screw 5/8-11 x 4 1/2 Hex Head	601012381	WS103	2
65	Lower Beam Bracket Lock Washer 5/8 Lock	679033109	WS1733	2
66	Lower Beam Locating Pins	756160323	412-31	8
67	Lower Beam Bracket Gibs	756400363	412-32	2
69	Apron Stop Rod Bracket	756200365		1
70	Lower Beam Bracket Gib Screws 3/8-16 x 1" SSCP	621012634		10
71	Socket Head Cap Screw, 1/2-13 x 1 1/4	611012273		2
72	Apron Gauge Bar	756130264	416-43	1
73	Apron Gauge Bar Stop Collar	756260265	416-54	1
74	Apron Gauge Bar Stop Collar Set Screw 3/8-16 x 3/4 Square Head	633012173	WS628	1
75	Apron Stop Swivel Pin	756160258	416-40	1
76	Apron Stop Swivel Pin Cotter Key 3/32 x 1 1/4	600073517	WS1528	1

**NO. 412  
APRON ASSEMBLY  
PARTS IDENTIFICATION CHART**



**NO. 412**  
**APRON ASSEMBLY**  
**PARTS IDENTIFICATION LIST**

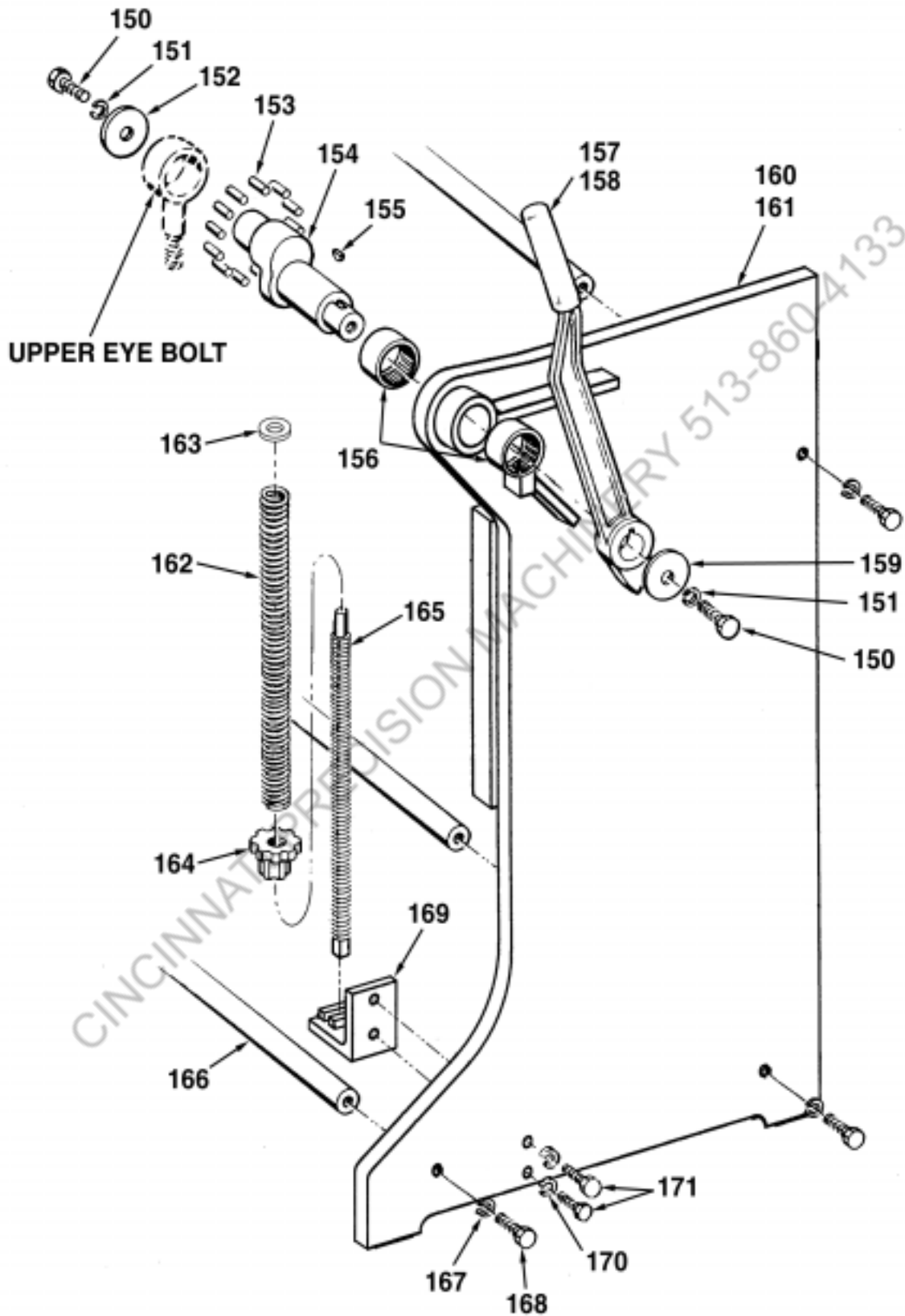
ITEM NO.	PART NAME	PART NO.	OLD PART NO. (Ref. Only)	QTY.
100A	Apron Complete (consists of items 100-105)	756020373	412-3M	1
100	Apron (Available only as assembly 756020381 above)			
101	Apron Jaw	756020236	416-22R	1
102	Apron Jaw Screws 5/16-18 x 5/8 Socket Flat Head	613012130		9
103	Apron Jaw Dowel Pins, 1/4 Dia. x 1/2	600053314		4
104	Apron Work Support	756180237	416-45	1
105	Apron Work Support Screw 5/8-11 x 3/4 Hex Head	601012361	WS145	4
106A	Apron Hinge RH Complete (Consists of items 106, 108 & 109)	256990004		1
106	Apron Hinge RH (Available only as assembly 256990004 above)			1
108	Apron Adjusting Screws 1/2-13 x 1 3/4 Sq Head	633012277	WS657	1
109	Apron Hinge Bearings	656235000	416-97	2
107A	Apron Hinge LH Complete (Consists of items 107, 108 & 109)	256990005		1
107	Apron Hinge LH (Available only as assembly 256990005 above)			1
108	Apron Adjusting Screws 1/2-13 x 1 3/4 Sq. Head	633012277	WS657	1
109	Apron Hinge Bearings	656235000	416-97	2
110	Apron Hinge Mounting Bolts 5/8-11 x 2" Hex Head	601012371	WS94	6
111	Apron Hinge Mounting Bolt Washers 5/8 Lock	679033109	WS1733	6
112	Apron Hinge Mounting Bolt Nuts 5/8-11 Hex Full	643023009	WS1358	6
113	Apron Hinge Shims	756720369	412-27	As Req.
114	Apron Bumper Spring Screw 3/8-16 x 2" Hex Head	601012183	WS37	2
115	Apron Bumper Spring	656184571	416-41	2
116	Apron Bumper Spring Screw Nuts 3/8-16 Hex Jam	649023005	WS1333	4
117	Apron Hinge Pin	756160242	416-31	2
118	Apron Hinge Pin Retaining Rings, 1 3/8	656164310	WS1974	4
119	Lower Eyebolt	756340267	416-25	2
120	Turnbuckle	756260268	416-26	2



**NO. 412**  
**APRON ASSEMBLY**  
**PARTS IDENTIFICATION LIST**

ITEM NO.	PART NAME	PART NO.	OLD PART NO. (Ref. Only)	QTY.
121	Upper Eyebolt	756340269	416-78	2
122	Turnbuckle Lock Nut, 1/8 Hex Jam	649023012	WS1340	2
123	Counterweight Arm RH	756030376	412-24	1
124	Counterweight Arm LH	756030375	412-41	1
125	Counterweights	590041618	416-18	4
126	Counterweight Bolts, 1/2-13 x 3 Carriage	639012283	WS2103	4
127	Counterweight Washers, 1/2 Flat	678033107	WS1706	4
128	Counterweight Nuts, 1/2-13 Square	659023008	WS1386	4
129	Counterweight Arm Mounting Screw	601012273	WS64	4
130	Counterweight Arm Mounting Screw Washer 1/2 Lock	679033107	WS1731	4
131	Apron Stop Swivel Pin	756160280	416-38	1
132	Apron Stop Swivel Pin Cotter Key, 3/32 x 1 1/4	600073517	WS1528	1
133	Apron Stop Swivel Set Screw 3/8-16 x 5/8 Square Head	633012172	WS627	1

**NO. 412  
HEAD AND LEG ASSEMBLY  
PARTS IDENTIFICATION CHART**



**NO. 412**  
**HEAD AND LEG ASSEMBLY**  
**PARTS IDENTIFICATION LIST**

ITEM NO.	PART NAME	PART NO.	OLD PART NO. (Ref. Only)	QTY.
150	Washer Mounting Screw 3/8-16 x 3/4 Hex Head Cap	601012173		4
151	Washer Mounting, 3/8 Lock	679033105	WS1729	4
152	Upper Eye Bolt Washer	756830271	416-80	2
153	Roller Bearings	600255207	416-39	50
154	Brake Crank	756210270	416-77	2
155	Crank & Clamping Lever Key	600123927		2
156	Brake Crank Bearings	656235014	416-98	4
157	Clamping Lever RH	756030273	416-16	1
158	Clamping Lever LH	756030274	416-17	1
159	Handle Washer	678033117	40-9	2
160	End Frame RH	756140351	814-100	1
161	End Frame LH	756140352	814-101	1
162	Lower Beam Lift Springs	656184570	416-23	2
163	Washer, Lift Spring	756830368	814-110	2
164	Lower Beam Lift Spring Rod Adj Nuts	756560257	416-36	2
165	Lower Beam Lift Spring Rods	756030367	814-135	2
166	Tie Rod	756030374	412-107	3
167	Tie Rod Mounting Screw Lock Washer, 1/2"	679033107	WS1731	6
168	Tie Rod Mounting Hex Head Screw 1/2-13 x 1 1/2	601012275		6
169	Bracket, Lift Spring	756200366	814-104	2
170	Lock Washer, 1/2"	679033107	WS1731	4
171	Hex Head Cap Screw, 1/2-13 x 1 1/2	601012275		4