



1-805 323-8961 J.C. OR MARK

TECHNICAL MANUAL

3-ROLL INITIAL PINCH MACHINE

For Service Call: (805)323-8961
TOLL FREE (800)824-4610 OUTSIDE CA

J.M.MONTGOMERY MFG INC

314 Yampa St., Bakersfield, CA 93307

N O T I C E

This machine is totally hydraulic operated.

Hydraulic fittings do work loose. When this machine was run at the factory before shipping all fittings were tight and not leaking.

We find in shipping some fittings will work loose. AT START UP
ALL FITTINGS SHOULD BE CHECKED FOR TIGHTNESS.....

It is the owner's responsibility to periodically check and maintain fittings because they will vibrate loose.

WARNING

To prevent serious bodily injury
NEVER place any part of your body
near moving parts of this
machine .

NEVER Wear loose clothing that
could become tangled or
caught in moving parts.

NEVER Operate or maintain this
machine without proper
instructions.

It is the employers responsibility to implement
the above and also to provide proper guards,
devices or means that may be necessary or
required for any particular use ,operation,
set up or service .

DO NOT REMOVE THIS SIGN FROM MACHINE

ALL WARRANTED REPLACEMENT PARTS ARE FOB BAKERSFIELD, CALIFORNIA.

BEARINGS ARE NOT COVERED BY WARRANTY IF THEY HAVE NOT BEEN
GREASED.....

IF MACHINE DOESN'T START.....

IF MACHINE IS HOOKED UP BUT WILL NOT START:

CHECK THE LIMIT SWITCH ATTACHED TO THE FRONT SAFETY CABLE....SOMETIMES DURING SHIPPING THE CABLE WILL STRETCH OR LOOSEN. THIS WILL TRIP THE LIMIT SWITCH AND CAUSE THE MACHINE NOT TO WORK AT ALL. REMOVE FRONT COVER...THE LIMIT SWITCH IS IN FRONT WITH CABLE ATTACHED AND IS SPRING LOADED. IT MIGHT BE NECESSARY TO RESET THIS SAFETY SWITCH.

FORM ROLL ADJUSTMENT

THE FORMING ROLL IS ADJUSTABLE TO FACILITATE CONE ROLLING AND ROLL PARALLELING. ROLL IS ADJUSTED BY ROTATING LEVER VALVE MOUNTED IN BACK OF MACHINE ON DRIVE CABINET. ROTATING THE VALVE 90° WILL LOCK ROLL ON DRIVE END, ALLOWING ROLL ON DROP ARM END TO ADJUST UP OR DOWN BY FORMING ROLL CONTROL VALVE. ONCE ROLL IS OFFSET OR PARALELLED AS DESIRED, ROTATING THE VALVE BACK 90° WILL MAINTAIN ROLL AS SET.

(2) Re-rolling —

If the cylinder is rolled, handled, and welded properly to begin with, re-rolling should not usually be necessary. However, if the cylinder is improperly formed and already welded, some re-rolling may be necessary. It would be wise for the fabricator to discuss limitations of re-rolling, if this is the process he has encountered due to improper machine operation or welding technique. In most cases, once the cylinder is welded, in order to re-roll, the fabricator will require slightly more capacity than he will for initial rolling. Re-rolling is hard on a machine, primarily because the welded ring has no open end that can move as the diameter changes; and, therefore, stresses must be absorbed back within the plate. The fabricator should be certain to ask the manufacturer what the implications of re-rolling are and if the manufacturer has personnel who can show the fabricator how to properly operate the machine to eliminate this re-rolling process.

SAFETY

These instructions provide necessary and proper information for persons engaged in the operation and maintenance of this Montgomery plate bending roll. Any person operating or maintaining the machine must be familiar with the information contained herein. Adherence to the precautions, procedures and maintenance practices described should ensure long and satisfactory use of your plate bending roll. Make sure all safety features of the machine work properly at all times. There should never be any servicing work done on the machine unless the main disconnect switch is OFF.

Braking on this hydraulic machine is dynamic. The "Stop" button on the control will stop the machine immediately. A safety cable running across the front and back of the plate roll is an EMERGENCY SHUT-OFF AND IMMEDIATELY STOPS THE ROLLS WHEN IT IS PULLED. The limit switch attached to this safety cable must be maintained in proper adjustment at all times for instant stopping of the rolls if this becomes necessary. The electric control panel is completely over-load and under-voltage protected.

WARNING: Never stand in the way of the drop arm when it is being operated. Make sure no persons' hands are near the top roll when closing the drop arm.

PERSONS OPERATING A PLATE BENDING ROLL FOR THE FIRST TIME SHOULD THOROUGHLY FAMILIARIZE THEMSELVES WITH THE OPERATING CONTROLS AND

then

PROCEED CAUTIOUSLY

in rolling material.

WARNING: To prevent serious bodily injury never place any part of your body near moving parts of this machine. Never wear loose clothing that could become entangled or caught in moving parts. Never operate or maintain this machine without proper instructions.

IT IS THE EMPLOYERS RESPONSIBILITY TO IMPLEMENT THE ABOVE AND ALSO TO PROVIDE PROPER GUARD DEVICES OR MEANS THAT MAY BE NECESSARY OR REQUIRED FOR ANY PARTICULAR USE, OPERATION, SET UP OR SERVICE.

INSTALLATION

Special foundations are not required for Montgomery plate bending rolls. Foundations should however be level and flat and sufficiently strong to withstand the weight of the machine. Bolting machine to floor is not necessary.

When uncrating machine remove all coverings and straps. Clean rollers with kerosene. Check for loose or missing bolts. Check all bolts for tightness especially before initial start-up. They can loosen in shipping.

Incoming electric power conduit can be of the flexible or rigid type. Leave room for door to open and close around machine. When positioning in shop, allow space for feeding material into plate bending roll. Allow space at side of drop arm for removal of completed material. Allow space at end for opening and servicing of electrical enclosure. Allow room for drop arm to open.

MAKE SURE PUMP IS PHASED FOR CORRECT DIRECTION. Electrical requirements are stated on the metal tag on the cabinet of the machine. If for any reason the voltage requirements change; for example from 230v to 460v, then the electrician should check fuses and heaters to make sure they are the correct size.

WITH MAIN POWER OFF Check lubricating points making sure all grease fittings all around the machine are lubricated. Make sure

all grease lines are secure.

IT REQUIRES ONLY A MINUTE OR TWO TO LUBRICATE YOUR MACHINE, BUT MAY SAVE HOURS IN DOWN TIME.

Occasionally during shipping the safety cable around the machine can be "tripped", i.e., stretched or become loose. This will cause the limit switch not to work properly. There will be no power to the machine. If machine is all hooked up and there is no power, check the front limit switch. Remove front cover - the limit switch is in front with cable attached and is spring loaded. It might be necessary to re-set this safety switch.

LUBRICATION

When the machine is new or when the operator plans to use the machine all day it should be lubricated twice each day, making sure not to miss any of the grease fittings all around the machine. When your machine first arrives make sure your plant maintenance person familiarizes himself with all the lubricating points, periodically removing the front cover to inspect gearing. Check at this time to make sure all grease lines are secure. On hydraulic models check lines for leaks and any loose bolts. Grease the bearings on the drop end. The zerk fittings are very visible. At the bottom of the drop end are two zerk fittings..on the gear end the zerk fittings are all in a line to grease the whole gear end.

All of these procedures should be done with the MAIN POWER OFF. We recommend 2 - 3 shots of lithium base molydisulfide grease with a drop point of 450 degrees.

IT REQUIRES ONLY A MINUTE OR TWO TO LUBRICATE YOUR MACHINE, BUT MAY SAVE HOURS IN DOWN TIME.

FIRST OR TOP ZERK GREASES
 THE TOP ROLL BEARING BLOCK
 SECOND OR MIDDLE ZERK GREASES
 THE PINCH ROLL BEARING BLOCK.
 THIRD OR BOTTOM ZERK LUBES
 THE FORM ROLL BEARING BLOCK.

ZERK LOCATED IN THE END OF
 ROLL FOR DROP-ARM BEARING.

HOLE IN BEARING HOUSING BEHIND
 DROP-ARM AND ZERK IN BEARING
 BLOCK TO BE ALIGNED BEFORE
 GREASING.

HOLE IN BEARING HOUSING AND
 ZERK IN BEARING BLOCK MUST BE
 ALIGNED FOR GREASING.

ZERK ON EACH DROP-ARM GUIDE
 FOR GREASING SWING PIN.

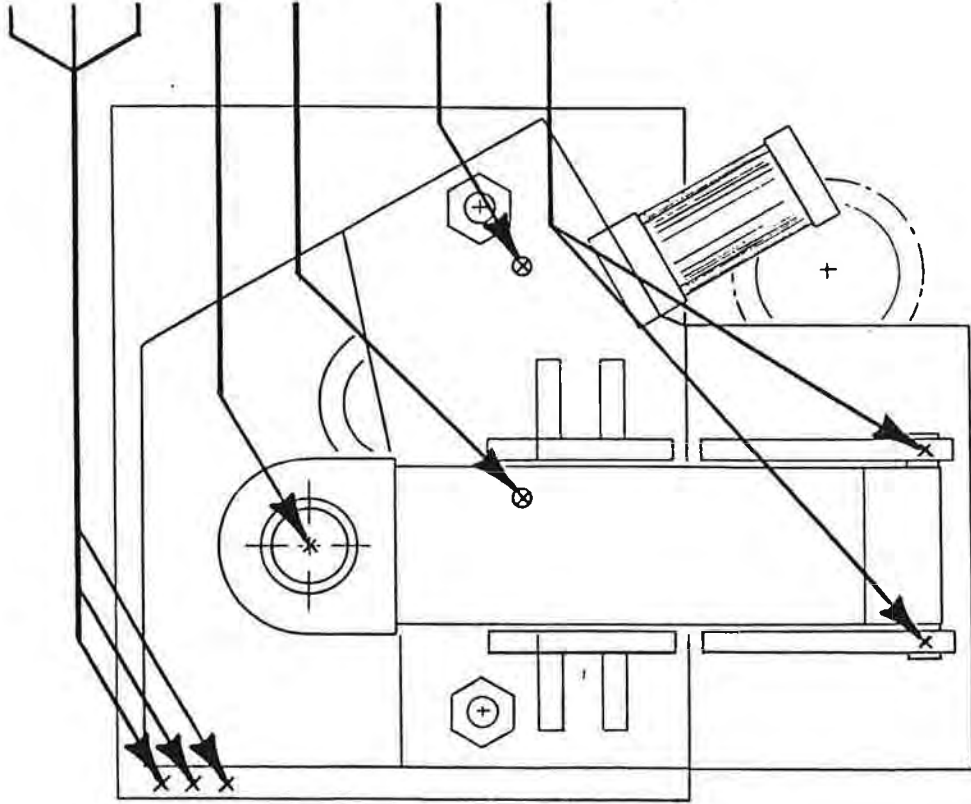
NOTE:

BEARING HOUSING
 SLIDES SHOULD BE GREASED
 BY HAND PERIODICALLY TO
 INSURE THE SLIPPAGE OF THE
 BEARING BLOCKS.

DROP-ARM HEAD
 SHOULD BE LIGHTLY GREASED
 TO KEEP IT FROM STICKING TO
 THE ROLL.

NOTE:

THE HECO 200 SPEED REDUCER
 ON YOUR MONTGOMERY PLATE
 BENDING ROLL IS LUBRICATED
 AS AN INTEGRAL PART OF
 THE HYDRAULIC SYSTEM AND
 NEEDS NO FURTHER LUBRICATION.



DATE	BY	REVISION
MONTGOMERY MANUFACTURING		
LUBRICATION DIAGRAM		
DATE	BY	REVISION

OPERATING INSTRUCTIONS

CAPACITY - The machine is rated on the capacity to bend mild steel approximately two times the top roll diameter in several passes. All capacities are based on 60,000 psi tensile strength steel.

MONTGOMERY BENDING ROLLS - Slip roll forming and plate bending machines are intended for curving sheet metal and plates and for forming cylinders from these. Machines are initial pinch type, sometimes called pinch rolls. The front rolls, top and bottom, are the pinch rolls. Top roll, when machine is closed, is in a fixed position. Bottom roll adjusts up and down to suit thickness of material. Rear or bending roll adjusts up and down at an angle to produce desired radius or curvature.

To Adjust Bottom Feed Roll: {raise or lower it} Turn the adjusting wedge screw in frame under each end of roll. The bottom feed roll adjusts up or down to provide proper space between rolls. Most rolls are crowned - adjust in center of roll. Space should be wide enough for material to pass freely through these rolls when rolls are turned on.

WARNING

(Forcing material through the feed rolls without sufficient clearance for thickness of material may result in serious damage to the machine.) Position of rear roll determines the amount of curve or radius formed in sheet metal or plate. To decrease the radius, raise the rear roll; to increase radius,

lower the rear roll. No set rule may be applied for setting rear roll for any desired radius, since variations in stiffness of different lots of metal will affect this setting. The numbered roll position indicator found on all machines therefore has no absolute significance. The indicator will however permit operator to save time in returning to useful predetermined settings.

TO FORM THE MATERIAL: Insert the sheet or plate from the front of the machine between the two feed rolls {top and bottom rolls}. Then depress "Forward" button. This will feed the sheet through to the rear roll which will bend the sheet upward thereby forming the curve or cylinder. Decrease or increase radius being formed by adjusting rear roll as described above. The operator may make a template having the desired curve on one edge. He can then make tests until the curve being formed matches the template.

FLAT SPOTS: All initial type bending rolls leave a slight flat area on the starting edge of the sheet. This can be reduced by pre-forming. Feed material in from rear of machine and roll it 4 or 5 inches. Bring material to front of machine and start pre-formed edge through pinch rolls.

LONGITUDINAL GROOVES: In order to roll small diameters the rear roll has a longitudinal starting groove to pick up and start material through machine. The pinch roll has a groove for aligning material in the rolls.

SMALLEST CYLINDERS are obtained by rolling material through the machine in one pass {after pre-forming}. Trying to achieve an extremely small diameter by bringing the material down in several

passes usually workhardens the material so that the small diameter cannot be achieved at all. MATERIAL ROLLED SHOULD BE WITHIN THE CAPACITY OF THE MACHINE. DO NOT OVER LOAD.

BRAKE MOTOR: On mechanical models: Montgomery bending rolls have a magnetic brake as standard equipment on the drive motor to permit the accurate stop required in pre-forming and other operations. Hydraulic models have dynamic braking.

CAPACITIES OF MONTGOMERY BENDING ROLLS depend on several factors: diameter of rolls, length of rolls, type of material rolled, thickness and width of material, uniformity of finished product required, etc. Rolling material beyond the capacity of the machine will result in the rolls deflecting instead of material bending properly. If the machine is much overloaded, the material will scarcely form at all and there is great danger of permanently springing the rolls or otherwise damaging the machine.

SHORT, THICK CAPACITIES: Bending rolls are sometimes used to roll pieces that are thicker although narrower than capacity of machine. Manufacturers furnishing short thick capacity sheets do not usually guarantee the capacities but offer them as a guide only. Such capacity sheets usually show that thicker pieces will roll to larger diameters only, while thinner wider sheets will roll to smaller diameters. Rolling narrow thick pieces is done at the users' risk, due to the many variables involved including

thickness, width and stiffness of material, diameter and length of rolls, gearing of machine, experience of the operator, etc. An operator, experimenting very carefully, can learn about handling narrow thick pieces, rolling them carefully near the bearings at the geared end of the machine.

O P E R A T I O N

"STOP".....On lever operated machines: Returning lever to neutral position stops machine immediately. On remote control pendant machines Push stop button and machine stops immediately.

"IN & OUT"...The control works the rear forming roll to form the desired diameter. By pushing the "IN" lever or button the rear forming roll moves inward toward the top roll to form a smaller diameter. By pushing the "OUT" button or lever the rear forming roll moves away from the top roll for forming larger diameters.

"FORWARD & REVERSE"...."Forward" runs the steel through the machine; "Reverse" brings the steel back to make a second pass.

Pinch roll {lower roll} has two adjusting screws. Turning the end of the adjusting screw will change the up or the down direction of the lower pinch roll for adjusting to the thickness of steel being rolled. A wrench is supplied by the manufacturer for this adjustment.

The machine has two limit switches inside of electric cabinet. One is by the end of the forming roll and limits the top and bottom travel of the forming roll. This switch should be checked at regular intervals for proper adjustment. The second limit switch is in the front of the cabinet. It has a cable attached that runs across the front of the machine. It is a SAFETY LIMIT SWITCH AND SHOULD BE MAINTAINED IN PROPER ADJUSTMENT AT ALL TIMES. PULLING THE CABLE TURNS THE MACHINE OFF IN AN EMERGENCY.

MONTGOMERY PLATE BENDING ROLLS

On hydraulic models: Recommended hydraulic oil:
Chevron (or equal) AW-46 Hydraulic Oil

BEFORE START UP.....

Check all hydraulic fittings....They can loosen in shipment
causing leakage.....

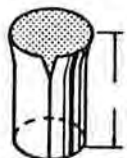
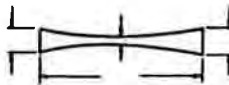
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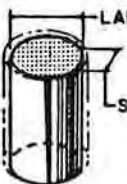
1- PINCHING IS TOO STRONG FOR THIN SHEETS.
2-VARIATION IN PLATE THICKNESS.



1- THE UPPER AND LOWER ROLLS ARE OUT OF ALIGNMENT.
2-VARIATION IN PLATE THICKNESS.



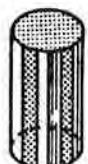
1- PINCHING OF ONE END IS TOO STRONG.
2- PLATE IS CRUSHED.
3-VARIATION IN PLATE THICKNESS.



LARGE RADIUS

1- VARIATION IN PLATE HARDNESS
2- FAULTY OPERATION.

SMALL RADIUS

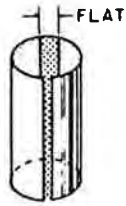


1- NOT ENOUGH CRIMPING (TOO FLAT OR TOO NARROW).
2- FAULTY OPERATION.

FLAT



△					
△					
△					
△	11/83	CUSTOMER USE	AB	JC	MM
REV	DATE	ISSUED FOR	BY	APR.	ENG.
MONTGOMERY MANUFACTURING BAKERSFIELD CALIFORNIA					
TITLE TROUBLESHOOTING GUIDE					
MODEL ALL PLATE BENDING ROLLS				DATE 11-23-83	
SCALE N/A			No. 0-1		



1- FAULTY COORDINATION, WHEN FEEDING PLATE BETWEEN EDGE CRIMPING



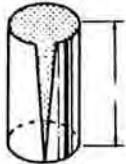
1- IRREGULAR CRIMPING FORCE
2- FAULTY OPERATION.



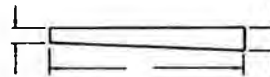
1- TOO MANY PASSES.
2- FAULTY OPERATION.



1- TOO MUCH CRIMPING
2- FAULTY OPERATION



1- ROLLS SHOW CONICAL SHAPE.
2- VARIATION IN PLATE THICKNESS.



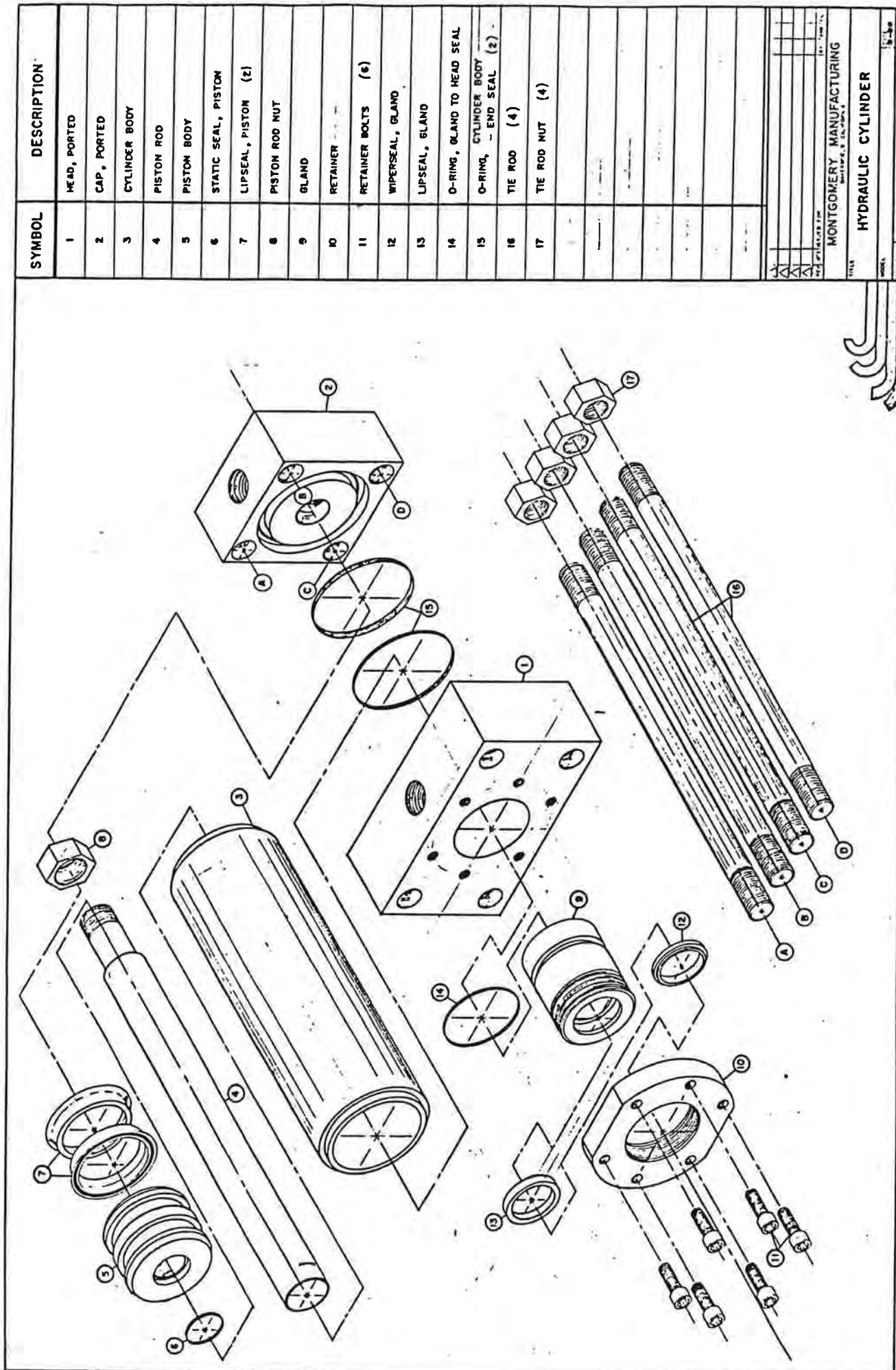
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TITLE TROUBLESHOOTING GUIDE CONT.						
MODEL ALL PLATE BENDING ROLLS					DATE 11-23-83	
SCALE N/A					No. 0-2	

(1) Crowning—

Crowning on a bending roll is the science of taper cutting the roll forging to compensate for deflection. All bending rolls should be crowned, and the crowning should be evident in all three or four roll forgings. In order to be able to accomplish the widest range of work possible, the machine should have a rigid frame, as well as fully crowned rolls (the rolls crowned the full length from the center line out to the journal in both directions). In crowning, the manufacturer is attempting to approximate a straight surface when the machine is placed under load. Needless to say, crowning has a somewhat limited range, depending on the roll forging size and the type of work being performed. If the fabricator's requirement is for a 1"x10' Plate Bending Roll for ASTM Grade A-36 steel on diameters from 96" to approximately 30", the machine would usually be built with a full crowning for 1" plate. If, however, the fabricator requirement for the bulk of his work is for ½" thick plate and he plans to run this on the 1" machine, he may wish to consider having the machine crowned for ½" and not for 1".

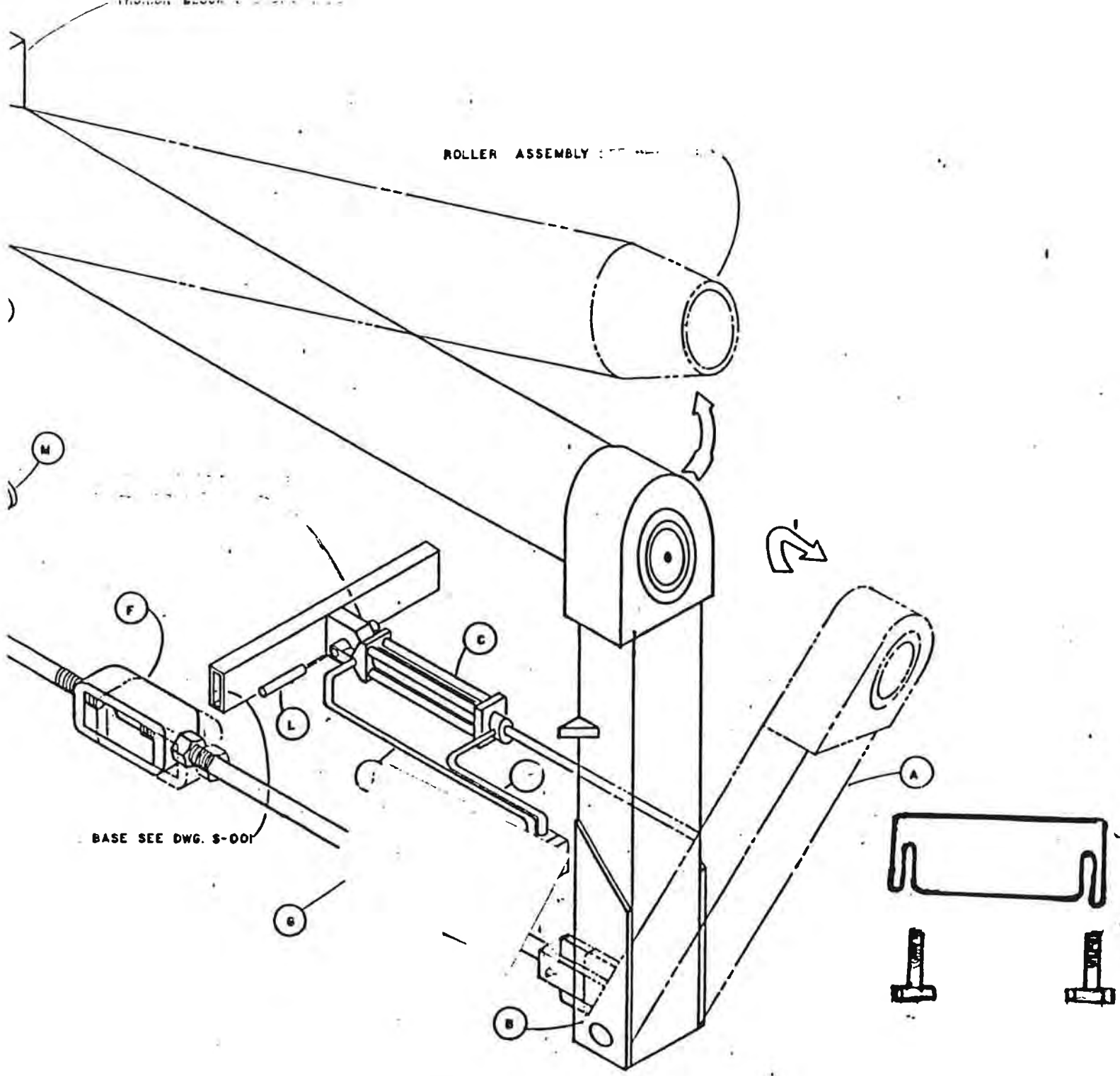
This means it is normally best for the fabricator if the manufacturer crowns the machine for the most commonly encountered job. When varying from design crowning, it is often necessary to do some shimming either in the center or on the ends of the plate. This compensates for either an hour-glassing or barreling effect caused by being either over or under the design thickness range of the crowning built into the machine. Shimming is used to vary the crowning, when dealing with off-design thicknesses and widths. On lighter plate, shims of cardboard or sheet metal are usually sufficient.

The fabricator should make certain that his bending roll supplier is fully aware of the importance of crowning and of how to properly crown the roll for his most common thicknesses and widths being run.



SYMBOL	DESCRIPTION
1	HEAD, PORTED
2	CAP, PORTED
3	CYLINDER BODY
4	PISTON ROD
5	PISTON BODY
6	STATIC SEAL, PISTON
7	LIPSEAL, PISTON (2)
8	PISTON ROD NUT
9	GLAND
10	RETAINER
11	RETAINER BOLTS (6)
12	WIPERSEAL, GLAND
13	LIPSEAL, GLAND
14	O-RING, GLAND TO HEAD SEAL
15	O-RING, CYLINDER BODY
16	TIE ROD (4)
17	TIE ROD NUT (4)

MONTGOMERY MANUFACTURING
 HYDRAULIC CYLINDER
 W. A. MONTGOMERY



REMOVE CLAMP BEFORE OPENING DROP ARM

SCALE	NONE
DATE	JUNE 191
DRAWN BY	A. BOYLE

MONTGOMERY

INITIAL TYPE

Plate Bending Rolls

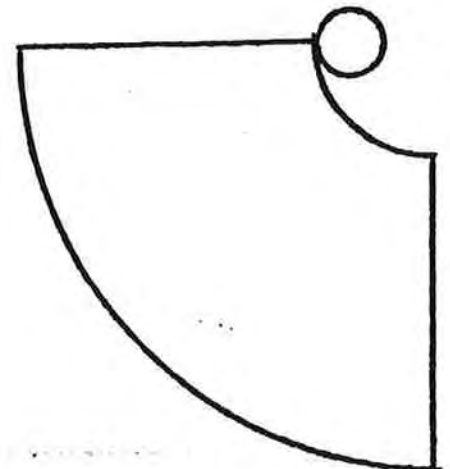
INSTRUCTIONS FOR CONE ROLLING ATTACHMENT

USE OF THE CONE ROLLING ATTACHMENT REQUIRES EXPERIMENTATION, BUT WITH PRACTICE, THE EXPERIENCED OPERATOR CAN ROLL A CONE SHAPE AS EASILY AS HE CAN ROLL MATERIAL INTO A CYLINDER.

THE PURPOSE OF THE SMALL CONE ROLLERS ON THE END OF YOUR MACHINE IS TO SLOW THE TRAVEL OF THE SMALL END OF YOUR MATERIAL. SET YOUR PLATE BENDING ROLL SO THAT YOUR SHEET OF MATERIAL IS LOOSE ON THE LARGE END OF THE CONE BEING ROLLED AND FREE TO SLIP. THE CONE SHOULD BE ROLLED IN ONE PASS - IF THE LARGE ROLLS ARE REVERSED, YOUR MATERIAL WILL COME AWAY FROM THE CONE ROLLING ATTACHMENT AND WILL ROLL INTO A STRAIGHT CYLINDER. REMOVE THE MATERIAL AND START OVER AGAIN, BEING SURE THE MACHINE IS SET CORRECTLY AND THAT THE CURVED EDGE IS UP AGAINST THE CONE ROLLERS.

YOUR CONE ROLLER IS ONLY AN ATTACHMENT, AND THE VARIETY OF SHAPES THAT CAN BE ROLLED IS LIMITED. A SPECIAL CONE ROLLING MACHINE WOULD BE REQUIRED TO FORM TRUE CONES OR MORE COMPLICATED SHAPES.

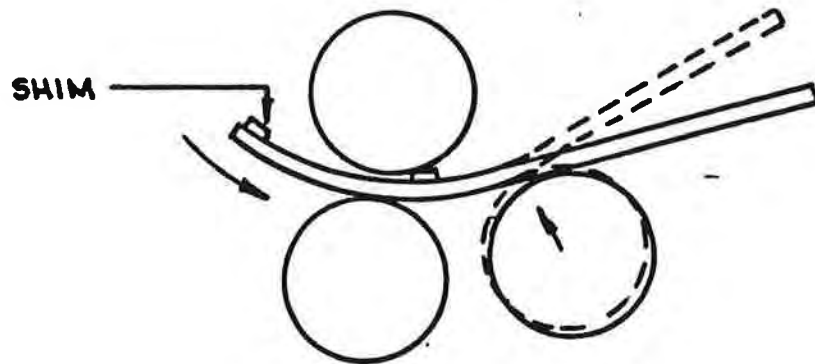
REMOVE THE CONE ROLLING ATTACHMENT WHEN NOT IN USE TO MAKE MORE ROOM FOR REGULAR WORK ON YOUR PLATE BENDING ROLL.



SHIMMING

There will be a nominal flat at the end of the plate that is as small as can be obtained without special application. On plates 1/2" and lighter, this flat may be reduced by applying a shim strip on top of the flat and running this flat area through the pinch opening and return to the front. (See Figure #3). Some elevation of the rear roll may be required to reduce the flat. The shim strip should not exceed 1/16" or the amount of crowning in the top roll, whichever is greater, and should be from 1/2" to 1-1/2" wide. If a fully length shim does not have any effect, try a shorter strip and move it along the plate. This will complete the pre-forming operation on one end and the plate may be removed from the machine.

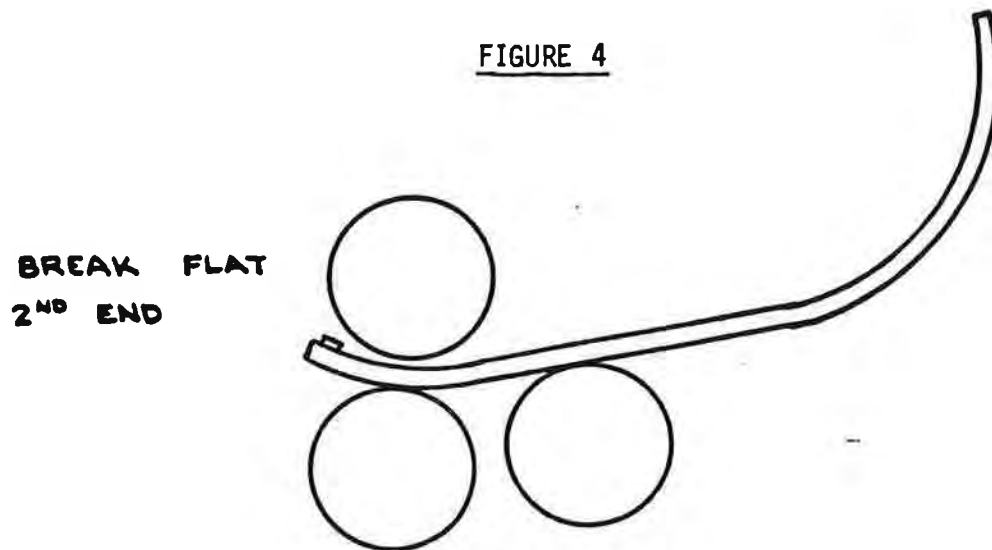
FIGURE 3



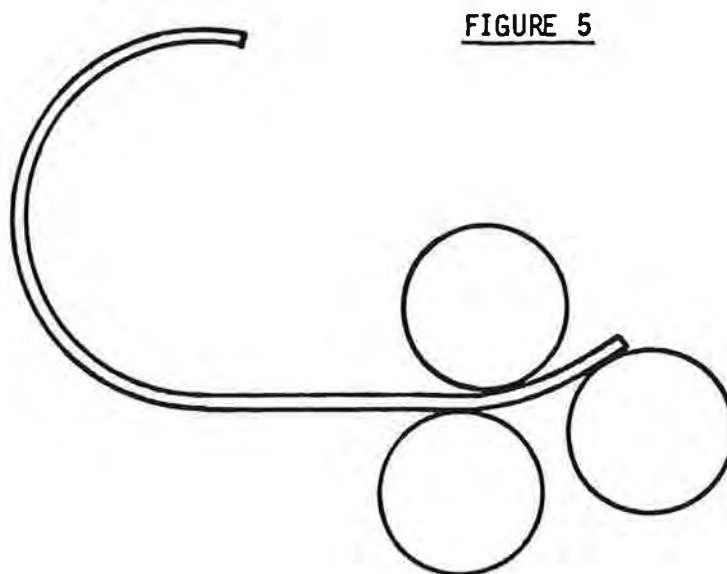
The shim strip must be put in place with the machine stopped. Never touch the strip or plate when rolls are moving.

When removing the plate, it must be supported so that the pre-form is not changed. Having the crane too high or too low will change the radius and make it difficult to finish the cylinder to a true circle.

The plate is re-entered into the machine at the rear and squared with the rolls. The rear roll is elevated to a point at least 2" below the original roll setting and formed just far enough to use the shim strip. (See Figure 4).

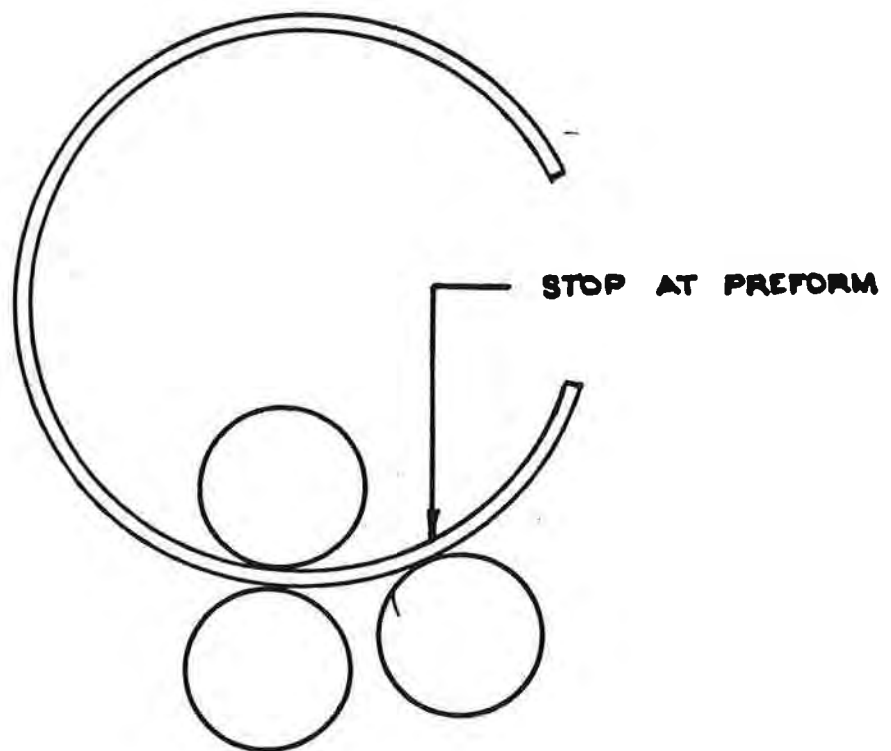


This is run through the pinch as before, elevating the rear roll if necessary. Lower the rear roll to the first position and run a pass from the rear until the pre-formed section just leaves the rear roll. (Figure 5). This will leave a flat section just behind the original preform.



The rear roll is elevated to a point just below the original pre-form setting and a pass made to the rear. Return to front and adjust rear roll up and make another pass to the rear. This flat area must be removed by rolling toward the rear. Use passes and adjustments as necessary to close the butt joint. Do not roll in the pre-formed area after the first pass. (See Figure 6).

FIGURE 6

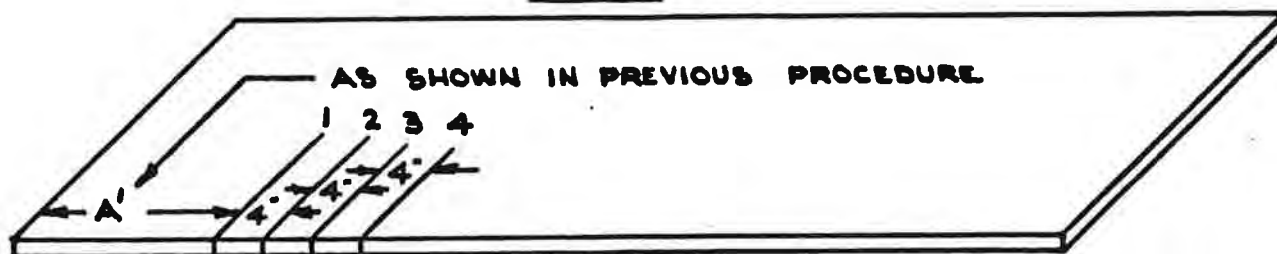


PRE-FORM WITH BLEED OUT:

For most accurate forming of cylinders, the pre-form should have a fully formed end and a transition from this radius to the flat plate. This transition is commonly referred to as "bleed-out". This operation requires several rolling passes from rear to front of the machine. The number of passes will depend upon the diameter of cylinder to be formed. The smaller diameters will require more passes than larger diameters. (See Figure 7).

The bleed-out is formed to marks on the plate. The plate may be marked prior to entering into the machine or during rolling. Always be sure the machine is not running if the plate is to be marked during forming. The following example assumes the plate will require four passes for forming to diameter and the pre-form and bleed-out will require the same number of passes.

FIGURE 7



Mark plate as shown above and enter at rear of machine. Set rear roll for first pass, not to exceed the diameter restriction shown on the capacity chart for your machine, and roll to the front until mark #4 is visible at the pinch. Return to rear, raise the rear roll for second pass and roll to the front until mark #3 is visible at the pinch. (See Figure 8 and 9).

FIGURE 8

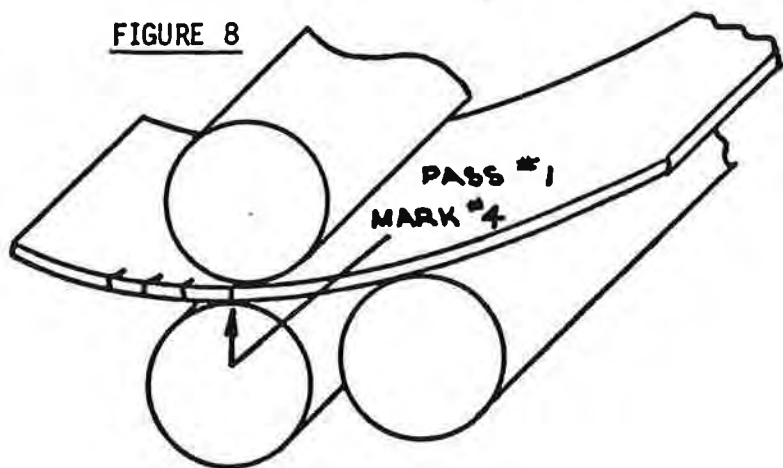
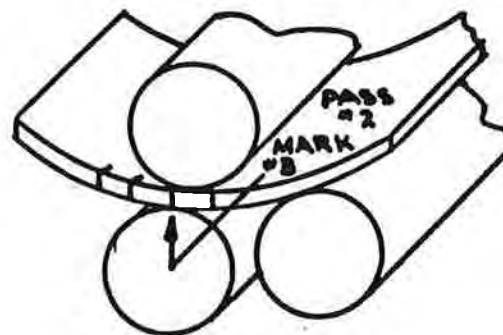


FIGURE 9



Continue in this manner until the bleed-out and pre-form are complete. Never roll past any mark for that given pass. Rolling past a mark will cause a tight place to form at that point. This, in turn, will show up as a tight place with an open radius on either side.

After pre-form is complete, remove plate, turn and enter the opposite end at the rear. Form the cylinder by rolling from the rear at, or near, the same settings used in the bleed-out. Do not roll the finished pre-form.

MINIMUM DIAMETER CYLINDERS - PIPE DUTY RATING:

The Montgomery Plate Roll is designed to form cylinders having inside diameters approximately 1-1/2" larger than the top roll diameter, if the material being formed has the capability to form to the small diameter.

If a plate is first formed to a large radius, and successive passes made to form a cylinder, the smallest possible diameter formed will be 6" to 10" larger than the top roll diameter. In order to form the minimum diameter, the plate must be bent nearly to its final size in the first pass and must be within the pipe duty rating of the machine. The first pass refers to the first full length pass after preforming.

The minimum diameter section is formed by entering and squaring the plate from the rear with the rear roll at a low elevation. With the plate in the pinch, the rear roll is raised to a position for the required diameter and a portion rolled for the preform. Lower the rear roll and remove the plate. Turn the plate and enter the opposite end at the rear. Raise the rear roll to preform setting and make a complete rolling pass. Note that after preforming the one end the plate may be removed, the rear roll lowered and the preformed end entered at the front. If entered at the front, leave some preform in front of the pinch, raise the rear roll to touch the preformed portion and continue raising rear roll for approximately 1/2" to 1" more and make a complete rolling pass. Visually check clearance at top and rear rolls to avoid jamming rolls and plate together. A minimum diameter cylinder will form to some overlap at the butt joint. Do not allow overlap to enter between any two rolls. When rolling pressure is removed, the overlap should spring open.

CHECKING RADIUS:

Good rolling practice requires careful checking of the radius being formed. This is important to prevent overforming of plates and the resulting necessity of corrective forming.

Rolling a short portion of plate and checking with a radius gauge will indicate whether to proceed with the forming pass or to make a corrective roll adjustment before proceeding. Generally, if the gauge shows the radius to be oversize, the pass is completed and corrective roll adjustment made prior to the next forming pass.

The radius gauge must only be used with the machine stopped.

Radius gauges are matched to the work requirement. A large plate radius formed to a close tolerance will often require a gauge several feet in length. A small radius formed to a full circle will require a much smaller gauge. Regardless of the type required, the gauge must be accurately made and of substantial material.

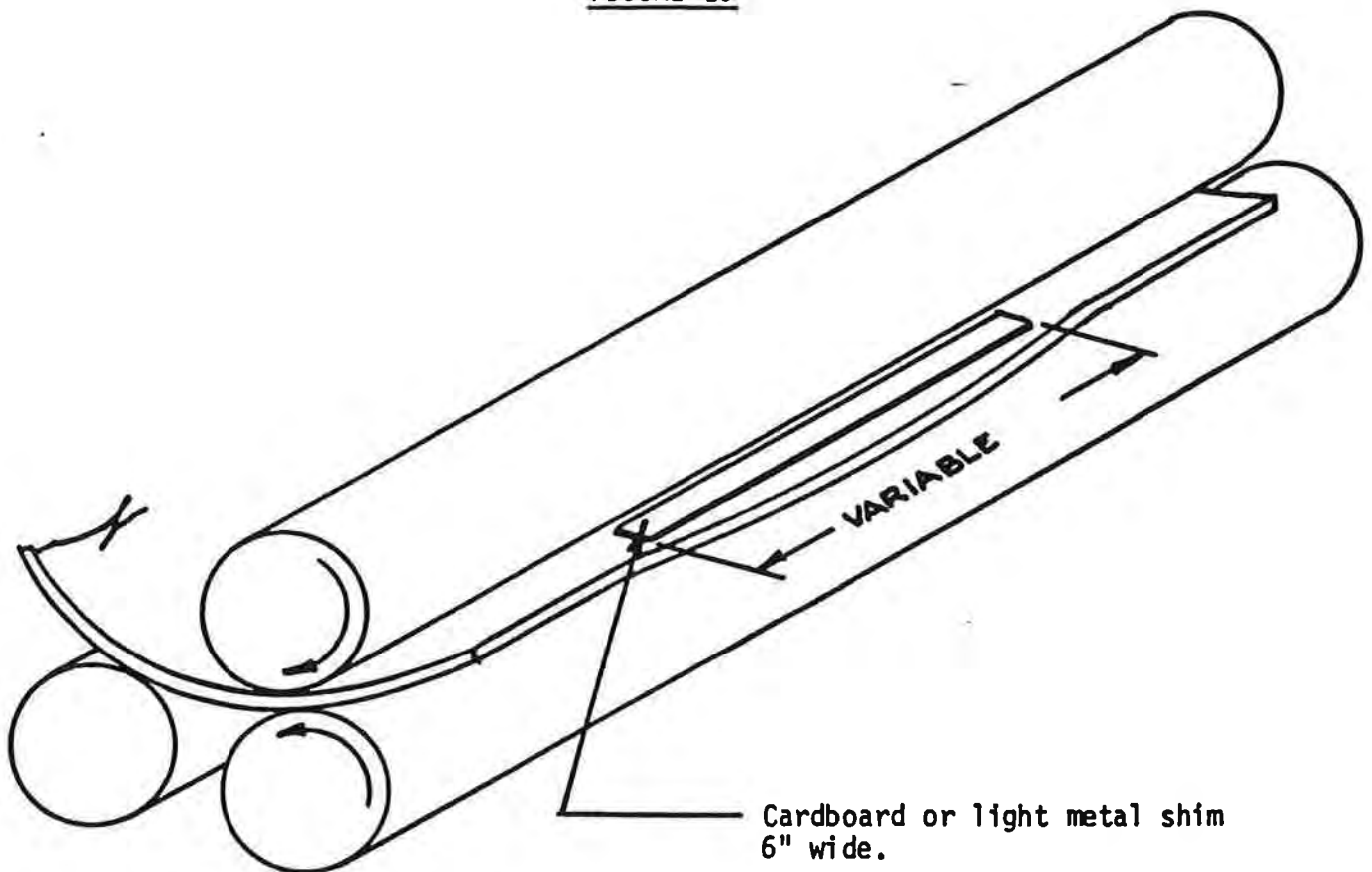
CROWNING IN ROLLS:

All three roll forgings are crowned and therefore larger at the center in order to offset the roll deflection under rolling pressure. Without this crowning, all cylinders would have butt joints open at the center. As deflection varies with pressure, or bending load, this crowning is correct for only one particular load. Heavy cylinders will have open center butt joints and light cylinders will have open end butt joints. The ends of sectional shells will be affected the same way. This condition exists only a few inches back from the edges.

OPEN CENTER BUTT JOINT:

Figure 10 shows corrective method. Place a light cardboard or metal shim on top of the plate at the center and roll into the pinch from the front. Reverse rotation and check edge. Use more or less shim for straight edge. Note that some bowing of the edge will correct itself during final forming.

FIGURE 10



Cardboard or light metal shim
6" wide.

Rotate as shown with shim on top
of plate.

CHART ROLLING: (CONTINUED)

Until the operator is familiar with the rolling characteristics of the machine and various materials to be rolled, he will be uncertain in setting the rear roll. This is an excellent time to record the various diameters resulting from his settings. This will give a greater range of principle settings than charting only the settings for the desired diameter.

No two plates will be rolled to the same diameter with exactly the same roll settings. The diameter produced varies with minor variation in plate thickness, carbon content, hardness, etc.

The operator should not attempt to form an exact diameter in one pass. The forgings should be set to produce a slightly oversize cylinder that it is open at the longitudinal butt joint and make a series of passes to close the cylinder.

If the operator attempts to roll an exact diameter in one pass he will frequently produce a cylinder that is undersize and difficult to open. Even if it is not undersize, it will undoubtedly be out of round.

ROLLING PROBLEMS - CORRECTIONS

ROLL ADJUSTMENTS:

The forgings in a bending roll must be adjusted according to the result obtained in rolling. Having all rolls parallel may or may not form a cylinder having the same radius throughout. This is due to differences in plate hardness, thickness or shape and to pressure variation in the roll bearings. The hinge must be locked in the full up position when rolling.

UNEQUAL END DIAMETERS:

Lower the lower front roll at the tight end of the cylinder. Over-correction will be necessary to achieve equal diameters. A second adjustment will be necessary for complete correction to prevent over forming of the large end.

The rear roll is adjustable for tilting by disengaging the wormshaft clutch but this should only be necessary to level the rear roll with the top roll or for rolling some conical sections.

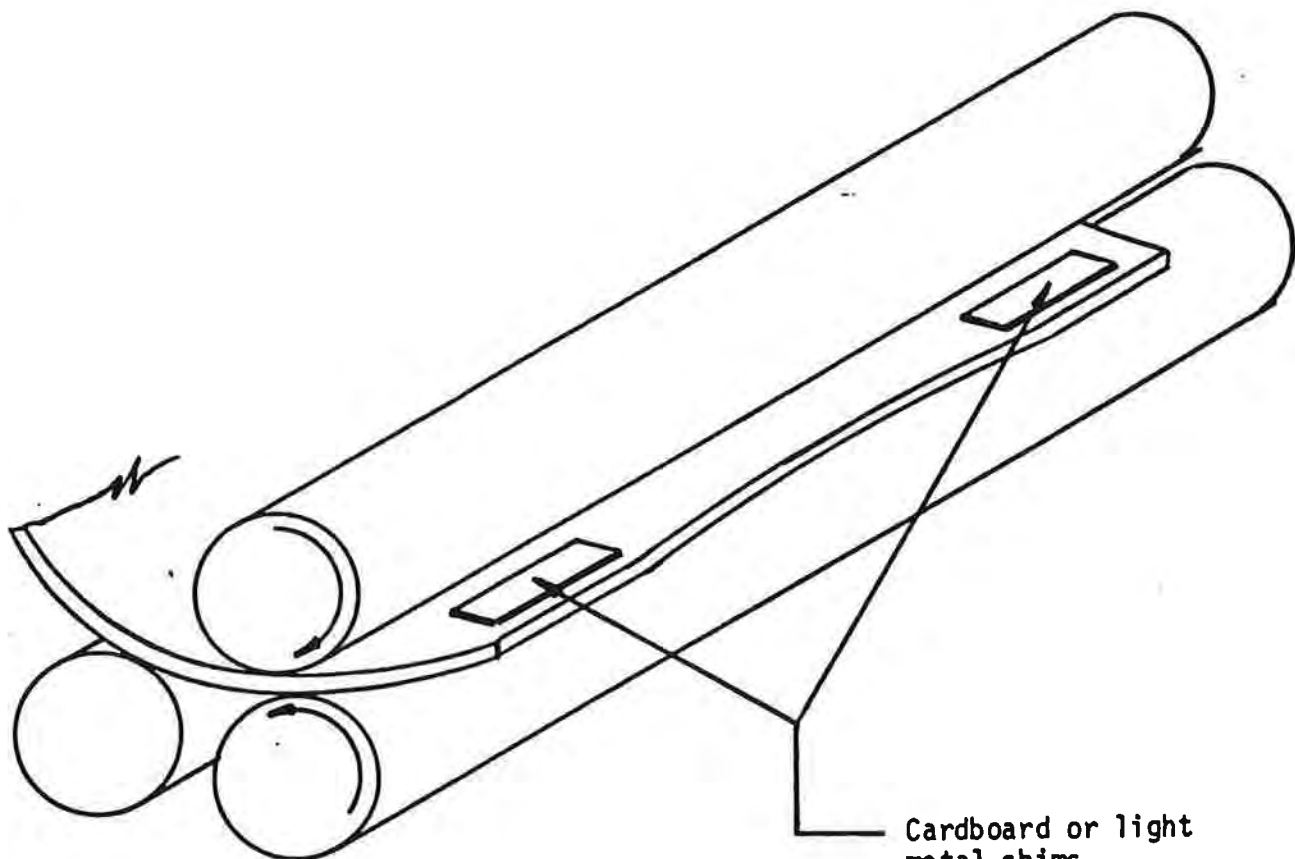
TIGHT CENTER AT BUTT JOINT:

Figure 11 shows corrective method with shims. An alternate method is shown on Figure 12. The wood block is placed on top of the plate at center and the rolls "rocked" to press center of plate down. Do not stand in front of the block. The block must be dry wood. A block that is wet or too large can jump from the machine.

When using shims, make certain that the amount of shim does not increase the total plate and shim thickness to a dimension greater than the opening between the top and bottom rolls when measured at the ends of the rolls.

FIGURE 11

Tight at Center

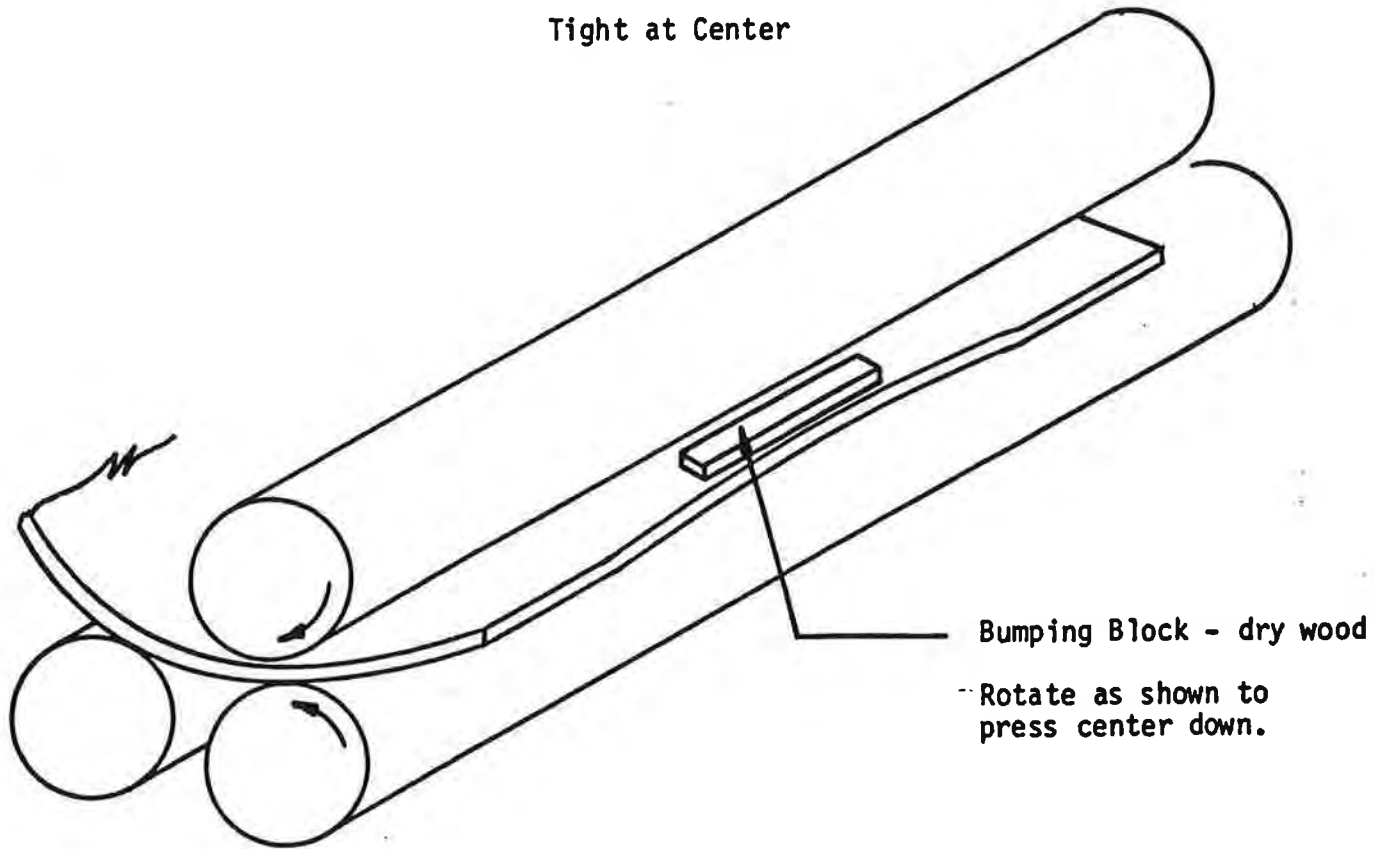


Cardboard or light
metal shims.

Rotate as shown with
shims on top of plate.

FIGURE 12

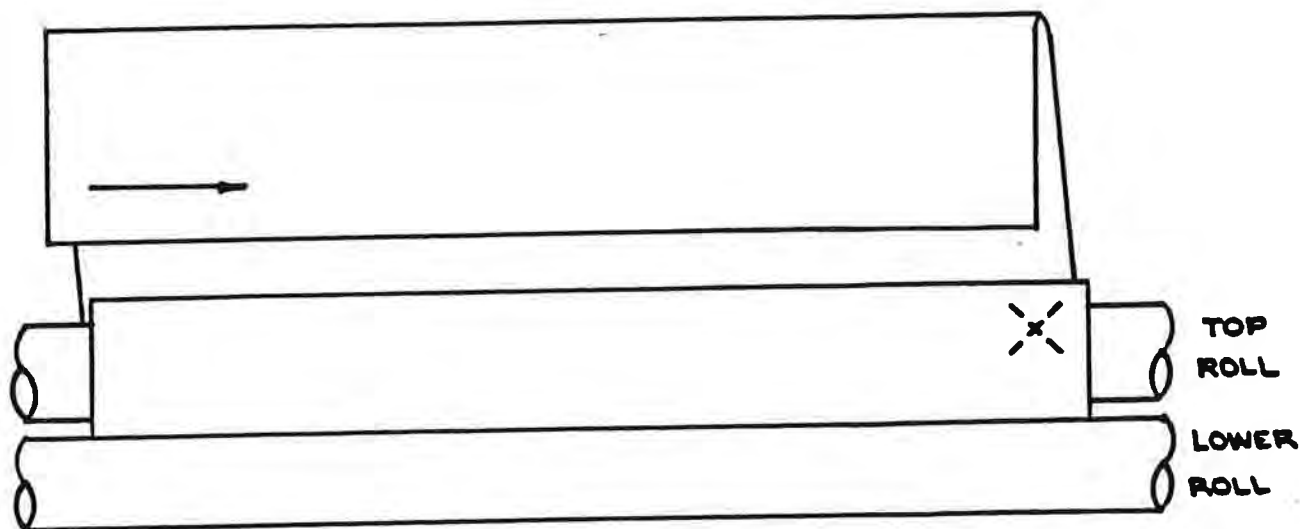
Tight at Center



When the plate edge is straight, do not reroll this section of plate without the shim. If rolled without shim in place, the edge will bow to the original shape. The ends of the plate should be to the final radius after shimming and should not require further forming.

SKEWED OR OFFSET PLATES
CORRECTIVE METHODS

FIGURE 13



Correction must be started when butt joint is open.

As viewed from the front of the machine, the upper butt joint edge must be forced to the right to align with the lower edge. This means that the cylinder must be shifted to a new axis and rolling continued.

In the above sketch, the new axis must push the upper edge as indicated by the arrow. As the rear roll will do this pushing, the cylinder should be moved away from the rear roll at the opposite side (at dotted X). Lower the rear roll, move the plate about 1/4" away at the proper point, maintaining contact with the rear roll at the opposite side. Place a 1/4" shim about 12" long and 2" wide between the plate and the rear roll and raise the rear roll for the next forming pass. "Rock" the plate to the extent of the shim to start a new bend, remove the shim and roll the complete pass. This should remove most the skew. Experience will indicate the amount of shim needed for various amounts of skew for various plate thickness.

As the shim will bend during use, it is necessary to visually check that it does not enter between the plate and the lower front roll. This will cause a severe overload on the machine.

14. Operating sequences for 3-roll initial-pinch benders

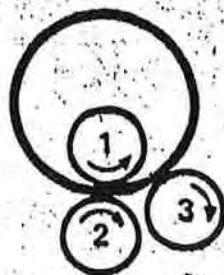
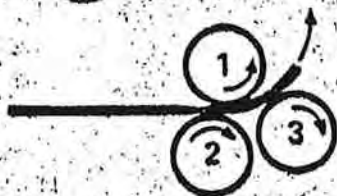
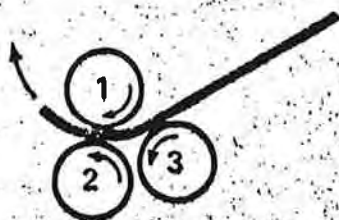
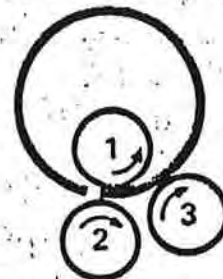
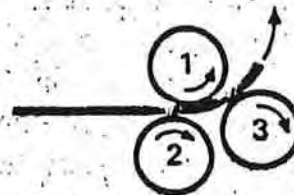
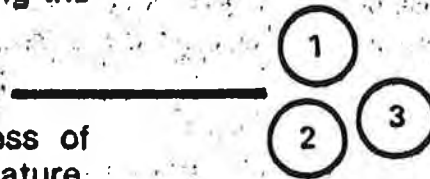
For most jobs on machines of this type, a single pass is the most economical method to make large-diameter cylinders, generally at least 48 in. dia, that do not require extreme accuracy or a virtual absence of flat ends. The first sequence below shows how this is typically done. Accurate forming, with minimal flat area and a consistently precise radius of curvature, can be produced on this type of bender by using the sequence below

Set pinch roll No. 2 to approximate thickness of stock. Adjust roll No. 3 for the desired curvature. Load workpiece at the front of the rolls; it can be squared against No. 3

Turn bender on and advance workpiece 6-8 in. beyond roll No. 3. Check curvature with a 'sweep' templet and adjust No. 3 roll if necessary

Continue forward roll bending until trailing end of workpiece is between rolls No. 1 and 2. If ends don't meet, raise No. 3 roll slightly and reroll until they do

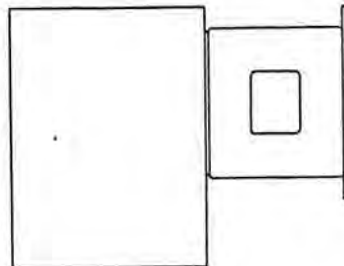
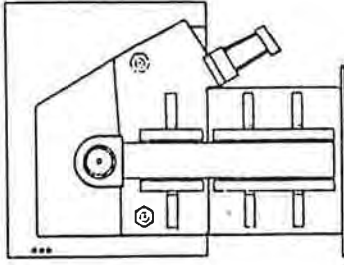
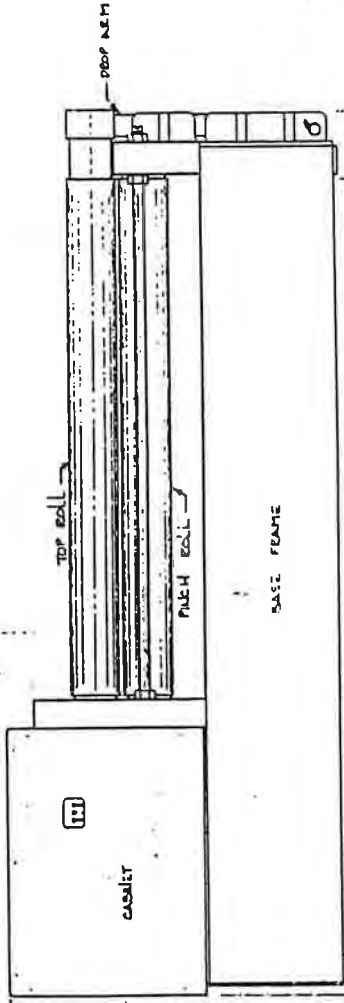
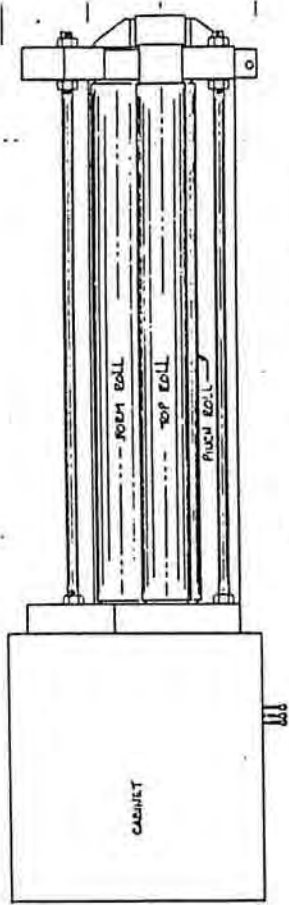
Drop tail hinge and remove completed cylinder. If a reduction in the flat end is desired, turn cylinder around, load over roll No. 1, lower the roll and lock up, then reroll



Set pinch roll No. 2 to approximate thickness of stock and raise roll No. 3 to approximate position for desired curvature. Load workpiece into the rear of the rolls, turn machine on, and advance workpiece 6-8 in. Remove workpiece from the rolls and check curvature with templet, rerolling if necessary with No. 3 roll adjusted in position

Turn workpiece end for end and load prebent end into the front of the rolls. Raise No. 3 roll to a position slightly higher than it was for prebending

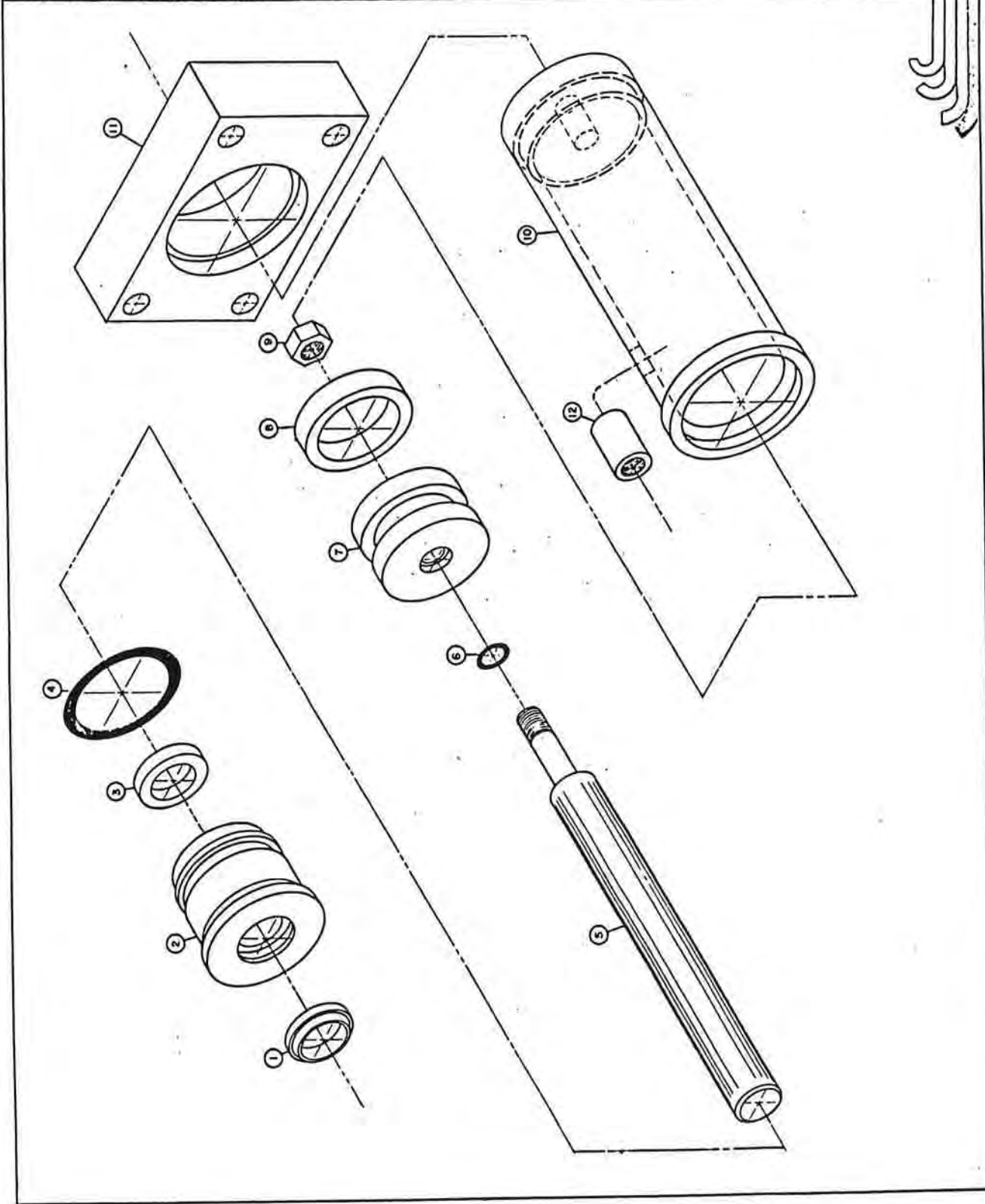
Restart machine and rotate rolls in forward direction to make complete cylinder. If roll No. 3 is set properly, a cylinder ready for welding will be produced in one pass



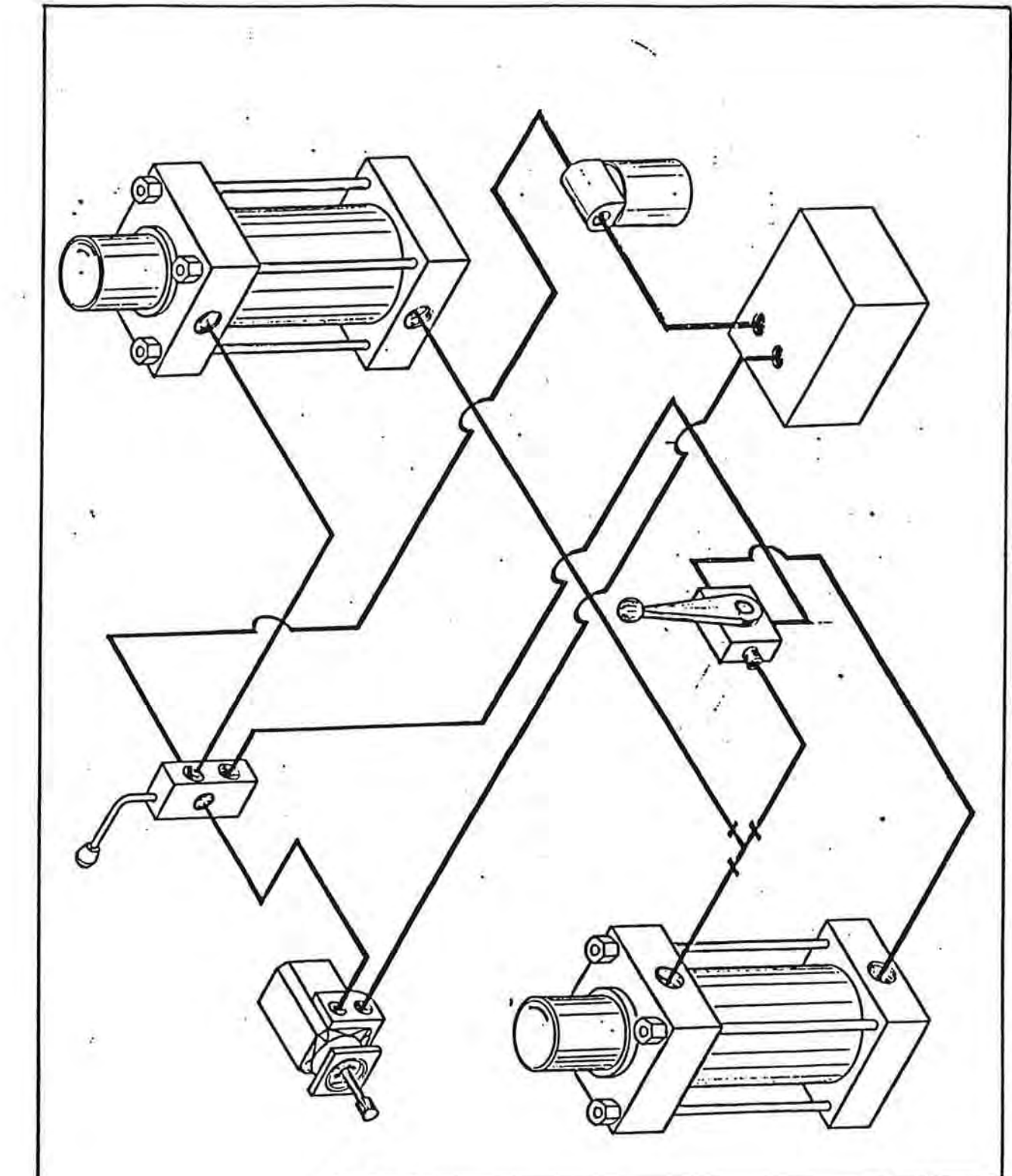
APPROVED FOR	DATE	BY

MONTGOMERY MANUFACTURING
 MONTGOMERY, ALA.
 TITLE FRONT, RIGHT AND LEFT SIZES AND TOP VIEWS
 DRAWN BY P. A. THORNTON
 CHECKED BY
 DATE

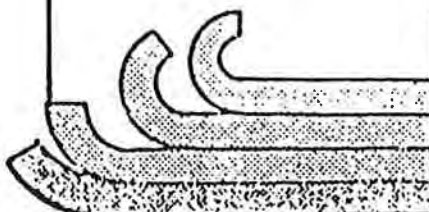
SYMBOL	DESCRIPTION
1.	WIPERSEAL, HEAD
2.	HEAD
3.	LIPSEAL, HEAD
4.	O-RING, HEAD TO CYLINDER
5.	PISTON ROD
6.	STATIC SEAL, PISTON
7.	PISTON, BODY
8.	LIPSEAL, PISTON
9.	PISTON ROD NUT
10.	CYLINDER BODY
11.	MOUNTING FLANGE
12.	PORT



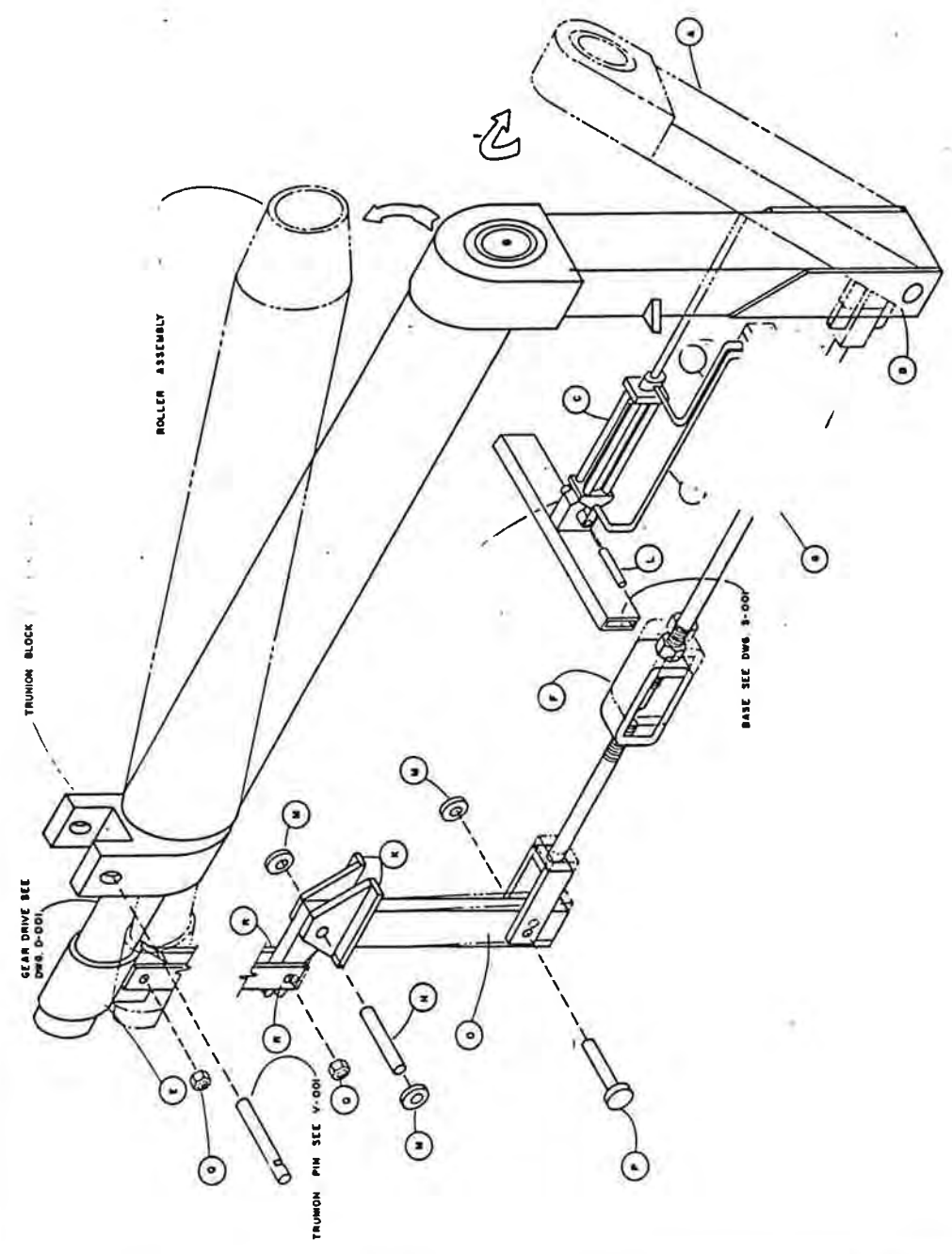
TITLE: HYDRAULIC CYLINDER
 MONTGOMERY MANUFACTURING
 WORK: 10-1-68
 R. A. MCGUIRE



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REV	DATE	ISSUED	FOR		BY	APP	ENG
MONTGOMERY MANUFACTURING BAKERSFIELD CALIFORNIA							
TITLE MASTER AND SLAVE CYLINDER							
MODEL ALL				DATE 4-15-85			
SCALE NONE				BY P.A. MEGUIRE			
				NO. 9 000001			

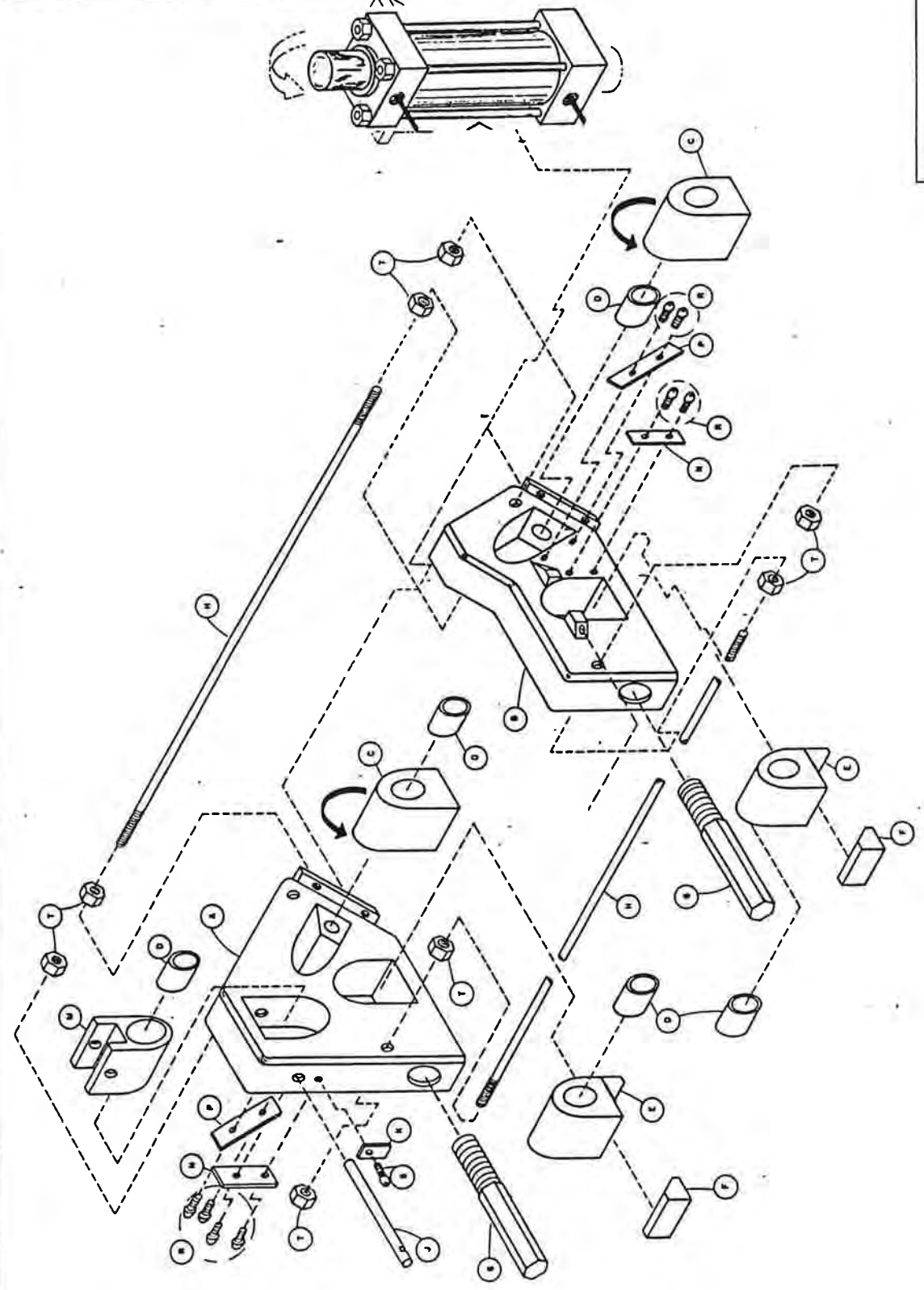


PARTS LIST			
ITEM	P/N	DESCRIPTION	QTY
A	DA-21	DROP ARM	1
B	DA-22	ARM LEGS	2
C	DA-23	CYLINDER	1
E	DA-25	TAL COLLAR	1
F	DA-26	TURNBUCKLE	1
G	DA-27	PULL ROD	1
K	DA-30	PYRAMID	1
L	DA-31	PIV	1
M	DA-32	SHAFT COLLAR	3
O	DA-33	DOB LEG	1
P	DA-34	PIN	1
Q	DA-35	MUT	2
R	DA-36	LINK	2

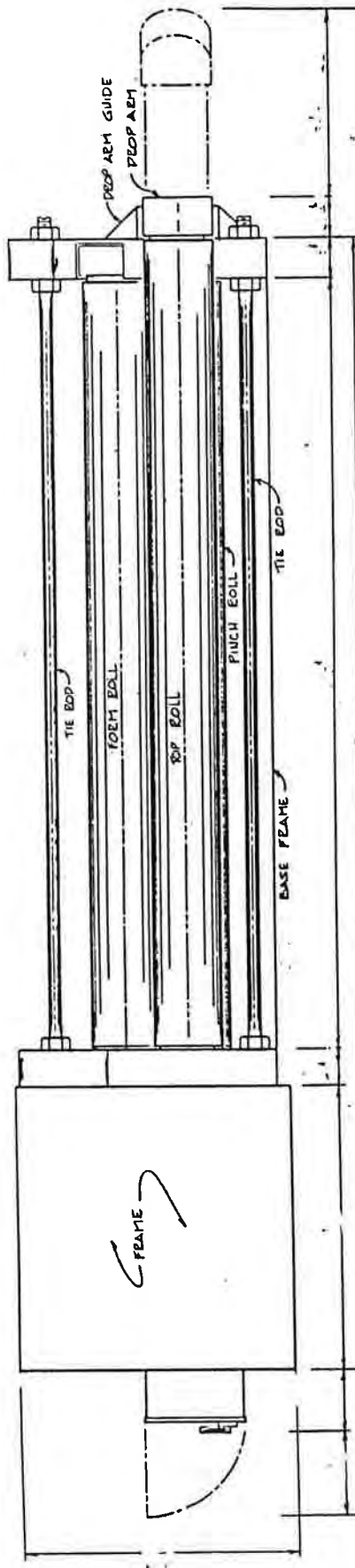


J M MONTGOMERY MANUFACTURING INC.	
SCALE	APPROXIMATE 3"
NAME	
DATE	
NAME 1982	DROP ARM B LINKAGE
DESIGNED BY	
A. BOYLE	
PAGE NO	U-008

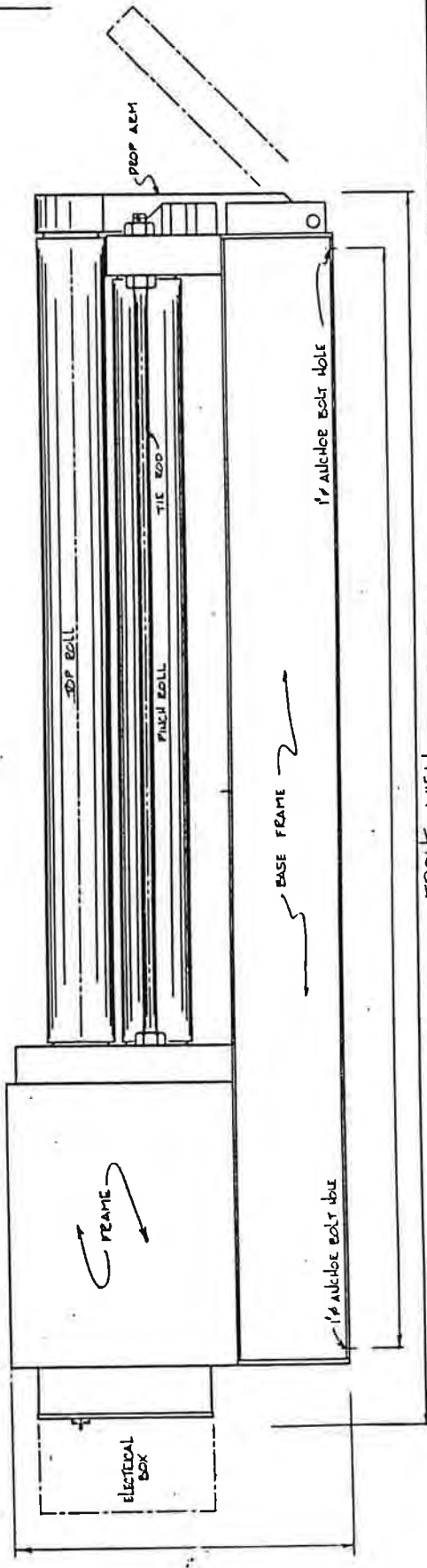
ITEM	P/N	DESCRIPTION	QTY
A	BH-10	BEAR END HOUSING	1
B	BH-11	OPEN END HOUSING	1
C	BH-12	FORM BLOCK	2
D	BH-18	MAIN BEARING	6
E	BH-19	FINCH BLOCK	2
F	BH-20	FINCH WEDGE	2
G	BH-21	WEDGE SCREW	2
H	BH-22	TIE BARS	2
J	BH-23	TRUNION PIN	1
K	BH-28	TRUNION RETAINER	1
M	BH-29	TRUNION BLOCK	1
N	BH-30	"P" RETAINER PLTS	2
P	BH-33	"P" RETAINER PLTS	2
R	BH-36	"P" & "B" RET. SCRS	6
S	BH-37	TRUNION SET SCR	1
T	BH-38	TIE BAR - JAMB NUTS	6



J. M. MONTGOMERY MANUFACTURING, INC.	
DATE	APPROVED BY
NONE	[Signature]
DATE	REVISED BY
JUNE 1962	[Signature]
DESIGNED BY	DRW. NO.
A. BOYLE	V-001

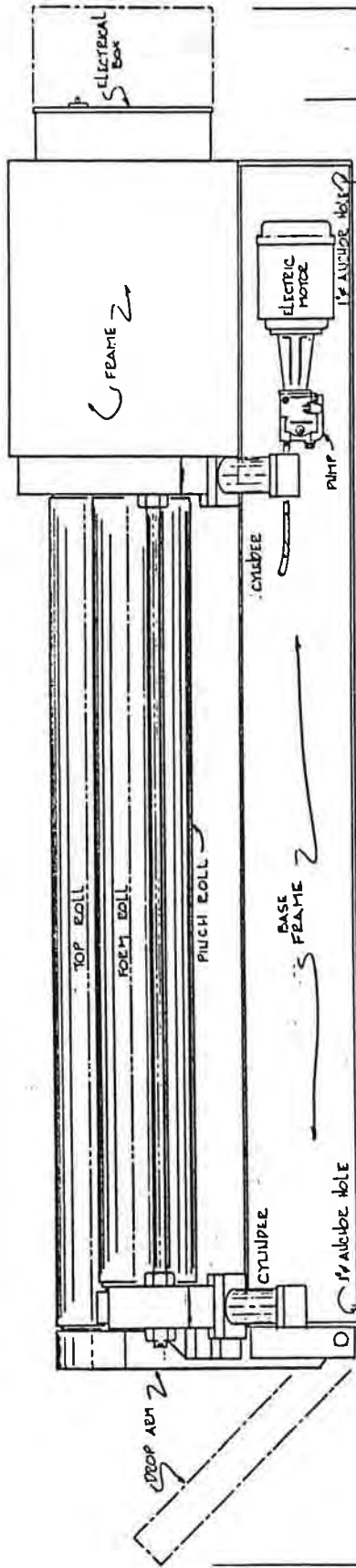


TOP VIEW

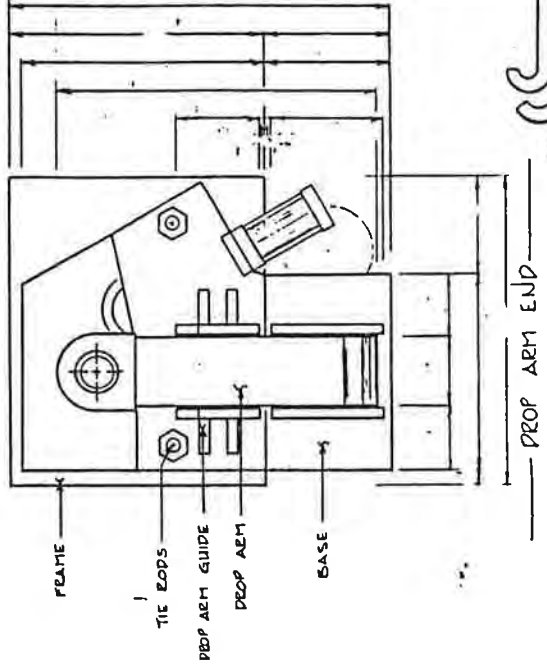


FRONT VIEW

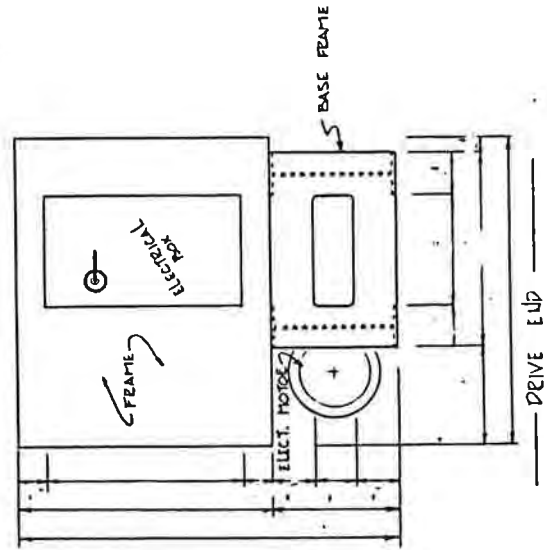
DATE	BY	CHKD	APP'D
MONTGOMERY MANUFACTURING			
TOP VIEW			
FRONT VIEW			
ELECTRICAL BOX			
PROP ARM			
PROP ARM GUIDE			



REAR VIEW



PROP ARM END

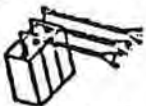


DRIVE END

RECOMMENDED MINIMUM CLEARANCE AT THE TOP OF TOP ROLL PLUS DESIRED WORK SPACE.

ROOM TO ALLOW FOR THE OPENING AND WORKING IN THE ELECTRICAL BOX IS RECOMMENDED.

MONTGOMERY MANUFACTURING	
TITLE	PROP DRIVE END AND PROP ARM END VIEWS
DATE	
BY	
CHECKED	
APPROVED	
SCALE	
SHEET	1
OF	1



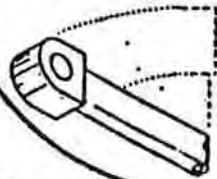
LEVER CONTROLLERS

Allow for variable control of the drive motor, the drop arm and the form roll.

No charge

HYDRAULIC DROP ARM

For ease of material removal at completion of bend. Drop arm houses one of the top roll bearings and is hinged on a swivelling pin at its base.



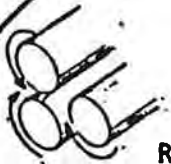
No charge

HYDRAULIC FORM ROLL

The form roll can be raised and lowered by means of the control levers and the hydraulic cylinders which are connected in series. This allows for rapid prebending with excellent results.

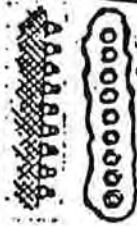


No charge



ROLLS are driven through a hydraulic motor.

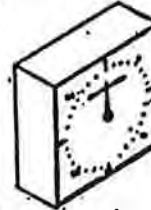
No charge



CENTRALIZED GREASING SYSTEM

Makes maintenance easy and effective.

No charge



DIAL INDICATOR

The machine is equipped with an easy to read dial indicator for the form roll. Mounted on frame housing facing operator for ease and accurate reading.

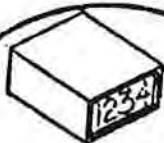
No charge

MONTGOMERY PLATE BENDING ROLLS

OPTIONAL EQUIPMENT

Factory installation and one day of training.

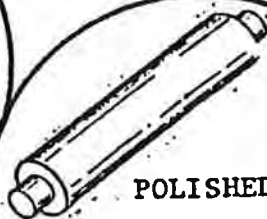
\$1200.00



LED INDICATOR

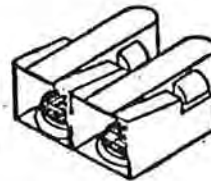
Takes the place of the dial indicator and shows position of the form roll.

\$875.00 EA



POLISHED ROLLS

lengths
4', 5', 6' \$450.00
8', 10', 12' \$750.00



FOOT SWITCH

For hands-free control of the drive motor

\$375.00



CONE ROLLING ATTACHMENT

Easily installed or removed and allows for ease of feeding material for bending conical shapes

\$150.00 6-17-88

REMOTE CONTROL PEDESTAL

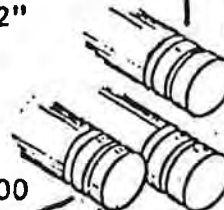
This controller can be placed anywhere around the machine to allow the operator to be in the best position for viewing and operation during bending.



~~\$2,200.00~~

ROD AND TUBE GROOVES

can be cut into rolls at factory for sizes of 3/8", 1/2" and 5/8"...



\$350.00

REMOTE CONTROL PEDESTAL WITH VARIABLE SPEED

can be positioned at the best vantage point around the machine. However, this controller allows operator to have variable speed control.



\$2,200.00

STANDARD
FOR 10



Montgomery

J. M. MONTGOMERY MFG., INC.

METAL FABRICATING MACHINERY
314 YAMPA STREET BAKERSFIELD, CA 93307
(805) 323-8961 800-824-4610 (OUTSIDE CA)

GENERAL TERMS AND CONDITIONS

1. PURCHASER is the party to whom the Quotation/Agreement is submitted and from whom the purchase order is received.
2. SUPPLIER is J.M. MONTGOMERY MFG., INC.
3. END USER is the party who ultimately receives the machine and his sole line of responsibility through the Purchaser.
4. PRICES, unless otherwise indicated, are net for immediate acceptance and subject to change without notice. Upon acceptance, prices are firm where the manufacturing costs are firm.
5. PAYMENT is required as noted or payment is due in full on presentation of the invoice. A finance charge of 1 1/2% per month will be due on all late payments.
6. APPLICABLE TAXES relating to the contract whether local, State and/or Federal shall be added to the prices indicated.
7. DELIVERIES given are based on Supplier's present estimate of the time required to ship after Purchaser's order is received. Supplier will endeavor to complete delivery as near the time indicated as possible, but will not be responsible for any loss or damage due to its failure to make delivery as promised.
8. SHIPMENTS will be made FOB factory at Supplier's discretion unless otherwise provided and shall be shipped at Purchaser's risk. Supplier will not be held responsible for delays of carriers or loss or damage to machinery in transit. Examination should be made of all parts immediately on arrival at Purchaser's plant and any damage should be reported to Purchaser's local transportation agent AT ONCE. Please note, Supplier cannot and will not enter claims for damages.
9. OPERATION AND MAINTENANCE are the responsibility of the Purchaser and/or End User, and supplier shall not be responsible for any damages caused by or as a result of ignorance, incompetent operation or the Purchaser's and/or End Users failure to lubricate and maintain the equipment as specified in the applicable instruction manual. Instruction manuals are provided with the machine containing relevant operation and servicing information.
10. LIMITED WARRANTY
I. For a period of one (1) year from the date of delivery, Supplier guarantees to the original purchaser only that the machine's structural components will be free from defects in materials and workmanship and will repair or replace any such structural component which proves to be defective in material or workmanship, provided the machine is used and maintained in accordance with the specifications and maintenance in accordance with the specifications and maintenance procedures as stated in the supplier's instruction manual and such parts or components are returned to the supplier as provided in sub-paragraph 10, III.
- II. All components and sub-assemblies supplied by other vendors as original equipment with the machine are guaranteed under the individual warranties of those vendors for the duration of their standard warranty period.

- III. The supplier's warranty will only cover the cost of repair or replacement of the defective parts or structural components returned to the factory of authorized dealers service department. Defective parts must be returned to the Supplier, transportation charge prepaid, within 21 days of shipping date of warranty parts for cost of parts. Such parts or components will be returned to purchaser or End User FOR Supplier's factory.
- IV. In failing to adhere to the Installation and Maintenance notes in the Manufacturer's Instruction Manual, a User will cause all warranties to become null and void.
- V. No liability under this warranty shall exceed the purchase price of the defective component and warranty shall not be effective unless payment is current.
- VI. Repairs, alterations, adjustment or misuse of the equipment by other than supplier's personnel shall void all liability of J.M. Montgomery Mfg., Inc., unless such authorization has been provided for the purchaser in writing.
- VII. This warranty is expressly in lieu of any other expressed or implied warranty, including any implied warranties of merchantability, suitability or fitness and any other obligation of the supplier, except as expressly set out herein and this warranty extends only to the purchaser.
- VIII. If any warranties or guarantees are implied by law, such are limited to the period of the expressed limited warranty set out above.
11. SUSPENSION OF PERFORMANCE. If in our judgment, reasonable doubt exists as to Purchaser's financial responsibility, or if Purchaser's account is past due in any amount owing the supplier, the supplier reserves the right without liability and without prejudice to any other remedies, to suspend performance, decline to ship, or stop any materials in transit, until Supplier receives payment of all amounts, whether or not due, owing to it, or adequate assurance of such payment.
12. ORDER CANCELLATIONS will not be accepted from the Purchaser. The Purchaser may buy the extent of work completed against an order as an alternative and at that time payment in full for the work in progress will be required.
13. RETURNED MERCHANDISE will not be accepted without written permission and must arrive prepaid. A re-stocking charge of 15% will be applied to all returned merchandise.
14. CONTRACTUAL LAWS relating to the Quotation/Agreement shall be governed by the laws of the Commonwealth of California and this contract shall be deemed a part thereof.
15. SERVICE RATES:
Standard Rates:
Charge for in-plant service during normal working hours, Monday thru Friday...\$35.00/hr
Charge for travel---Monday thru Friday.....\$25.00/hr
Overtime Rates:
Charge for work performed in excess of 8 hrs. in one day, or hours worked beyond normal day shift working hours.....\$45.00/hr
Saturdays, Sundays and Holidays.
Charge for work performed during Saturday, Sunday or Holidays.....\$70.00/hr
Travel expenses. Customer will be billed actual travel expenses accrued for commercial travel. (Air fare, taxi, car rental, etc., meals and lodging.)
16. ENTIRE AGREEMENT: The terms set forth herein constitute the sole terms and conditions of the contract between Purchaser and Supplier. No other terms, condition or understanding whether oral or written shall be binding upon Supplier unless hereafter made in writing and signed by Supplier's authorized representative.

J.M. MONTGOMERY MFG., INC.
314 Yampa St., Bakersfield, CA 93307