

EQUIPMENT MANUAL

NO. 180 DEEP THROAT COMBINATION FORMER

MANUAL FORM F-21-B

This manual has been written to instruct your operator in the operation and maintenance of your Niagara Combination Former. When written, it was completely up-to-date. Because of later improvements in design, descriptions may vary slightly from the Combination Former delivered to you.

Your Niagara Combination Former is a precision-built, accurate, quality machine tool. Careful attention to adjustment and maintenance should result in many years of trouble free service. Although your former has been carefully inspected and tested in our plant, some of the adjustments may have been disturbed in transit. Therefore, it is recommended that your millwrights, maintenance men and operators carefully read these instructions before the former is installed or operated. Additional copies of this manual will be furnished on request. We can assume no liability for unauthorized alterations or attachments to the former.

NOTE: If the employee does not read or understand English, it is the employer's responsibility to interpret and explain all warning signs, all information contained in this manual or anything pertaining to the care and use of this combination former.

PRICE \$10.00 EACH

WARNING

TO PREVENT SERIOUS BODILY INJURY
NEVER PLACE ANY PART OF YOUR BODY NEAR
MOVING PARTS OF THIS EQUIPMENT.
NEVER WEAR LOOSE CLOTHING THAT COULD
BE ENTTANGLED OR CAUGHT IN MOVING
PARTS.
NEVER OPERATE OR MAINTAIN THIS EQUIPMENT
WITHOUT PROPER INSTRUCTIONS.
IT IS THE EMPLOYEE'S RESPONSIBILITY TO IMPLEMENT THE
SAFETY MEASURES THAT ARE NECESSARY OR REQUIRED FOR
THE PROPER USE OF THIS EQUIPMENT.
DO NOT REMOVE THIS SIGN FROM THIS EQUIPMENT.

Niagara Machine & Tool Works
General Offices, P.O. Box 475, Buffalo, New York 14240, U.S.A.

INSTALLATION

BEFORE INSTALLING THIS FORMER, READ AND UNDERSTAND THE CURRENT ANSI B11-12 STANDARD FOR MACHINE TOOLS - ROLL FORMING AND BENDING MACHINES - SAFETY REQUIREMENTS FOR CONSTRUCTION, CARE AND USE.

Copies can be ordered from: American National Standards Institute, 1430 Broadway, New York, New York 10018.

RECEIVING

Immediately upon receiving your former, check it very carefully for damage or losses in transit. Since all equipment is sold f.o.b., the Niagara plant, our responsibility ceases when the transportation company signs the Bill of Lading, indicating that they have received all the items listed on the Bill of Lading in good condition. Report any loss or damage to the delivering carrier promptly to insure proper handling of your claim.

SETTING UP

RIGGING AND HANDLING - It is usually most convenient to leave the former on skids while locating it on its foundation. The Combination former may be rigged into position on rollers or, if crane service is available, it may be lifted by placing a bar through the throat of the frame, finding a balance point, and then placed in its desired position. Care must be taken that the Circle Cutting Arm or Flanging Attachment is close to the Rolls to obtain more effective balance when lifting. Do not attach any lifting slings to the Circle Cutting Attachment or Flanging Attachment.

MOUNTING - The 180 Combination former does not require a special foundation. However, it should be placed directly on a solid floor of adequate strength to support the weight of the former. Shims should be inserted under the base as required to level the former.

CLEANING

The former is protected from rusting during shipment by a compound. In spite of precautions taken in preparation for shipment, dirt and foreign material may find their way into the bearings and can cause considerable damage unless thoroughly cleaned. The rust proofing compound should be washed off with a suitable solvent. Remove all dirt accumulated in transit. Be sure all oil holes are not only open but also clean. It is a desirable precaution to run a new former idle for a while, being sure the working parts are well lubricated.

LUBRICATION

Proper lubrication is a vital importance and gives the owner an opportunity to save maintenance and to increase the length of service. The former is provided with oil holes and oil cups at the various lubrication points. The front lower shaft bearing is lubricated by removing a plug and filling hole with oil. The gear box should be filled to the oil level plug at the rear. The lubrication chart on Page 9 illustrates the location of these points and additional information relative to lubrication.

CONNECTING ELECTRICAL SERVICES

CAUTION: ELECTRICIANS CHECKING DIRECTION OF ROTATION SHOULD BE CAUTIONED NOT TO OPERATE THE FORMER UNTIL IT HAS BEEN THOROUGHLY CHECKED, CLEANED, LEVELED AND LUBRICATED. A WIRING DIAGRAM IS FURNISHED IN THE ELECTRICAL CONTROL CABINET.

Remove the guard covering the incoming power terminals on the line side of the main disconnect switch in the electrical control cabinet. Connect an electrical line of proper voltage, phase, Hertz and size to the power terminals. Only one power source is required. Use at least the same size wire as the wire connecting the starter to the motor. The motor must rotate in the proper direction so material moves away from the operator when standing at the Master operators station.

CAUTION: REPLACE THE GUARD OVER THE INCOMING POWER TERMINALS. HIGH VOLTAGE WILL BE PRESENT ON THESE TERMINALS EVEN THOUGH THE MAIN DISCONNECT SWITCH IN THE ELECTRICAL CONTROL CABINET IS IN THE "OFF" POSITION.

CAPACITY

The capacity of this former is given for U.S. Gage Mild Steel as follows:

With standard cutters of with	
circle flanging rolls	12 gage
With standard crimping rolls	16 gage
With other rolls	14 gage

NOTE: THIS FORMER IS NOT SUITABLE FOR CUTTING RINGS (IF SIDE CUTS)

OPERATION

BEFORE OPERATING THE FORMER, READ AND UNDERSTAND THE CURRENT ANSI B11-12 STANDARD. CAUTION: READ THIS ENTIRE MANUAL BEFORE PLACING FORMER IN OPERATION.

GENERAL OPERATION

Detailed instructions for performing all the various operations possible on this former are beyond the scope of this manual. The production of satisfactory sheet metal parts depends largely on the skill and training of the craftsman performing the operation. To get the most out of the former, it should be operated by skilled sheet metal workers.

Training courses in the performance of the various operations that can be performed on this former are generally available at trade and technical institutions. Text book publications on the subject are available.

CLUTCH AND DRIVE

For operation, the Selector Switch for Hand-Foot must be set in the chosen mode. In the foot mode, rolls rotate only while the foot switch is depressed in the forward or reverse position. In the hand mode, roll rotation is controlled by forward or reverse push buttons and a masterstop button. The drive is reversible.

ADJUSTMENTS

The adjustments for this former are easily made. Lateral adjustment of the upper roll shaft, for vertical roll alignment, is accomplished by means of the two knurled screws on the top of the former. By tightening or loosening either of these screws, the shaft may be adjusted in or out. As these screws must oppose each other, be sure they are both tight before operating the former.

The spring behind the crank screw elevates the upper shaft. If the upper roll raises sluggishly, the nuts holding the spring can be tightened and/or some oil can be placed on the bearing surface between the rocking box and the frame.

The upper roll can be lowered by either the treadle or the crank handle. The crank handle should be used to ease the upper roll into capacity work. The jam nuts on the crank screw can be set so the upper shaft will move down just enough to accommodate the thickness of work. MULTIPLE THICKNESS PASSING BETWEEN THE ROLLS, WITH THE UPPER ROLL IN A FIXED SETTING; CAN CAUSE SERIOUS DAMAGE. Forcing the crank screw with insufficient clearance between the rolls to accommodate the work will spring the shafts. The foot switch is usually used for quick action on light work.

The pivot screws, held by lock nuts on each side of the housing, provide a pivot for the rocking motion of the upper roll shaft. These pivots maintain the axial alignment of both shafts; this adjustment is factory set and should not require further adjustment under normal usage.

CHANGING ROLLS

CAUTION: BEFORE CHANGING ROLLS BE SURE THE SELECTOR SWITCH IS IN THE "OFF" POSITION AND THE MAIN DISCONNECT IS IN THE "OFF" POSITION, LOCKED AND TAGGED.

Rolls are held on the shaft by means of collar screws fitted into tapped holes in the ends of the shaft. Both screws have a right hand thread.

To change rolls:

1. Raise the upper roll with crank screw.
2. Using the pin wrench provided, place the two prongs into the holes of the collar screw of the upper roll.
3. Loosen the upper screw by turning it to the left (counter-clockwise). Loosen the lower nut by turning it in the same direction. If the collar rolls become extremely tight, open the rolls by use of the crank screw and insert a block of wood between the shafts. Lower the upper shaft so the block of wood is clamped firmly between the two shafts. Engage the clutch. Holding the pin wrench in place with the left hand, strike the outer end of the wrench sharply with a hammer, in the proper direction as described above.

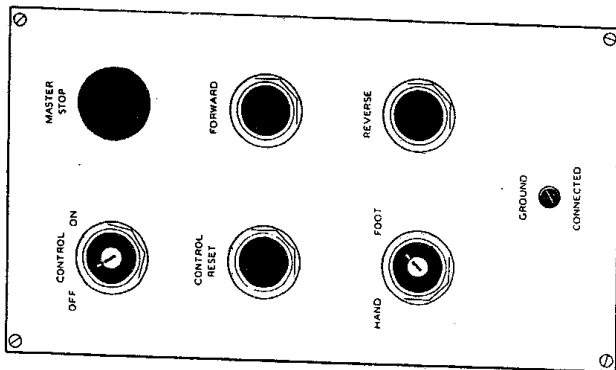


Fig. 1

MASTER OPERATOR'S STATION

4. Remove the upper roll by sliding it off the shaft.
5. Repeat the above operation for removal of the lower roll.
6. Mount the desired rolls by installing the lower roll and then the upper roll so that the keyway in the roll fits over the key on the shaft.
7. Lower upper roll until shafts are parallel, check lateral alignment and, if necessary, make proper adjustment with knurled screws on top of the former.

When installing rolls, be sure that shaft ends and shoulders are clean and free of nicks and burrs. Remove burrs with file if necessary. Apply a light coating of oil to shaft ends when installing rolls.

To prevent collar screws from sticking, threads should be kept clean and lubricated.

Form F-27 illustrates standard rolls and gages used on this former. It is important to remember that the correct gage must be used with these various rolls to obtain optimum results.

SINGLE OR O.G. BEADING

1. Install rolls as described in paragraph CHANGING ROLLS.
2. Determine the setting of the gage using a scrap piece of material.
3. Insert the work between the rolls with the edge pressed firmly against the gage.
4. Hold the work in a horizontal position with the left hand and lower the upper roll until the work is held firmly between the rolls.
5. While holding the work against the gage with the left hand, engage the clutch and feed the upper roll into the work slowly. The bead should be made in several revolutions of work. More revolutions are necessary to make a bead on heavier metal. NOTE: A multiple thickness seam must not be passed between the rolls.

CRIMPING

1. Install rolls as described in paragraph CHANGING ROLLS.
 2. Set the gage to the desired width of crimp. Measure from the gage to the end of the lower crimping roll.
 3. Proceed as previously outlined under SINGLE OR O.G. BEADING. CAUTION: For jobs with riveted or single locked seams, start and finish without crossing the seam. Crossing the seam would damage the corrugations on the rolls and may spring the shafts.
- Other operations such as elbow edging, furnace collar edging, wiring and burring can be performed on the 180 Combination former in a similar manner as described under SINGLE OR O.G. BEADING and CRIMPING.

CIRCLE CUTTING

1. Install cutters as described in paragraph CHANGING ROLLS.
2. Adjust the clearance between the cutters by use of feeler gages to about ten percent the thickness of the metal to be slit (see Fig. 1). This adjustment is made by means of the knurled screws.
3. The upper roll should be lowered just enough to break through the metal, about 1/32" (see Fig. 3). Find this setting with a piece of scrap material and set jam nuts on crankscrew accordingly. (An extra set of cutters makes it possible to sharpen one set without interrupting work schedule.) See paragraphs on INSTALLATION and OPERATION OF CIRCLE CUTTING ATTACHMENT on Page 5.

CIRCLE FLANGING

Install rolls as described in paragraph CHANGING ROLLS. The upper roll is properly adjusted when one thickness of material can be inserted between the flanging rolls at points "T" as illustrated in Figure 3. The two nuts on the crankscrew should be locked in place to prevent the rolls from being adjusted closer than one thickness of material. See the paragraphs on INSTALLATION & OPERATION OF CIRCLE FLANGING ATTACHMENT on Pages 6 & 7.

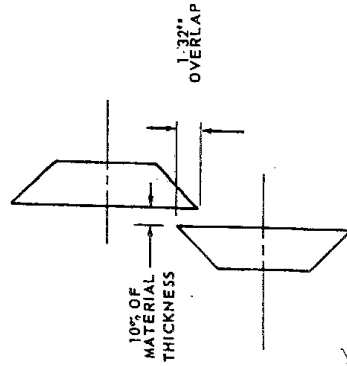


Fig. 2

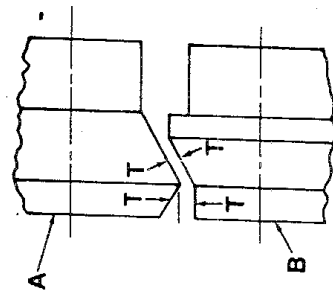


Fig. 3

CIRCLE CUTTING ATTACHMENT-INSTALLATION

1. Raise the upper shaft and install cutters on shafts (see paragraph on CIRCLE CUTTING).
2. Support stand (26) (see Fig. 4) should be turned in as far as possible by hand.
3. Attach a sling around the horn (16) (balance level) and insert the horn into the frame opening until the end of the horn is flush with the back of the former frame.
4. With the sling still attached, place a metal straightedge on lower clamping disc (11) (at right angle to horn) and measure from each end of straightedge to base of former to align clamping disc (11) by rotating horn (16).
5. Remove set screw (41) and spot a hole in the horn (16) to facilitate future installation. Retighten set screw (41).
6. Adjust the support stand (26) until it rests on the floor (shim if necessary). Tighten the support stand locknut and remove sling.
7. Open clamping lever (3) and loosen jam nuts on top and bottom of set screws (4) & (15).
8. Turn straightedge on clamping discs (11), parallel with the horn (16), and adjust lower clamping disc set screw (15) until the bottom of the straightedge is resting on the top of the lower cutter (B). Tighten set screw (15) with jam nut. Remove straightedge.
9. With a piece of square material, locate and prick-punch the center. (Material should be maximum capacity range and diameter as listed in Niagara Bulletin for the machine.) Place material on the center of the lower clamping disc (11) and adjust the top clamping disc with set screw (4) so the material will be held firmly in place when clamping lever (3) is brought down. Tighten jam nut on set screw (4).
10. Loosen two cap screws (34) holding circle arm (37) and adjust arm toward left hand side of the former (away from operator) to maximum position with adjusting screw (35) on circle arm holder (25). Tighten the cap screws (34). Bring the material into the cutters by turning crank handle (28). Engage the clutch and cut the circle in one pass. If there is an opening between material being cut and the cutters, stop and adjust circle arm (37) as in paragraph FINE ADJUSTMENT OF CIRCLE ARM below. Failure to do this may cause cutters to pull the material away from the center of the clamping discs. Put chisel marks at point X on Swivel table and base of circle arm as a working point for maximum cutting.
11. Tighten the jam nuts on the adjusting screws (35) and measure the diameter of the test piece of the material. Then set the pointer on the front of circle arm holder (25) to correspond to the diameter of the material cut.

CIRCLE CUTTING OPERATION

1. Locate and prick-punch the center of a square sheet of material. Place material on the center point of the lower clamping disc (11) (Fig. 4). Adjust the top clamping disc with set screw (4) so the material is held firmly in place when the clamping lever (3) is brought down. Tighten jam nut on set screw (4).
 2. If marks on swivel table and base of circle arm (point X) are not lined up; loosen two cap screws (34) holding circle arm and align marks (point X). Retighten cap screws.
 3. Bring the material into the cutters by turning crank handle (28). Engage the clutch and cut the circle in one pass. If circle is not cutting correctly; see paragraph FINE ADJUSTMENT OF CIRCLE ARM below.
- NOTE: THIS FORMER IS NOT SUITABLE FOR CUTTING RINGS (INSIDE CUTS).

FINE ADJUSTMENT OF CIRCLE ARM

If the center of the clamping disc is BEHIND the correct position, the cutters will tend to draw away from the center of the disc. Adjust the circle arm in small increments TOWARD THE OPERATOR.

If the center of the clamping disc is AHEAD of the correct position, the cutters will tend to draw toward the center of the disc. Adjust the circle arm in small increments AWAY from the operator.

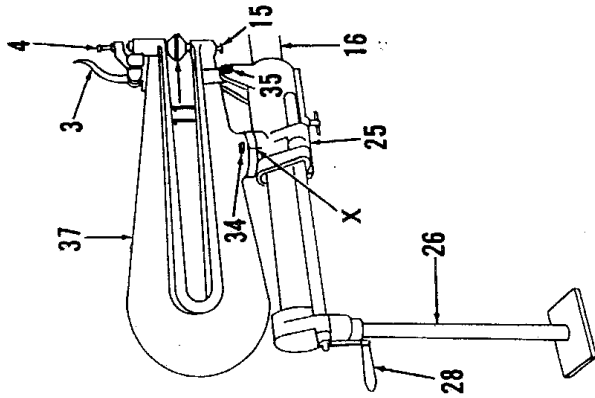


Fig. 4-1

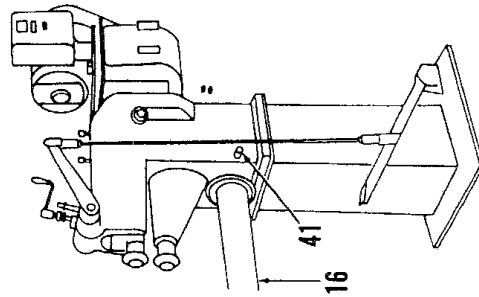


Fig. 4-2

CIRCLE FLANGING ATTACHMENT-INSTALLATION

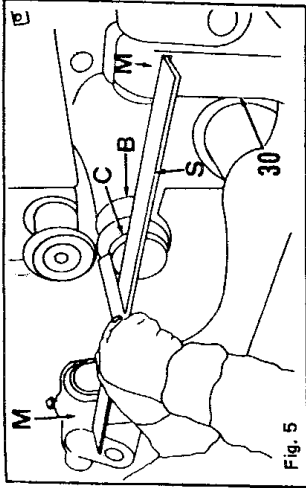


Fig. 5

1. Install rolls as described in paragraph CIRCLE FLANGING. With a sling, carefully install yoke and horn into hole in frame.
2. Place 24" straightedge (S) (Fig. 5) against the milled sections (M) of yoke (30) and measure out 1-11/16" from the milled sections to point (C) of lower roll (B).

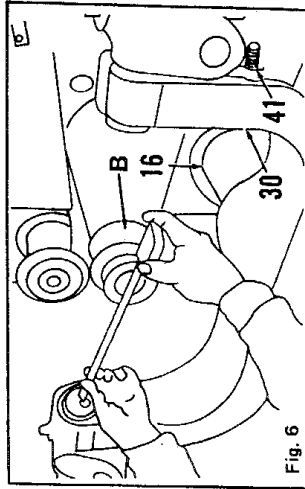


Fig. 6

3. Center yoke (30) from axis of lower roll (B) (Fig. 6) by measuring from each side of the yoke to the axis with a tape. Tighten set screw (41) in frame to lock horn (16) in place. Remove set screw (41) and spot a hole in horn to facilitate future installation; then, replace and tighten set screw.

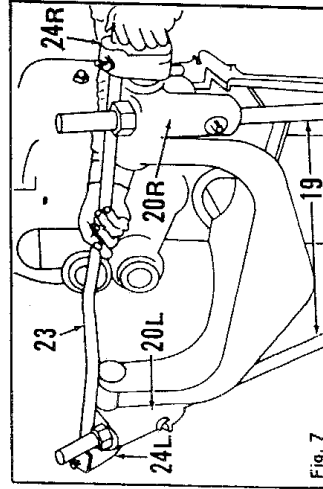


Fig. 7

4. Insert adjusting Rods (19) (Fig. 7) into holes in Pivot Sockets (20L) & (20R). Slip R.H. support Rod Lever (24R) over shaft on R.H. Pivot Socket (20R). Insert Lever Connecting Rod (23) into R.H. Support Rod Lever (24R). Install L.H. Support Rod Lever (24L) into L.H. Pivot Socket Shaft (20L) and onto lever Connecting Rod (23) simultaneously.

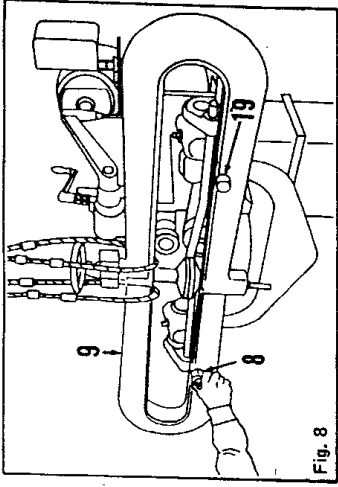


Fig. 8

5. With sling and crane, lift flanging attachment (9) (Fig. 8) onto adjusting rods (19). Install and tighten locknuts (8).

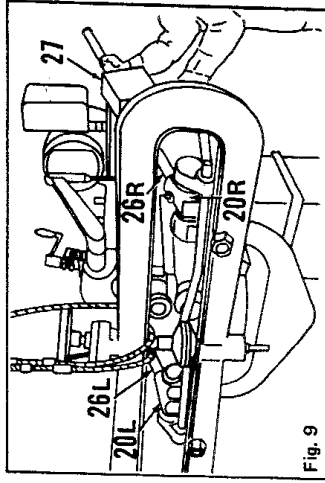


Fig. 9

6. Install curved counterbalance rod (26R) (Fig. 9) into R.H. pivot socket (20R). Install straight counterbalance rod (26L) into L.H. pivot socket (20L). When needed, slide counterbalance weights (27) over rods (26R) & (26L) and adjust as necessary to balance flanging attachment. Tighten all set screws and locknuts on the flanging assembly and remove sling.

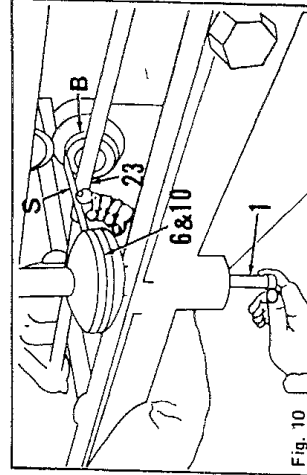


Fig. 10

7. With straightedge (S) (Fig.10) clamped between clamping discs (6) & (10), parallel straightedge with top surface of lower roll (B) by means of set screw (1). Turn high point of lever connecting rod (23) until it touches straightedge (S) to support work piece. Now, the flanging attachment is fully installed.

CIRCLE FLANGING-OPERATION

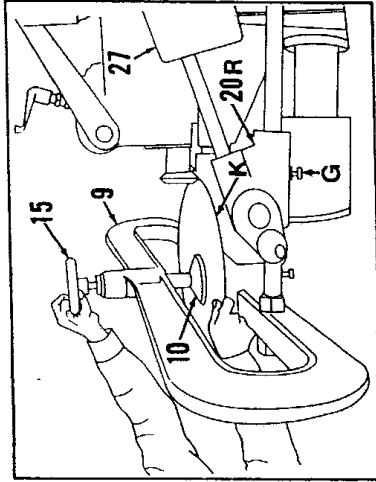


Fig. 11

1. Adjust flanging attachment (9) (Fig. 11) in or out to correspond with inside radius of flange to be made. This is done by loosening set screws (G) on pivot sockets (20R) & (20L). Retighten set screws after adjustment. Remove or adjust weights (27) as needed to counterbalance flanging attachment (9).
2. Center round blank (K) (Fig. 10) between clamping discs (6) & (10) and clamp by turning handwheel (15).

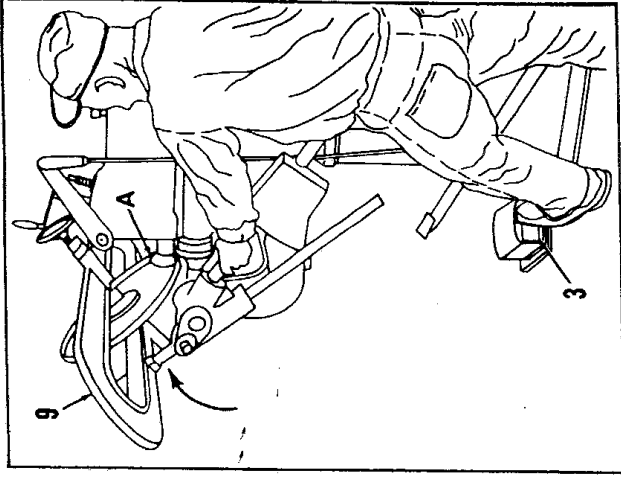


Fig. 13

4. With former still operating, tilt the flanging attachment (9) (Fig. 13) until desired angle of flange is made.

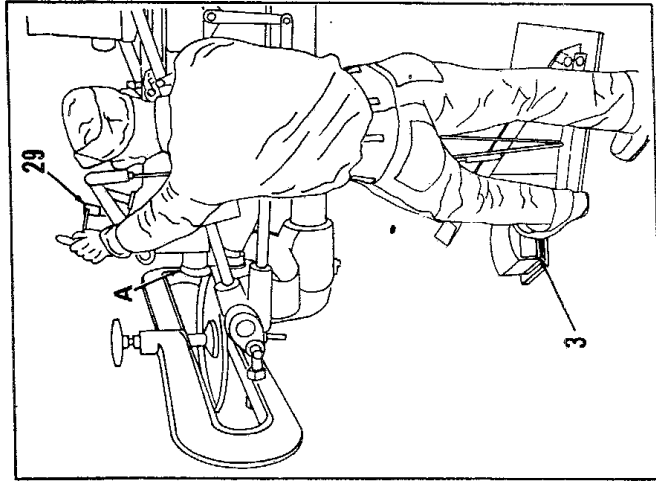


Fig. 12

3. Step on foot switch (3) (Fig. 12). With former operating, slowly lower the upper flanging roll (A) by turning crank handle (29) on frame, or foot switch, until roll bottoms.

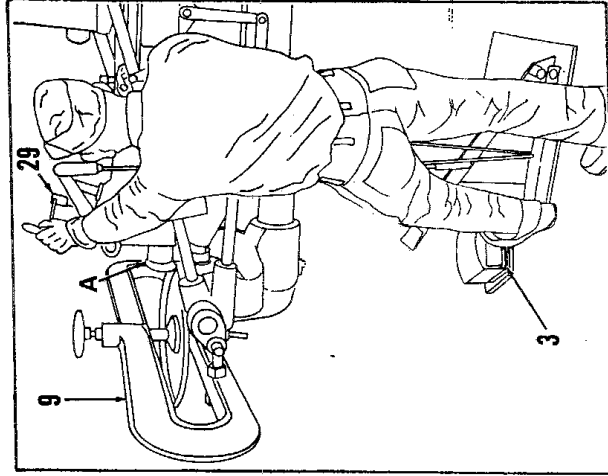


Fig. 14

5. Remove foot from switch. Raise upper flanging roll (A) (Fig. 14) to clear formed piece. Lower the flanging attachment (9) and remove the formed piece from the clamping discs.

MAINTENANCE

BEFORE MAINTAINING OR REPAIRING THE FORMER, READ AND UNDERSTAND THE CURRENT ANSJ B11-12 STANDARD.

GENERAL MAINTENANCE

Cleanliness and general good housekeeping are important. A clean former is easier, safer to operate and more conducive to better working conditions. When cleaning your former, use a solvent and rags, never use waste or an air hose.

Extreme caution must be exercised not to overload the combination former by exceeding its capacity or allowing double thickness of material to pass through the rolls. Dirt and debris must not be allowed to accumulate on the rolls or cutters as this may cause a malfunctioning condition.

Periodic inspection of your former is desirable. Know how it is supposed to operate so that faulty operations can be detected immediately. Replace any worn parts promptly and check fittings, nuts, and bolts for looseness.

Frequent and generous lubrication is a must for long life and dependability. Use the correct lubricants as specified on Page 9 LUBRICATION.

REGRINDING CUTTERS

Keep the cutters sharp for best results. For information on regrinding cutters, see pages 10 & 11.

Cutters made of High Carbon-High Chrome (HC-HC) require a great deal of skill and experience to grind and should be returned to the factory for sharpening.

It is suggested that an extra set of cutters be kept on hand, thus causing no loss in production. CLAIMS THAT CUTTERS WERE TOO SOFT OR CRACKED CANNOT BE CONSIDERED AFTER THEY HAVE BEEN GROUND OUTSIDE OUR FACTORY.

REPAIRS

When ordering repair parts, always state the Catalog number of the former and factory serial number. Since the reference or call out numbers on the following parts list are duplicated on other parts lists, specify part required by giving reference number and full part name followed by this form number.

SERVICE

Should service in the nature of erection, demonstration, or repairing of any former be requested, such service will be rendered at a rate per day plus transportation and living expenses. Direct correspondence regarding service to the attention of the Service Manager.

WARRANTY

Refer to terms & conditions at the time of sale.

LUBRICATION CHART

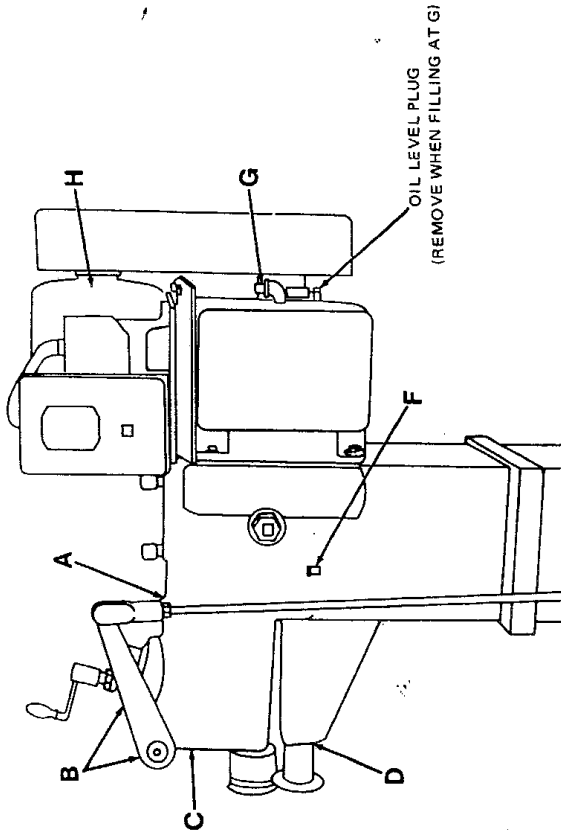


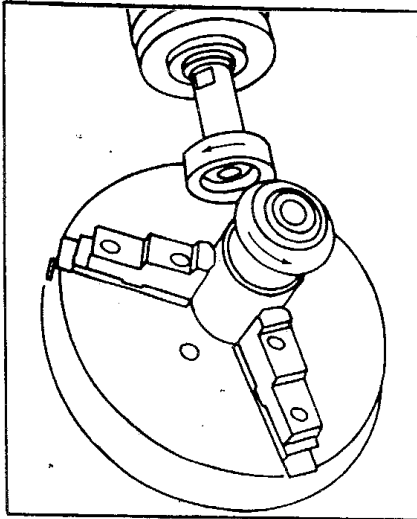
Fig. 15

Points of Lubrication	Service Intervals	Type of Lubrication
A B C D E F	Depends on former usage: Lubricate daily while operating	Mobilgear 630 or Equivalent
G (gear box)	Drain and refill every six months	Mobilgear 630 or equivalent
H	Follow Motor Manufacturer's Recommendations	

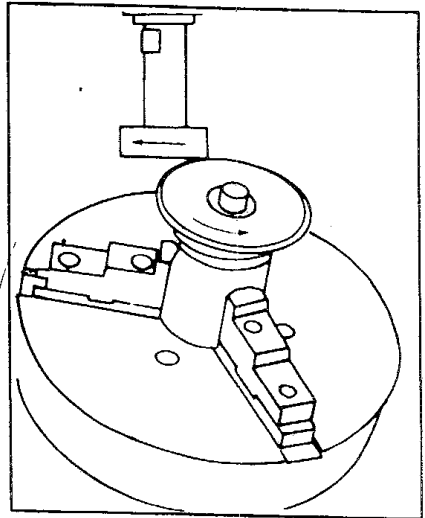
INSTRUCTIONS FOR REGRINDING CUTTERS

Cutters should be machine ground to proper angles by experienced operators. A coolant of water, borax water or emulsion should be applied in ample quantities. Standard Niagara cutters are made of high carbon tool steel which are best rough ground on a coarse-grain (24-36) wheel and finished on a fine-grain (60-100). They can be rough and finished machine ground on the same wheel if a Norton Company Alundum abrasive 24 to 36 grain L grade B vitrified bond or a Carborundum Company equivalent Aloxite abrasive 36 grain L grade vitrified is used. Any representative of a reliable grinding wheel company can recommend the desired wheel when

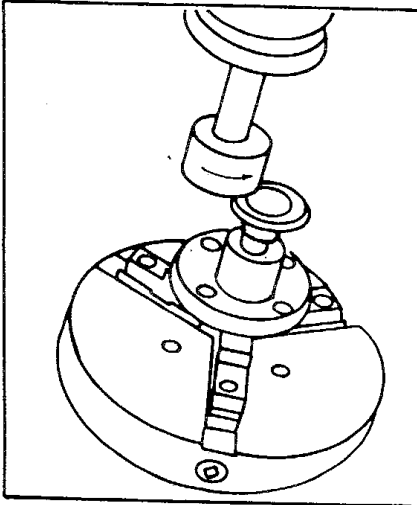
the details of the job are known. For this type of work Niagara uses a Norton wheel designated as 32A60K5VBE. When grinding, it is important that it should be done with the grinding wheel turning toward the cutting edge, and at right angles to the cutting edge. Peripheral grinding is not recommended. The manufacturer of the grinding wheel can recommend the proper speed for the particular wheel used. Cutters made of high carbon, high chrome (HCHC) require a great deal of skill and experience to grind and should be returned to the factory for sharpening.



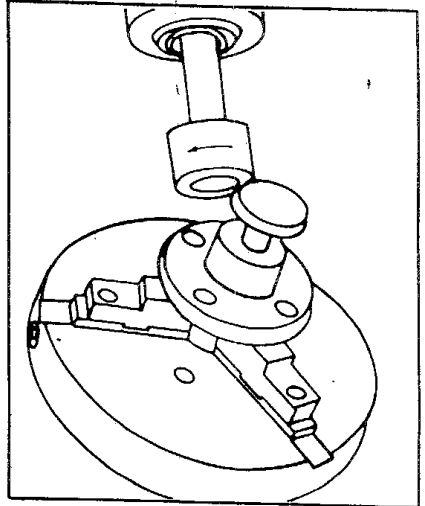
Grinding Edge of Cutter for Rotary Shear.



Grinding Edge of Lower Cutter for Ring Shear.



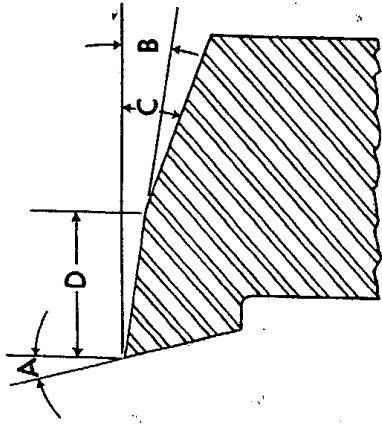
Grinding Face of Cutter for Rotary Shear.



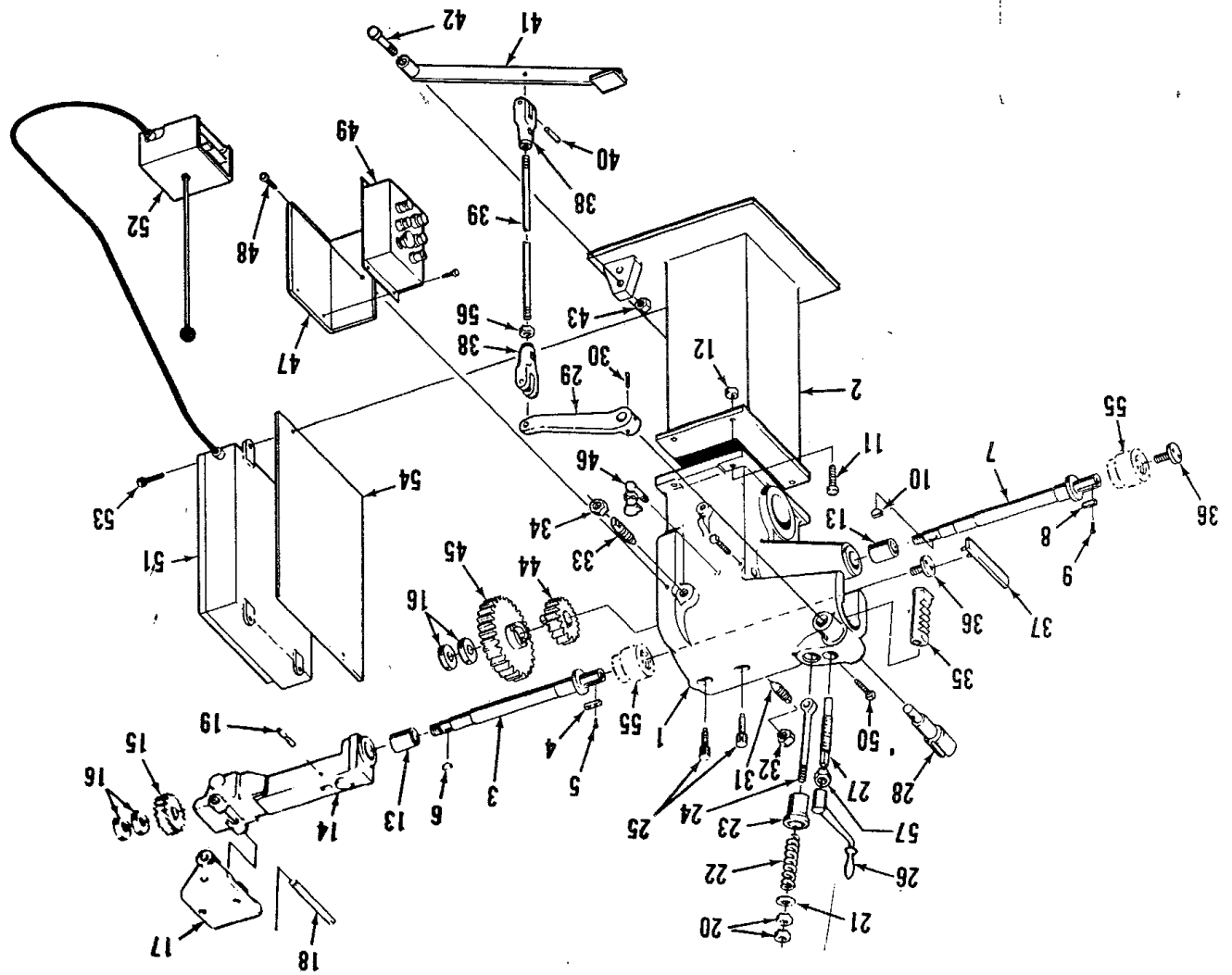
Grinding Face for Lower Cutter for Ring Shear.

NOTE DIRECTION OF ROTATION OF GRINDING WHEELS

ANGLES FOR REGRINDING CUTTERS



Part No. of Cutter	Angle A	Angle B	Angle C	Dimension D	Original O.D.
SPECIAL ALLOY (usually H.C.H.C.)					
P-36671	1°	2°	30°	1/8"	.3 5/8"
P-36672					

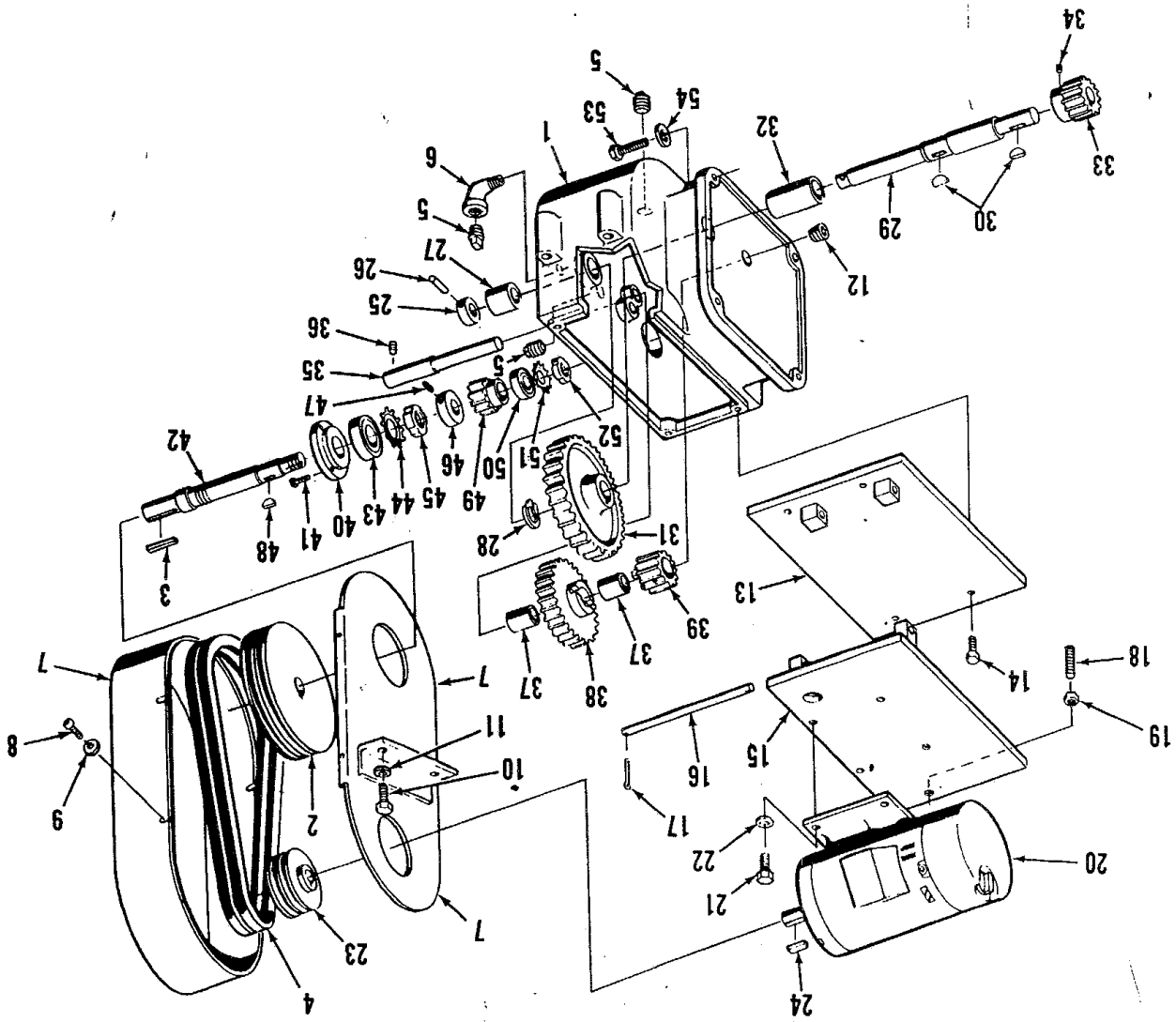


PARTS LIST

SINCE THE REFERENCE OR CALL OUT NUMBERS ON THE FOLLOWING PARTS LIST ARE DUPLICATED ON OTHER PARTS LISTS, SPECIFY PART REQUIRED BY GIVING REFERENCE NUMBER AND FULL NAME FOLLOWED BY FORM AND PAGE NUMBER.

FRAME

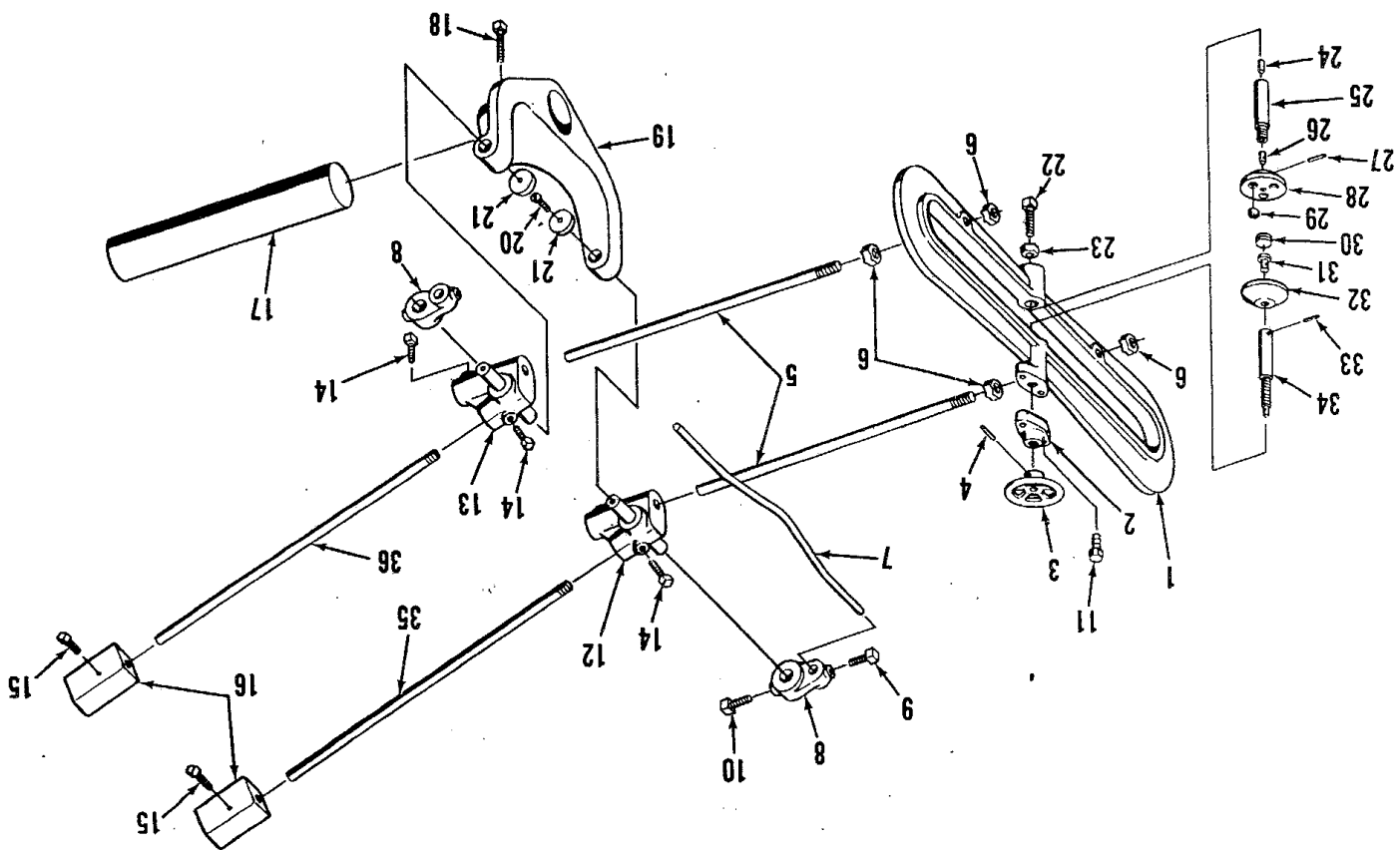
- | | |
|--|--------------------------------|
| 29. Lever | 1. Frame |
| 30. Roll Pin | 2. Pedestal |
| 31. L.H. Pivot Screw | 3. Upper Shaft |
| 32. Jam Nut | 4. Upper Shaft Key |
| 33. R.H. Pivot Screw | 5. Upper Shaft Key Screw |
| 34. Jam Nut | 6. Upper Shaft Woodruff Key |
| 35. Rack | 7. Lower Shaft |
| 36. Collar Screws | 8. Lower Shaft Key |
| 37. Wrench for Shaft Collar Screws | 9. Lower Shaft Key Screw |
| 38. Treadle Fork | 10. Lower Shaft Woodruff Key |
| 39. Treadle Rod | 11. Frame Mounting Screw |
| 40. Pin | 12. Hex Nut |
| 41. Long Treadle | 13. Upper Shaft Bushing |
| 42. Treadle Stud | 14. Rocking Box |
| 43. Hex Nut | 15. Upper Connecting Gear |
| 44. Lower Connecting Gear | 16. Upper and Lower Shaft Nuts |
| 45. Main Gear | 17. Adjusting Bracket |
| 46. Oil Cup | 18. Adjusting Bracket Pin |
| 47. Operator Station Bracket | 19. Spring Rod Pin |
| 48. Operator Station Bracket Mounting Screws | 20. Spring Rod Nuts - 1/2" hex |
| 49. Operator Station | 21. Washer |
| 50. Screw | 22. Spring Rod Spring |
| 51. Clutch Motor Controller | 23. Spring Cup |
| 52. Footswitch | 24. Spring Rod |
| 53. Controller Mounting Screw | 25. Locking Hand Screws |
| 54. Starter Bracket | 26. Crank Handle |
| 55. Roll (optional) | 27. Crank Screw |
| 56. Hex Nut | 28. Segment |
| 57. Nut | |



GEAR BOX

- 28. Retaining Ring
- 29. Driveshaft
- 30. Woodruff Key
- 31. Main Gear
- 32. Driveshaft Bushing
- 33. Main Pinion
- 34. Set Screw
- 35. Intermediate Gear Axle
- 36. Set Screw
- 37. Bushing
- 38. Intermediate Gear
- 39. Intermediate Pinion
- 40. Bearing Cover
- 41. Bearing Cover Screws
- 42. Pulley Shaft
- 43. Bearing
- 44. Lockwasher
- 45. Locknut
- 46. Pulley Shaft Collar
- 47. Set Screw
- 48. Woodruff Key
- 49. Pulley Shaft Pinion
- 50. Bearing
- 51. Lockwasher
- 52. Locknut
- 53. Gear Box Mounting Screws
- 54. Washer

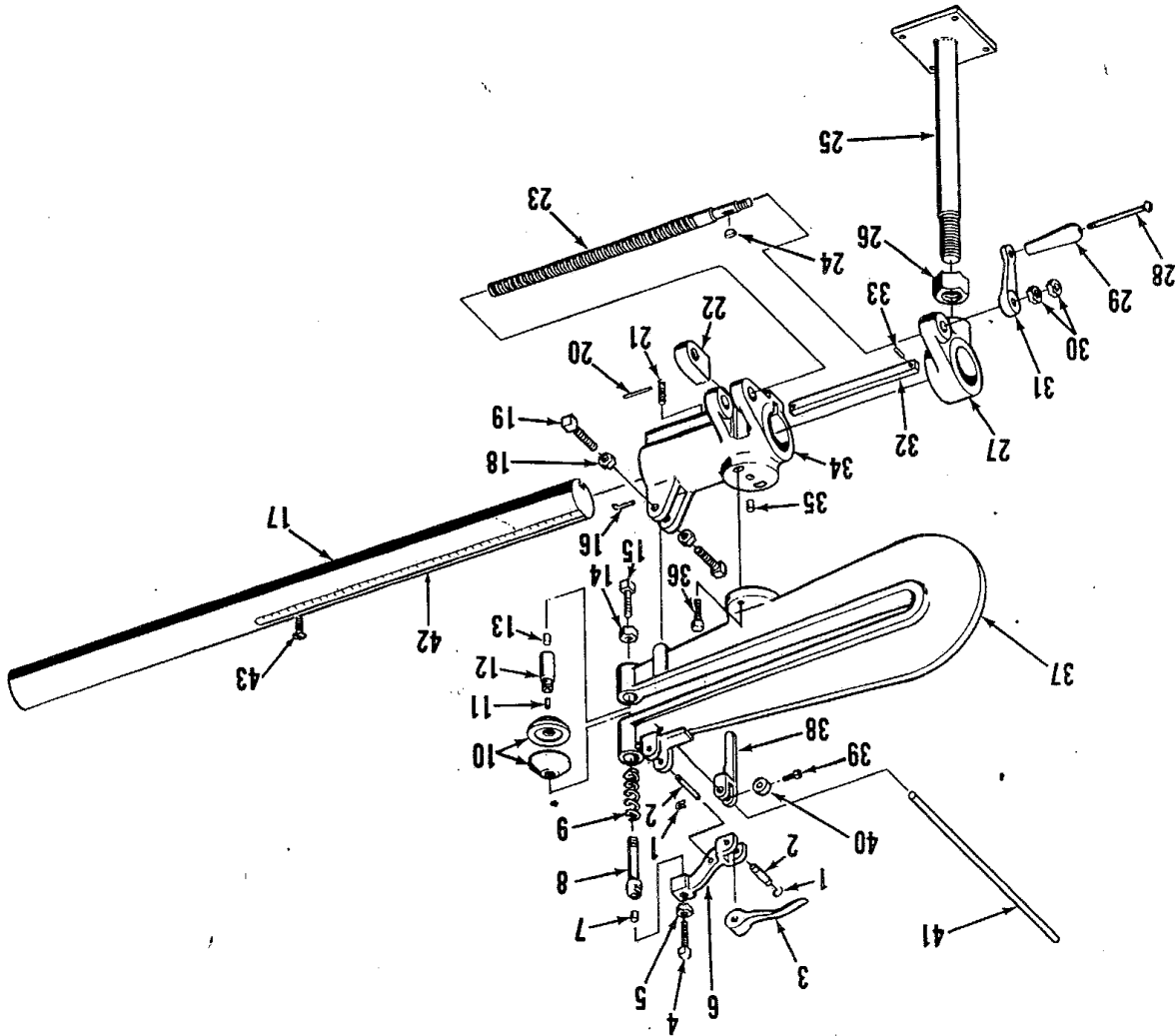
- 1. Gear Box Housing
- 2. Gear Box Sheave
- 3. Key
- 4. V-Belts
- 5. Oil Level Plug
- 6. Elbow
- 7. Belt Guard
- 8. Screw
- 9. Washer
- 10. Belt Guard Mounting Screw
- 11. Washer
- 12. Pipe Plug
- 13. Gear Box Cover
- 14. Gear Box Cover Mounting Screws
- 15. Motor Plate
- 16. Hinge Pin
- 17. Cotter Pin
- 18. Adjusting Screw
- 19. Hex Nuts
- 20. Motor
- 21. Motor Mounting Screw
- 22. Washer
- 23. Motor Sheave
- 24. Key
- 25. Driveshaft Collar
- 26. Collar Pin
- 27. Driveshaft Bushing



CIRCLE FLANGING ATTACHMENT

- 19. Yoke
- 20. Screw
- 21. Pivot Screw Collars
- 22. Set Screw
- 23. Check Nut
- 24. Lower Spindle Plug
- 25. Lower Clamp Spindle
- 26. Lower Spindle Point
- 27. Roller Pin
- 28. Lower Clamp Disc
- 29. Friction Plugs
- 30. Upper Spindle Plug
- 31. Upper Disc Pin
- 32. Upper Clamp Disc
- 33. Roller Pin
- 34. Upper Clamp Spindle
- 35. L.H. Weight Rod
- 36. R.H. Weight Rod

- 1. Circle Arm
- 2. Circle Arm Cap
- 3. Handwheel
- 4. Roll Pin
- 5. Adjusting Rods
- 6. Hex Nut
- 7. Support Rod
- 8. Support Rod Levers
- 9. Set Screw
- 10. Set Screw
- 11. Screw
- 12. L.H. Pivot Socket
- 13. R.H. Pivot Socket
- 14. Set Screw
- 15. Set Screw
- 16. Weights
- 17. Horn
- 18. Set Screw



CIRCLE CUTTING ATTACHMENT

- 22. Nut
- 23. Adjusting Screw
- 24. Woodruff Key
- 25. Floor Stand
- 26. Floor Stand Nut
- 27. Socket
- 28. Handle Pin
- 29. Handle
- 30. Check Nut
- 31. Crankhandle
- 32. Key
- 33. Pins
- 34. Circle Arm Holder
- 35. Pin
- 36. Screw
- 37. Circle Arm
- 38. Side Gage
- 39. Set Screw
- 40. Collar
- 41. Side Gage Rod
- 42. Scale
- 43. Screw
- 1. Snap Ring
- 2. Lever Pins
- 3. Lever
- 4. Set Screw
- 5. Nut
- 6. Eccentric Handle
- 7. Wearing Pin
- 8. Upper Disc Spindle
- 9. Spring
- 10. Clamping Discs
- 11. Center Point
- 12. Lower Disc Spindle
- 13. Wearing Pin
- 14. Nut
- 15. Set Screw
- 16. Indicator Pin
- 17. Horn
- 18. Jam Nut
- 19. Set Screw
- 20. Pin
- 21. Set Screw