SHEAR MANUAL

NIAGARA POWER SQUARING SHEARS

SERIES 3B - 4B - 5B - 6 - 7B - 8 - 9 - 10 - 12

FORM C·10·B

NIAGARA

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

INSTRUCTIONS and PARTS LIST

NIAGARA POWER SQUARING
SHEARS

SERIES 3B - 4B - 5B - 6 - 7B - 8 - 9 - 10 - 12

FORM C·10·B

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

Your Niagara Shear is a precision-built, accurate, quality machine tool. Careful attention to the adjustment and maintenance of the Shear should result in many years of trouble-free service. Although your machine 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 shear operators carefully read these instructions before the Shear 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 Shear.

WARNING

TO PREVENT SERIOUS BODILY INJURY

NEVER PLACE ANY PART OF YOUR BODY UNDER THE RAM, HOLDOWN FEET, BETWEEN BLADES, BEYOND GUARDS OR AWARENESS BARRIERS UNLESS THE POWER IS OFF AND THE RAM IS BLOCKED UP.

NEVER OPERATE, OR MAINTAIN THIS MACHINE WITHOUT PROPER INSTRUCTION AND WITHOUT FIRST READING AND UNDERSTANDING THE OPERATORS OR MACHINE MANUAL.

IT IS THE EMPLOYERS RESPONSIBILITY TO IMPLEMENT THE ABOVE AND MAINTAIN ALL GUARDS, BARRIERS AND DEVICES IN PLACE AND IN PROPER WORKING ORDER.

DO NOT REMOVE THIS SIGN FROM THIS MACHINE

PRICE $10.00 EACH

5C 646 N.M. & T.W.

Printed in U.S.A.

INDEX

RECEIVING

Immediately upon receiving shear, check it very carefully for damage or loss of parts in transit. Since all equipment is sold F.O.B., the Niagara plant, our responsibility for transit damage ceases when the transportation company signs the Bill of Lading indicating that it has received all of the listed items in good condition. Report any loss or damage to the delivering carrier promptly to insure proper handling of your claim.

Shortages not appearing on the Bill of Lading or discrepancies between equipment received and the order should be reported to us immediately.

INSTALLATION

If crane service is available, lift the shear onto the foundation. Attach slings as shown in Fig. 1. Protect the finished surfaces on the front of the bed with timber. CAUTION — do not attach sling around center of the shear because this may spring and distort the crosshead. If crane service is not available rig the shear into position on the foundation and lower with jacks under the bed at each end.

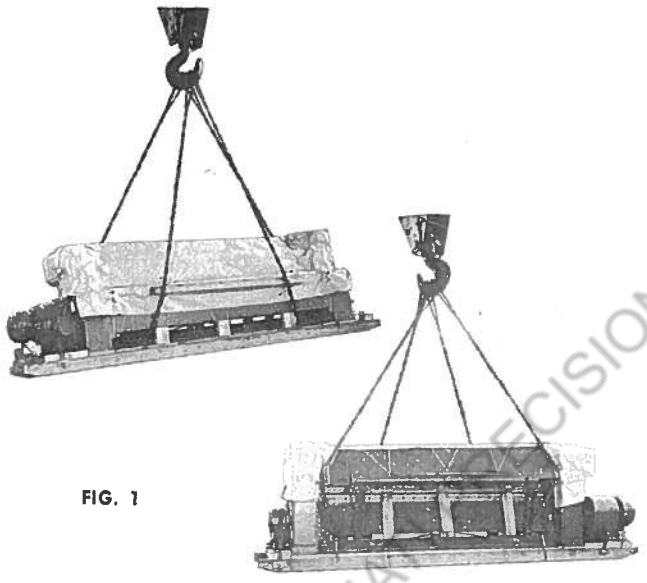


FIG. 1

FOUNDATION

A suitable foundation is necessary to keep the shear level and in proper alignment.The type and thickness of foundation will depend on the sub-soil conditions. In some cases, a rigid concrete foundation that will not settle is required.

Provision for foundation bolts has purposely been omitted. This is to prevent the possibility of adding undue strain or twist to the shear through possible settling of the foundation or tightening of bolts.

To prevent any tendency to move along the floor the shear may be blocked in place by lagging short pieces of angle iron to the foundation firmly against the front, back and side of each leg.

However, machines having steel legs are equipped with leveling screws which permit quick, accurate leveling without the use of jacks or wedges. Brackets in conjunction with the rear leveling screws are used to locate the shear and prevent any tendency for it to move from its foundation.

The shear should be placed on its foundation and leveled in accordance with the instructions which follow. Should shimming be required, the leveling screws are used to raise the shear off its foundation so shims can be inserted under the housings. Back off leveling screw "A" Fig. 1-A and insert a piece of scrap plate steel under the lug "B" for the screw to bear on without embedding into the floor or foundation. Tightening the leveling screw "A" will raise the housing to permit the insertion of shims. After the shims have been inserted, back off the leveling screws and check in accordance with the leveling instructions. When the final leveling is accomplished all four leveling screws should be backed off. UNDER NO CIRCUMSTANCES SHOULD THE WEIGHT OF THE SHEAR REMAIN ON THE LEVELING SCREWS DURING OPERATION OF THE SHEAR. They are intended only as an aid to leveling.

To prevent the shear from moving after it has been leveled, the two positioning brackets "C" should be lagged to the floor under the *REAR* leveling lugs only. When the brackets are in place, lower the leveling screws "A" through the bracket hole until they bear against the floor and then back off one or two turns and secure with locknuts "D". Then lag the positioning brackets to the floor.

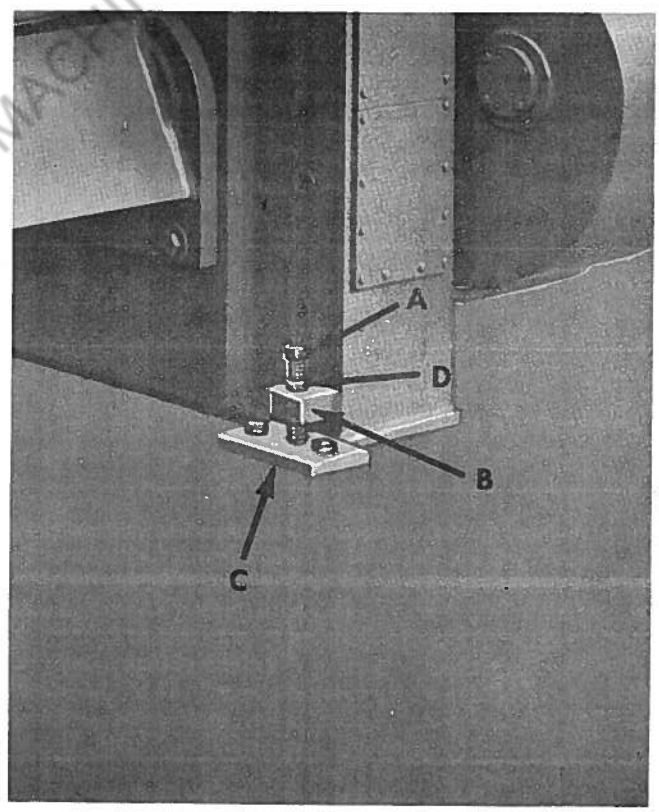


FIG. 1A Leveling device

To aid in preparing the foundation, an outline drawing of the shear giving overall dimensions will be furnished upon request.

CLEANING

The shear is protected from rusting during shipment by a slushing compound. This compound should be washed off with a suitable solvent such as Sovasol, carbontetrachloride or other cleaning fluid. Wipe the knives clean and coat with light oil. Remove all dirt and cinders accumulated in transit. Inspect the oil cups to see that they are clean. If not, do not blow out but remove cup and wash in solvent. Periodic cleaning after the shear has been placed in operation is desirable.

LEVELING

Accurate and successful operation of the shear depends on careful leveling. The purpose of leveling is to insure that the crosshead guide bearings carried by the left and right hand housings will be parallel and will guide the crosshead for vertical reciprocation without binding.

The simplest way to level a Niagara Shear is to check the clearance of the crosshead guide bearings. Any misalignment caused by the machine not being level will immediately become apparent in cross-corner binding of the crosshead in the ways.

Lengthwise (right to left) leveling is relatively unimportant and can satisfactorily be accomplished with the aid of a common carpenter's level. Front to back leveling of each end of the shear is very important to assure that the crosshead guide bearings of the right and left hand housings are exactly parallel to each other. A precision machinist's level used at each end of the bed is helpful although not absolutely necessary inasmuch as the leveling should always be verified by the feeler gage method to be described in the following paragraphs.

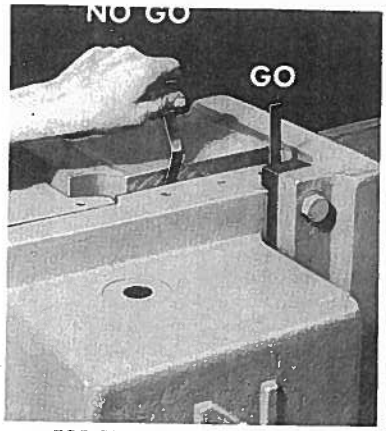
To level a shear by the feeler gage method select a .002" or preferably a .0015" feeler as a "GO" or "NO GO" gage. If this feeler can be inserted into the bearing the clearance is considered open. If the feeler cannot be inserted, the clearance is considered closed. There are eight bearing areas to be checked by means of the feeler gage. These are the front and back bearing surfaces at both the top and bottom of the crosshead guide at the left hand end of the shear and the four similar surfaces at the right hand end of the shear.

The crosshead in a level shear will rest in the guide bearings tilted either forward or backward. If tilted backward, the bearing clearance in the two wide bearings will be closed at the top (Fig. 2) and will not permit the insertion of the feeler, but will be open to receive the feeler at the bottom (Fig. 3). Similarly the narrow bearing at the top will be open at each end (Fig. 2) and closed at the bottom at each end (Fig. 3).

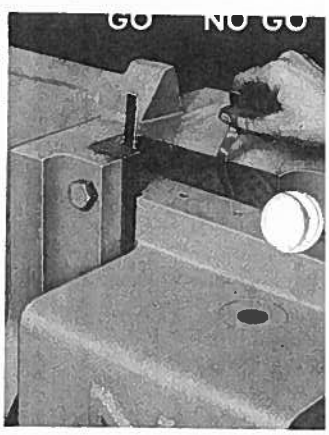
For a crosshead which rests with a forward tilt the two wide bearings will be open at the top (Fig. 4) and closed at the bottom (Fig. 5) while the narrow bearings will be closed at the top (Fig. 4) and open at the bottom (Fig. 5).

When a shear is not level the two open and two closed corners of one end of the shear do not correspond to the two open and two closed corners of the other end of the shear. This indicates that the machine is twisted and cross-corner binding of the crosshead exists.

To level the shear, insert shims under the front or rear feet of the housing as required to make the crosshead bearing clearance relationship the same at each end of the shear. Note that the actual amount of bear-

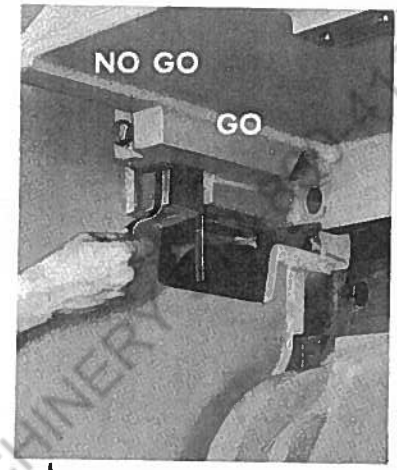


TOP RIGHT HAND HOUSING FIG. 2

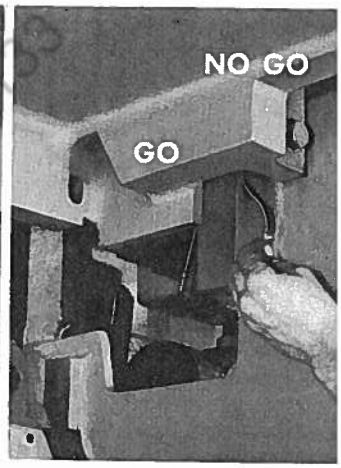


TOP LEFT HAND HOUSING

BOTTOM RIGHT HAND HOUSING FIG. 3

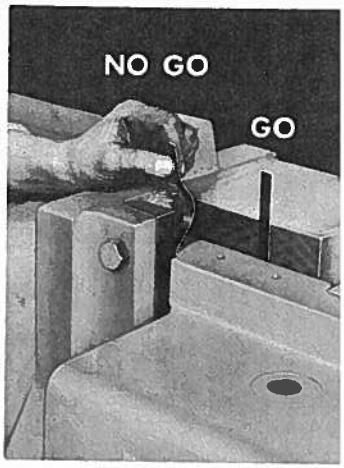


BOTTOM LEFT HAND HOUSIN



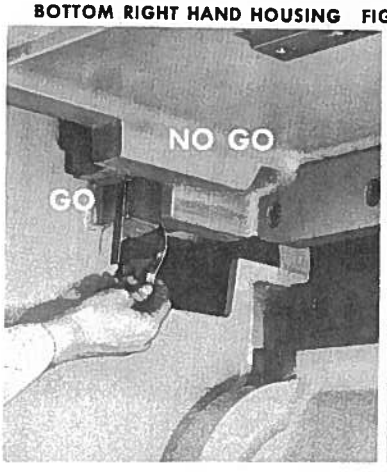
OR

TOP RIGHT HAND HOUSING FIG. 4

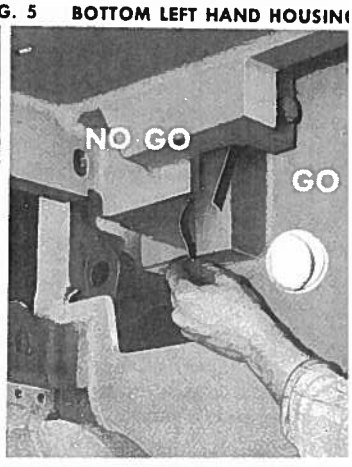


TOP LEFT HAND HOUSING

BOTTOM RIGHT HAND HOUSING FIG. 5



BOTTOM LEFT HAND HOUSIN



ing clearance is of no consequence when leveling. The feeler gage is used merely to determine which way the crosshead end bearing is resting in the guides. The accompanying photographs, taken during assembly, show the various conditions of a shear that is level.

Check all fasteners, nuts, bolts, etc., to insure tightness as they may have loosened in transit.

SETTING UP

If the back gage has been removed for transit, attach the brackets to the underside of the crosshead with the bolts provided. Dowel pins in the back gage brackets properly locate them in relation to the crosshead. The single bracket back gage is attached with a single bolt in the center of the crosshead. Adjust the back gage in accordance with instructions under "BACK GAGE" (Pgs. 8 and 9).

The center support bearing for the treadle shaft should be secured to the floor so that it does not bind the shaft. Shimming between the support bearing and floor may be necessary.

Connect the motor to run in the direction indicated by the arrow cast on the gear box. (CAUTION — DO NOT ATTEMPT TO RUN THE SHEAR UNTIL IT IS LUBRICATED AND THE KNIFE CLEARANCE CHECKED IN ACCORDANCE WITH SUBSEQUENT INSTRUCTIONS.) Direction of motor rotation may be observed by looking through the louvers, by removing the outer bearing cover or by removing the motor from the gear box. If the shear is equipped with an axial air gap or so-called "pancake" motor, the motor cover may be removed. IF THE MOTOR RUNS BACKWARD THE CLUTCH WILL NOT DISENGAGE AND THE CROSSHEAD WILL RECIPROCATE AS LONG AS THE MOTOR RUNS. WHEN STARTING THE MOTOR WAIT A FEW SECONDS BEFORE TRIPPING THE CLUTCH TO LET THE FLYWHEEL REACH FULL SPEED. This will insure the crosshead stopping at top position where the detent will hold it until the treadle is again depressed.

To special order, certain shears are equipped with an electro-pneumatic or solenoid foot treadle. Unless otherwise tagged, connect the coil of the solenoid valve to a 110 volt single phase line. Connect the air inlet of the solenoid valve to the shop air line. Use clean air at a minimum pressure of 80 lbs. per square inch.

LUBRICATION

The shear is now ready for lubrication. A metal lubrication plate is permanently attached to the shear at the left hand end giving the catalogue number of the shear, the serial number, and the shearing capacity as well as the recommended lubricants. Also see lubrication chart (Pg. 18).

Make certain that the oil is up to the oil level plugs in the eccentric chambers of both housings and in the gear box.

Fill all oil cups to the top with the recommended oil; wait several minutes for the oil to fill the grooves and passages and again fill to the top.

On sizes up to and including the No. 8 Series, grease the two crosshead wrist pins and the two holddown wrist pins with the recommended extreme pressure grease. A grease lubricating gun with hydraulic coupling such as an Alemite No. 7585 can be used for the purpose and can be furnished at extra charge. The wrist pins of the No. 9 Series Shears and larger are oil lubricated with Mobil Compound BB or equivalent.

The top of each holddown foot is provided with an oil hole to which a few drops of oil should occasionally be applied.

The spring counterbalance rods which extend above the top of the housing may be equipped with an oil hole or oil cup and should be lubricated at the regular lubrication periods. The larger shears have a counterbalance spring in each housing and the medium size shears in the left hand housing while the smaller shears may not have a counterbalance.

During the first hour of operation keep the oil cups filled to the top with the recommended oil to be sure that all passages are full and that the bearings will be flushed with fresh clean oil. A reasonably excessive amount of oil should be used for the first few weeks of operation.

CAUTION — Do not put waste or rags into oil cups to restrict the flow of oil.

Care should be taken to use only clean oil and clean oil cans as the least amount of dirt can damage bearings. Use the recommended specially compounded oils. *Common machine oil or engine oil is not satisfactory.*

Before starting a shear equipped with a centralized lubricator, fill the reservoir with the recommended oil and hand prime until the oil can be seen running out of the bearings. Periodically inspect the piping to see that it is not damaged. It is not practical to lubricate all parts, such as the holddown feet, with a centralized system. Therefore, these parts must be lubricated manually.

CAUTION — If an equivalent gear oil is used it must be non-gumming and must not exceed the viscosity or pour point of the gear oil recommended on the lubrication plate.

ADJUSTING KNIFE CLEARANCE

Before applying power to the shear or placing it in operation for the first time, the knife clearance should be carefully checked. During transit the shear is subject to conditions which may decrease the knife clearance and endanger the knives by rubbing or overriding.

Turn the shear over slowly by hand and observe very carefully to make certain that the knives are not rubbing or overriding. To make sure that the knives are not rubbing, try with tissue paper. The paper should fold down between the knives and not be cut. A convenient method of turning the crosshead over by hand, when equipped with an axial air gap motor, is to remove the cover of the motor, step on the treadle, and slowly rotate the motor armature. If the clutch does not engage, release the clutch lock. Shears which do not have an axial air gap motor may be turned over by hand by removing the motor and using the splined motor coupling (27-A) on a piece

of pipe formed into a crank or "T" wrench. Do not forget to rewire the splined motor coupling set screw after replacing it. An alternative to turning the shear over by hand is to slowly and carefully jog the motor a little bit at a time.

CAUTION — After a shear has been turned over by hand for checking knife clearance the clutch will not be fully disengaged as disengagement is dependent upon maximum flywheel speed.

Before starting the shear proceed in the following manner.

1. Place single stroke selector knob (106) on continuous as described on Page 10.
2. Step on treadle to engage clutch.
3. Jog the motor up to speed using the start and stop buttons, thus reciprocating the crosshead until the motor reaches top speed.
4. Next remove foot from treadle. If clutch clicks, step on the treadle again allowing crosshead to reciprocate a few more strokes.

To adjust the knife clearance, the entire bed carrying the lower knife is moved toward or away from the upper knife so as to decrease or increase the clearance between the upper and lower knives.

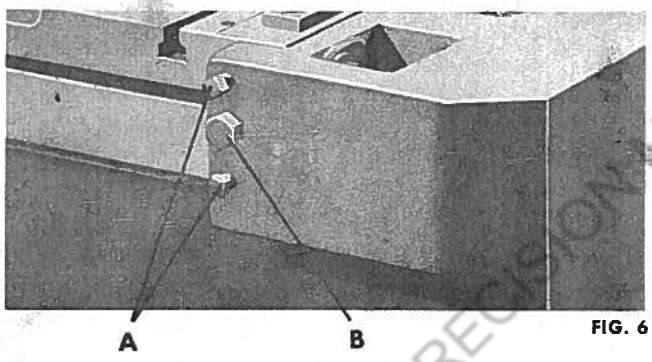


FIG. 6

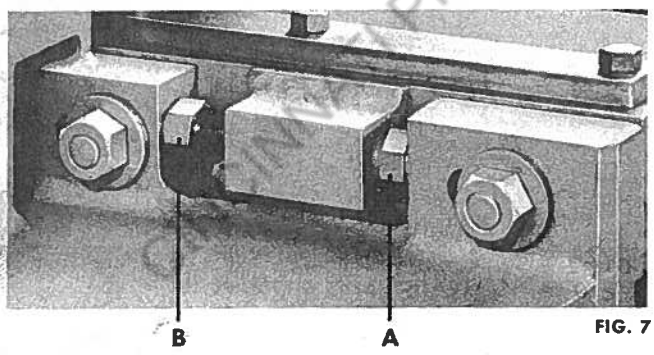


FIG. 7

To adjust the bed, slack off but do not loosen the nuts or bolts at each end that attach and clamp the bed to the housing. There are two nuts accessible from pockets in the top of each housing (on the same plane with the work surface of the bed), and cap screws under each end of the bed. Referring to Figs. 6 and 7, screws (A) move bed in to reduce knife clearance and screw (B) move bed out to increase knife clearance.

When adjusting screws (A) and (B), they should not be completely loosened but should oppose each other. For example: When moving the bed inward continue tightening screws (A) without loosening screw (B) until no further inward motion is observed and then slightly slack screw (B). Tighten screws (A) again and repeat until the bed is adjusted to the required setting.

The center knife clearance may be adjusted by means of the truss rod post at the rear of the crosshead. This adjustment is made by the nuts on the truss rod center post and *not by the turn-buckle*. First, loosen the locknut by turning it counter-clockwise. Turning the other nut clockwise will move the center of the upper knife toward the lower knife, or loosening the nut will increase the clearance. Certain short length shears have crossheads equipped with a straight truss rod within the rear of the crosshead. Tightening the nuts on this truss rod will reduce the clearance at the center of the knives and loosening will increase the clearance.

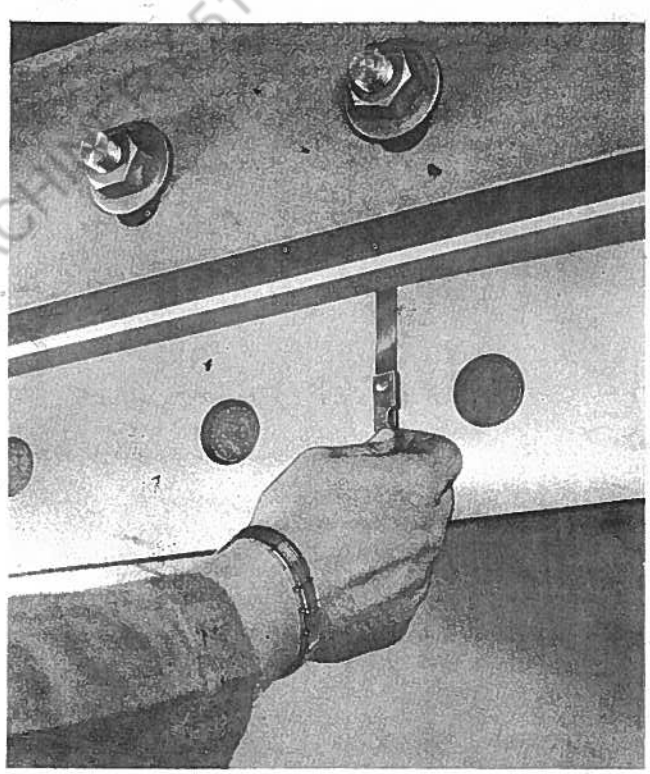


FIG. 8 Adjusting knife clearance

Adjustment Procedure: — Adjust the bed away from the upper knife so as to make sure the knives will not override. Then, with the power disconnected turn the shear over by hand until the knives intersect at the right hand end. Insert feelers equal in thickness to the desired setting vertically between the knives at the intersection as shown in Fig. 8 and adjust the bed accordingly. Next, turn the crosshead so that the knives intersect at the left hand end and adjust the bed to the feelers. Recheck right hand end. When both ends of the bed are adjusted to the desired clearance *retighten the bed bolts and nuts*. Then turn crosshead so that knives intersect

at center. If necessary, adjust center to the same clearance or slightly less than at the ends, as outlined in previous paragraph.

KNIFE CLEARANCE

Proper knife clearance is important to successful shearing; however, contrary to antiquated practice it is not necessary or desirable to use a different knife clearance for each different thickness of material. In our own fabricating shop we constantly shear 20 gage and 3/4" material side by side on the same shear at the same time with the same good results.

It is important not to use too small a knife clearance in order to avoid rubbing or overriding of the knives. Rubbing or overriding will result in loss of cutting edge keenness, scoring of the knife faces, serrating of the cutting edge, and in extreme cases, breaking of the knives or damaging of the shear itself.

Too great a knife clearance is undesirable as it leaves heavy burrs on the material and in extreme cases may cause the material to fold between the knives rather than cutting. An optimum clearance between these two extremes will produce satisfactory results without affecting the load on the shear or the service life of the knives.

The following knife clearances for various capacity shears will serve as a guide in setting the knives:

Shear Capacity	Knife Separation in Inches
1"	.018
3/4	.015
5/8	.012
1/2	.010
3/8	.008
1/4	.005
3/16	.004
10 Ga.	.003
12 Ga.	.003
14 Ga.	.003
16 Ga.	.003

The above clearances will be found to provide a universal setting when consistent thicknesses are being sheared. However, if a wide range of material is being sheared an optimum setting can be made to obtain the more desirable burr-free cut. When mild steel of the lighter gages (say 20 gage to 30 gage) predominates better results are sometimes obtained if the upper knife is ground to have an included angle of less than 90° (say 86°).

Shearing of copper, Monel metal, nickel, stainless steel, silicon transformer stock, aluminium, brass, lead, German silver, and many other metals and non-metallic materials may require closer knife settings. Some of these materials may also require special angles ground on the knives, or knives made of special alloys, and occasionally a reduced capacity rating of the shear. The factory will be pleased to make recommendations for your shearing problems.

CHANGING KNIVES

BEFORE proceeding to change knives be sure to TURN OFF power and OPEN the disconnect switch. To facilitate removal or attachment of the upper knife, remove the holddown or block it up out of the way. Block the holddown in position, then loosen the wrist pin set screws and withdraw the wrist pins. The holddown can then be raised and blocked at a height sufficient to permit access to the knife bolts. If desired, the holddown may be completely removed from the shear.

Remove the upper knife first. Before removing the plow bolts, block the upper knife in two or more places by inserting wood blocks between the knives and driving them slightly to the right so as to wedge the knives securely in position. When all the plow bolts have been removed, the upper knife may be lifted out from the front of the shear. Use great care in handling. If dropped, the cutting edges may be nicked or spoiled. Heavy leather gloves are recommended for protecting the hands. Boards may be placed on the bed perpendicular to the knife to protect the cutting edges from contacting the bed surface.

When removing the plow bolts from the lower knife be sure to hold or block the knife in place so that it cannot fall. Inspect all plow bolts to see that they are not damaged or worn. Periodic replacement of plow bolts is recommended.

Before proceeding to install new knives or changing to a new cutting edge, see that all faces of the knife seats are smooth and clean. Remove any burrs from the knife seats with a file. Also see that the knife surfaces are perfectly clean. Reassembly is a reversal of the disassembly procedure.

The distance from the cutting edge of the upper knife to the knife seat must be maintained as stamped on the center of the crosshead over the knife seat. Place a sheet metal shim between the knife seat and the top edge of the UPPER knife to maintain this distance after grinding.

The cutting edge of the LOWER knife must be even with the top of the bed. The height of the cutting edge is regulated by placing a shim UNDER, *not behind,* the knife.

Just before initially tightening the knives in position, replace the previously mentioned wood blocks and tap slightly to the right so as to flatten and clamp the upper and lower knife shims firmly in place on their respective seats.

Attach the knives loosely to the knife seats with full number of bolts. Care must be taken to seat the key of the bolt into the groove. When drawing the bolts home, start at the center and initially tighten these by working alternately right and left (of center) outward to the ends. As the plow bolts are tightened, the bolt heads should be tapped with a heavy hammer and a large diameter drift or steel rod. This insures that the plow bolt heads will be properly seated in the knives.

After the shear has been in operation for a short time, inspect all bolts, making sure they are still properly set. Retighten as required.

SETTING AND ADJUSTING BACK GAGE

Single Bracket Type

The back gage bracket is pivotally mounted and secured to the rear of the crosshead by a king pin bolt (A). Removal of this bolt will facilitate quick removal of the entire gage.

The angularity of the bracket for parallel or taper cutting is adjusted by means of the two set screws (B) at the inner end of the bracket under the crosshead. These screws butt against two downwardly projecting lugs so that loosening the screw on one side and tightening the opposite screw will change the angularity of the bracket and gage.

The gage bar is pre-stressed for stiffness by a truss rod which also provides an adjustment for maintenance of straightness.

To adjust the gage for parallel cutting, a convenient method is to use a 1″ square piece of cold rolled steel as a gage. Use this 1″ gage block between the face of the gage bar and the lower knife. Adjust

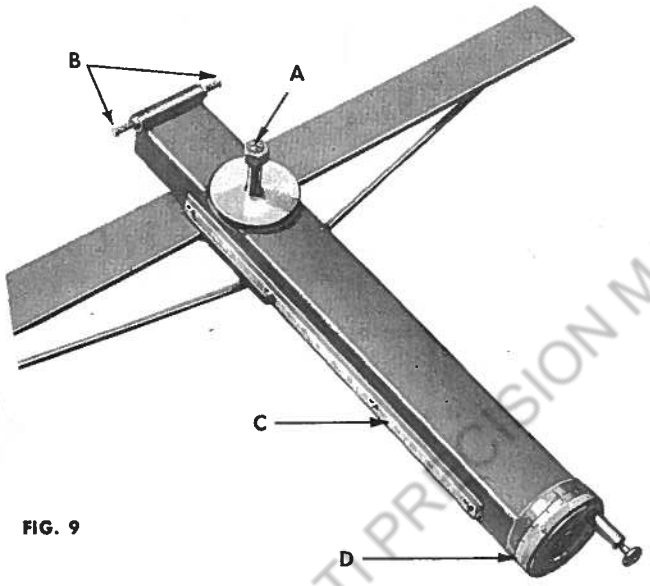


FIG. 9

the bracket and gage bar so that the block just fits snugly at each end and slightly loose in the center. Then set the long scale (C) at the right hand side of the bracket to read 1″ and the hand wheel scale (D) to read "O".

Positioning of the gage is accomplished by turning the hand wheel. Each full turn of the hand wheel moves the gage 1/4″ and the plunger-type indexing handle engages locking holes at each 1/128″ increment. When adjusting the gage, open it wider than the desired setting then make the final setting while moving the gage toward the bed.

Double Bracket Type

The double bracket type of back gage has two back gage brackets connected with a squaring shaft (Detail F, Fig. 10 which illustrates hand wheel end of the back gage operating mechanism).

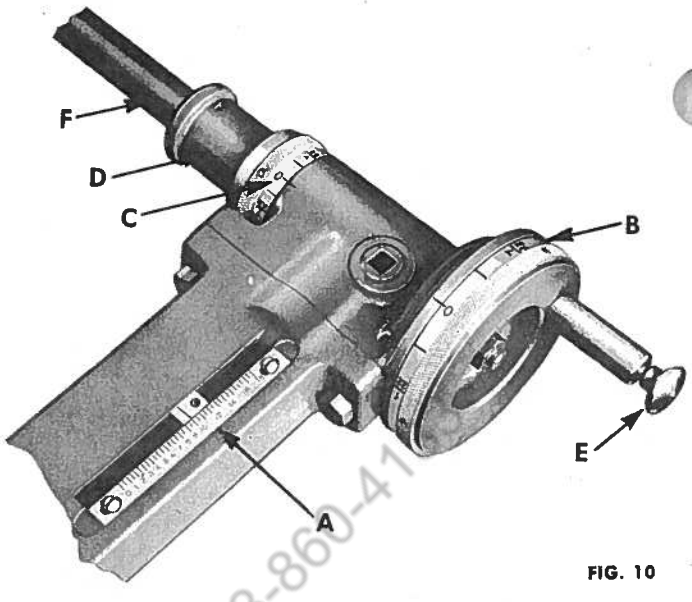


FIG. 10

Each full turn of the hand wheel moves the gage bar 1/4″. The locking type plunger (E) must be pulled out against its spring to turn the hand wheel. The position of the hand wheel is maintained by letting the plunger drop into one of a series of holes circumferentially spaced around the hand wheel. The spacing of the holes is such that the movement of the gage is 1/128″ between the adjacent holes for the hand wheel plunger.

Positions of the gage bar are read to the nearest 1/4″ on the adjustable scale (A). Scale (B) is calibrated to read the gage bar position to the nearest 1/64″ while the locking plunger may be set between the 1/64th graduations.

For accurate adjustment always open the gage beyond the point desired and make the final setting, moving the gage inward, to take up lost motion should any be present. If the shear is equipped with a Power Operated Back Gage always open the gage wider than the desired setting and make final adjustment with "Narrow" button.

Taper setting of the gage is easily accomplished. Slacken the cap screw at each end of the gage bar which attaches it to the bracket slides. Move the adjustment sleeve (D) away from the hand wheel bracket by gripping the sleeve with the left hand and pulling against retaining spring until the splined connection is exposed and disconnected. With the sleeve disconnected, the hand wheel will then actuate only one end of the gage bar. Do not forget to retighten the cap screws.

To set back gage parallel, select a steel block exactly 1″ thick and place between the gage bar and the lower knife at each end of gage bar. Adjust until gage is parallel then check by actually doing work and adjust until a parallel cut is obtained. Then set dials (B) and (C) to O with gage (A) on an even inch mark.

The gage bar is equipped with an adjustable truss rod to stiffen it and permit an adjustment to concave or straight condition. Gage bar should be straight or slightly concave on its working face so that the sheet

PERIODICALLY CHECK TIGHTNESS OF MOUNTING BOLTS TO INSURE DESIRED BACKGAGE ANGLE.

gaged against it cannot rock, thus causing inaccurate work. A good procedure is to trim a broad sheet taking a trim cut in width about equal 1-1/2 times the thickness of material. Then push the trimmed sheet against the back gage pressing on one end and then the other to see if any rocking can be detected. If rocking is noted, slack off on the center strut that holds the back gage brace rod, but not so much that an excessive hollow occurs.

On power operated gages the motor mount is slotted to adjust the chain tension. Adjustment of the counter can be made by loosening the lock nut and separating sprocket (189) from motor sprocket (188). Counter can then be changed at will.

Larger shears are equipped with a hinged back gage which can be swung out of the way to permit feeding long plates through the shear. A series of bolts clamps the gage bar in the up or down position. To obtain accurate shearing it is always necessary to install the bolts when operating in the gaging position.

Magnetic sheet supports, when supplied, are factory adjusted to handle a range of light material up to their magnetic capacity, which may be less than the machine's maximum capacity.

The magnetic rollers should be adjusted so they are in line with the top of the shear bed. Vertical slots in the roller support bar allow the rollers to compensate for various material thickness.

Should the roller support bar require adjustment, simply loosen or tighten locknuts on the spring loaded support screws. The roller support bars can be removed from the crosshead by loosening the mounting screws and sliding the bar forward to drop it out of the slotted holes.

FRONT GAGE

The front gage may be bolted to the top of the bed with bolts in the bed dovetails slots. Adjustable inlaid steel scales at each end of the bed will aid in lining up the front gage.

For gaging beyond the bed width, the front gage bar may be bolted to the front brackets.

EXTENSION SQUARING GAGE

An extension squaring gage, as shown in Fig. 11 can be furnished as special equipment for squaring large sheets. It is recommended for use at the left hand side of the shear. The extension squaring gage is furnished with one adjustable stop and an inlaid scale adjustable to compensate for knife wear.

To install the extension squaring gage remove the side gage from the shear bed. The side gage of the extension arm fits over the top of the bed and is fastened with the bolts provided. Extension squaring gages furnished after the shear has been shipped may require a certain amount of fitting by the purchaser to line up the bed holes properly. To accomplish this, loosen all of the bolts at the under side of the channel that attach the side gage. Move the side gage toward or away from the shear bed until the bed holes are in line, then re-tighten the attaching bolts. If there is not sufficient clearance for attaching bolts to line up the bed holes, remove the side gage and elongate the channel holes with a round file in the required direction.

Pack or shim between the outer gage support (A) and the floor until the gage arm is level. The gage arm may be tried for squareness by using a square against the lower knife or by checking the actual cut produced with the gage. When using an extension squaring gage it is extremely important that the shear is firmly positioned by use of angle brackets lagged to the foundation. Movement of the shear will have a tendency to throw the extension squaring gage out of line.

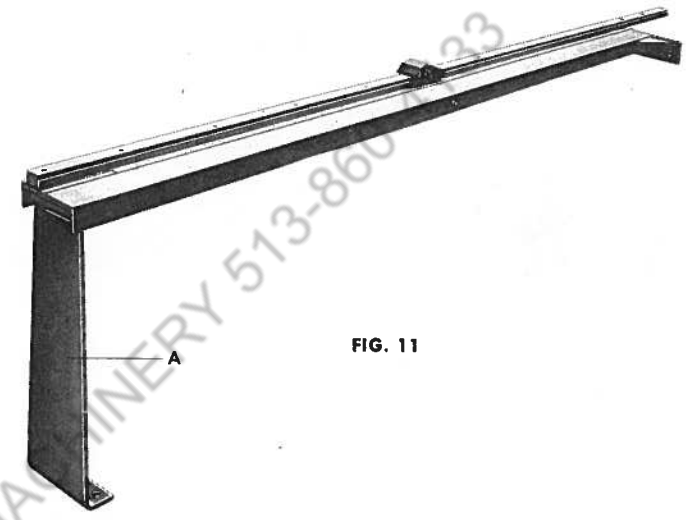


FIG. 11

CLUTCH

The famous NIAGARA sleeve clutch is enclosed in the gear housing where it is protected from dirt and damage. The clutch operates in a bath of oil to promote long life.

The sleeve clutch applies the power or torque to the driveshaft concentrically because the fourteen jaws form a complete circle on the sleeve. The sleeve transmits the torque to the main shaft through splines machined circumferentially in the shaft.

Due to the fourteen engaging jaws, the load is divided, thus making wear on the driving surfaces of the engagement points negligible.

The clutch gear, which rotates constantly, carries a driving member or clutch plate with matching clutch jaws. Both clutch sleeve and clutch plate are made of hardened alloy steel. The clutch sleeve is held in disengagement by the throwout shaft until the treadle is depressed momentarily. The throwout then releases the sleeve which, sliding on splines of the shaft, engages with the rotating clutch member on the gear. To effect disengagement, the throwout is permitted to come into contact with the throwout cam on the clutch sleeve where it rolls until the sleeve is disengaged from the clutch wheel face on the clutch gear.

The clutch gear or main drive gear is mounted on anti-friction bearings.

Single Stroke Selector

The shear may run continuously by keeping the treadle depressed or be made to come to a stop at the top of the stroke regardless of treadle position by merely suitably positioning the single stroke selector (Detail A, Fig. 12).

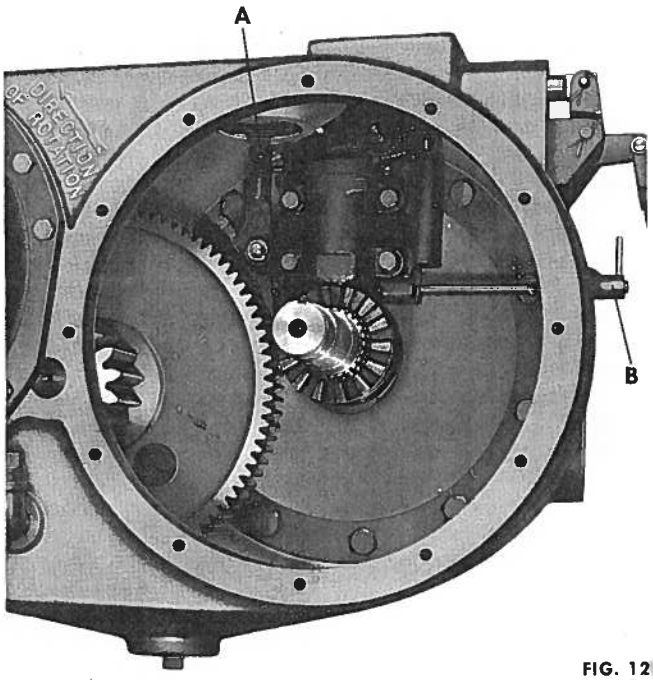


FIG. 12

The selector knob is reached through the large pipe plug at the top of the gear box. By pulling up and turning this knurled selector knob one-half turn, the shear may be set for either single stroke or continuous operation. The selector knob is round with a flat on one side. When the flat side is toward the sliding pin (117) the single stroke cam (140) is rendered ineffective. Turning the flat side away from the pin will make single stroke operation effective. Be sure the knob snaps back into place when adjustment is made so that it will not turn without lifting.

The single stroke feature reduces the possibility of accidents that may be caused by the operator failing to remove his foot from the treadle in time to prevent a second stroke. It functions by unhooking the treadle mechanism by means of a specially timed, cam operated device.

Clutch Lock

A clutch lock (Detail B, Fig. 12) is provided for locking the clutch out of engagement. To lock clutch, pull out slightly on locking lever, and turn pointer to position marked "LOCK". Make it a habit to always lock the clutch in addition to shutting off the power when making adjustments to the shear.

WHERE TO CUT

When shearing against a side gage it is well to use the gage at the left hand end of the shear. Shearing of short width sheets of heavier material at the center of the bed should be avoided. *Never exceed the capacity of the shear even in short widths, as short widths are as difficult to cut as wider sheets.*

Shearing of two sheets, one on top of the other, requires more pressure than a single sheet of equivalent thickness. If pack cutting is desired a reduced capacity is called for. The factory will be pleased to offer assistance in such cases.

Never attempt to shear material that is not securely gripped by the holddown. Small pieces not gripped by the holddown may tip and fold between the knives.

SQUARE CUTTING

Square cutting with the extension squaring gage by the following method will produce the least amount

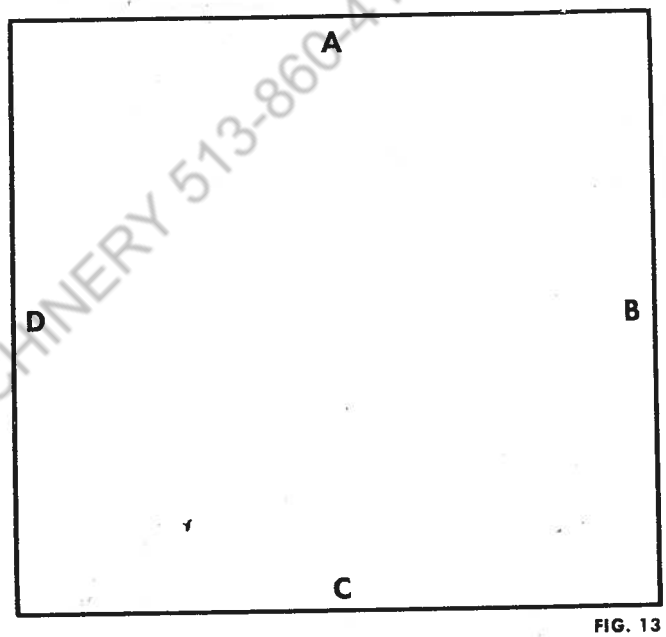


FIG. 13

of irregularity: Refer to the sketch (Fig. 13). Trim edge A. With edge A against side gage, trim edge B; with edge A against front gage, trim edge C. With edge C against same side gage used in the second cut, trim edge D.

SHEARING TO A LINE

It may be desirable to cut sheets to a scribed line rather than to a gage. This is accomplished by looking down behind the holddown bar and lining up the scribed work with the cutting edge. To facilitate better vision the front of the crosshead is sloped to the rear.

A light beam shearing gage, available as extra equipment, will aid in shearing to a line by illuminating the work area and casting a shadow of the upper knife on the work.

ACCURATE SHEARING

Keenness of the cutting edges, kind and thickness of material, proper use of gages, and size of cut are among the many factors that affect accurate shearing.

Accurate shearing results cannot be expected with stress-filled stock. The release of these strains by cutting cause distortion of the sheared edges and a straight cut is not obtained. Stress-filled stock should always be cut enough oversize to permit a second, narrow (trim) cut. This trim cut will improve the straightness of the sheared edge. Stretcher-leveled or stress-relieved stock should be used if utmost shearing accuracy is required. Cold rolled annealed stock can usually be cut with greater accuracy than ordinary black stock or blue annealed stock. Sheets produced in a modern strip mill are generally better than those made in old fashioned merchant mills.

For accurate shearing against the back gage, the operator should feed the sheet against the back gage holding it there firmly, but not necessarily with excessive pressure, until the cut is in process. However, there is no objection to maintaining this pressure for as soon as the cut is finished, the off-fall will drop to the floor and the sheet can be automatically fed in to strike the back gage preparatory for the next cut.

The back gage is planed perpendicular and its contact with the work remains unchanged until after the holddown feet have clamped the sheet. From this point on, as the crosshead descends further, the back gage is planed with a relief angle providing necessary clearance. On heavy plate shears, however, the back gage bar extends just above the bed.

SHEARING OF NARROW STRIPS

A certain amount of difficulty may be experienced in the accurate shearing of narrow strips. The three major difficulties encountered in shearing of narrow strips are: camber, curl, and bow. The tendency for these conditions is usually greater in the softer and more ductile materials.

CAMBER is the tendency for a strip to distort in such a way that the edges are no longer straight but become bowed to form a long curve. Camber is influenced by the slope of the upper knife, the material being cut, and the width of the strip in proportion to its thickness. The low slope of these shears reduces camber to a minimum. Stress-filled stock will camber to a greater degree than will stress-relieved stock. The narrower the strip in proportion to its thickness, the greater the camber.

CURL is the tendency of a narrow strip to twist around itself or to cork-screw. Curl is influenced by the slope of the upper knife, the width of the strip, and the thickness and kind of material. The narrower and heavier the strip, the greater the amount of curl. Dull knives may increase the amount of curl.

BOW is the tendency for a strip to change from a flat condition. Bow usually accompanies camber and curl but is reduced by the low slope of the upper knife, a feature common to Niagara Shears.

MAINTENANCE

Under normal operating conditions the shear should require very little maintenance, other than that of good care in keeping it clean and well lubricated. The knives should be kept sharp and properly adjusted. Periodic inspections should do much to prevent minor conditions from developing into costly repairs and possible consequential loss of productive operating time.

When the main drive gear or clutch require attention, drain the oil from the gear box and remove the large cover plate (25). As this plate fits over the outer support bearing of the main shaft, care must be taken to see that the cover is backed off evenly by inserting set-screws in the holes provided.

Removal of the spanner lock nut (143) and lock washer (143A) from the end of the shaft releases the outer support bearing (31), clutch gear (30), clutch sleeve (141), spring (144), and single stroke cam (140). These parts may be removed from the shaft in this order.

Before the latch bracket assembly can be removed, it will be necessary to remove the locking bar (135) and treadle connection link (33A). The locking bar end collar (137) is placed on the locking bar next to the inside wall of the housing where it retains the locking bar spring. The locking bar end collar may be removed by knocking out the standard taper pin. This will permit withdrawal of the locking bar from the gear box.

When reinstalling the latch bracket assembly, before the throwout housing cap screws (133) are tightened, the locking bar should be replaced and the housing moved so that there is clearance between the recessed portion of the locking bar and the shoulder of the clutch sleeve when in the unlocked position.

Replace the clutch sleeve and single stroke cam correctly by observing that it slides on with the "O-O" on the internal spline straddling the "O" on the external spline. Compress the clutch sleeve spring by hand and turn the locking bar handle one-half turn to hold the sleeve in position while mounting the clutch gear. When tightening the clutch gear on the shaft (on machines equipped with ball bearings), pull the lock nut (143) tight and lock. The clearance for free running of the bearings has been provided for in the machining. Larger machines use Timken bearings, in which case the lock nut (143) should be snugged up and then slightly backed off for running clearance. Be sure the through bolts holding the clutch gear face plate are tight.

Gearing

The entire flywheel and pinion shaft in the 3B through 8 Series can be removed as a unit by unbolting the motor adaptor flange and withdrawing it.

For servicing the intermediate gear and pinion assembly, the gear box should be removed from the shear. The motor and all parts on the eccentric shaft and the latch bracket must be removed as previously outlined. When the gear box has been removed the intermediate shaft can be driven from the gear box by tapping the outer end of the shaft. This shaft is stepped and cannot be removed by driving it in the opposite direction. The intermediate shaft does not revolve but is held in the walls of the gear box. The intermediate gear and pinion cluster rotate on this shaft.

Removal of Gear Box

After removal of the clutch gear, clutch sleeve, spring, single stroke cam and clutch bracket, the gear box can be removed by unbolting the cap screws which

fasten the gear box to the housing. Those cap screws lying behind the intermediate gear can be reached with a socket wrench and extension handle through a cored hole in the web of the intermediate gear.

When replacing the gear box, follow the procedure outlined below so that it will not become loose in operation.

1. Clean mating surfaces and remove any burrs with a file.
2. Replace all cap screws.
3. Tighten screws, finger tight.
4. Raise up rear end of gear box with jack to take up backlash in bolt circle clearance.
5. Pull up cap screws as tightly as possible, using a sturdy socket wrench with good leverage.

Brake

Two types of devices are used for controlling the stopping of the shear. Some shears employ a floating shoe type friction brake while others employ a patented detent device.

The detent device consists of a cam and spring loaded cam roller mounted on anti-friction bearings. The detent is located in the housing at the end of the shear opposite the gear box.

To remove the detent cam housing, first drain the oil from the right hand eccentric chamber. Then remove the round cover plate from the side of the cam box. Remove the large pipe plug in the bottom of the spring pot and insert a cap screw and washer in the tapped hole at the bottom of the spring plunger. Tightening this cap screw will release the spring pressure from the cam roller so that the cam can be removed from the end of the shaft. Either the spring pot or the entire cam housing can then be removed.

The friction brake is adjusted by turning the nut on the end of the spring rod. Turning the nut clockwise increases the brake tension; counter-clockwise decreases the brake tension.

The cover of the friction brake has an instruction plate with a sight window which enables a visual check of the brake setting. When the crosshead is in the correct stopping position, the line of the shoe will correspond with the line on the brake collar. When the line on the collar is below the line on the shoe, the brake is too tight. Conversely if the collar line is above the shoe line the brake is too loose.

If the friction brake is too LOOSE, the main shaft (6) will rotate too far and the motion will be stopped by the emergency abutment at the end of the clutch sleeve (141) cam track coming to rest against the throwout shaft (118). This is evidenced by a dull thud at the end of the stroke, the holddown feet closer to the bed and generally followed by difficult treadle operation. To remedy simply tighten brake.

If the friction brake adjustment is too TIGHT, the clutch sleeve (141) will not completely disengage from the clutch wheel face (150) and the clutch jaws will click or chatter. Squeaking and overheating may also be evidence of unnecessarily tight brake adjustment.

Counterbalance

The counterbalance spring adjustment is properly set at the factory and should not be disturbed. Should counterbalance have to be removed consult factory for correct installation.

REPAIR PARTS

When ordering repair parts, state the serial number of the shear. It is stamped on or near the front left-hand corner of the bed. Be sure to use complete names of parts (not numbers) listed on the following pages for positive identification.

It is recommended that knives be returned to the factory for regrinding. A fast regrinding service is available. Due to the hazards of improper regrinding, claims against knives reground outside our plant cannot be considered.

Knife Regrinding

Improperly ground knives drastically reduce knife life, cutting efficiency and quality. Keep genuine Niagara shear knives in factory-new condition by insisting upon Niagara's fast dependable regrinding service. Overnight service is available, but most users find it more convenient to have a spare set of Niagara knives.

Backed by over 75 years experience in the art of knife making, every Niagara Knife is carefully reground by highly skilled craftsmen in strict accordance with its own particular metallurgical characteristics.

You cannot afford and Niagara cannot be responsible for damage to your knives caused by others through improper knife grinding practices.

Reordering Knives

In ordering knives you will enable us to expedite delivery by sending the following information with your order: —

1. The part numbers stamped on the knives.
2. Type and size of shear.
3. Serial number of shear.
4. Type of knife required. (Refer to catalog)

PARTS LIST

When ordering parts always give the catalog and serial number of the shear. The serial number is stamped at or near the front left corner of the bed and also on the metal lubrication plate. Be sure to use complete names of parts listed for positive identification.

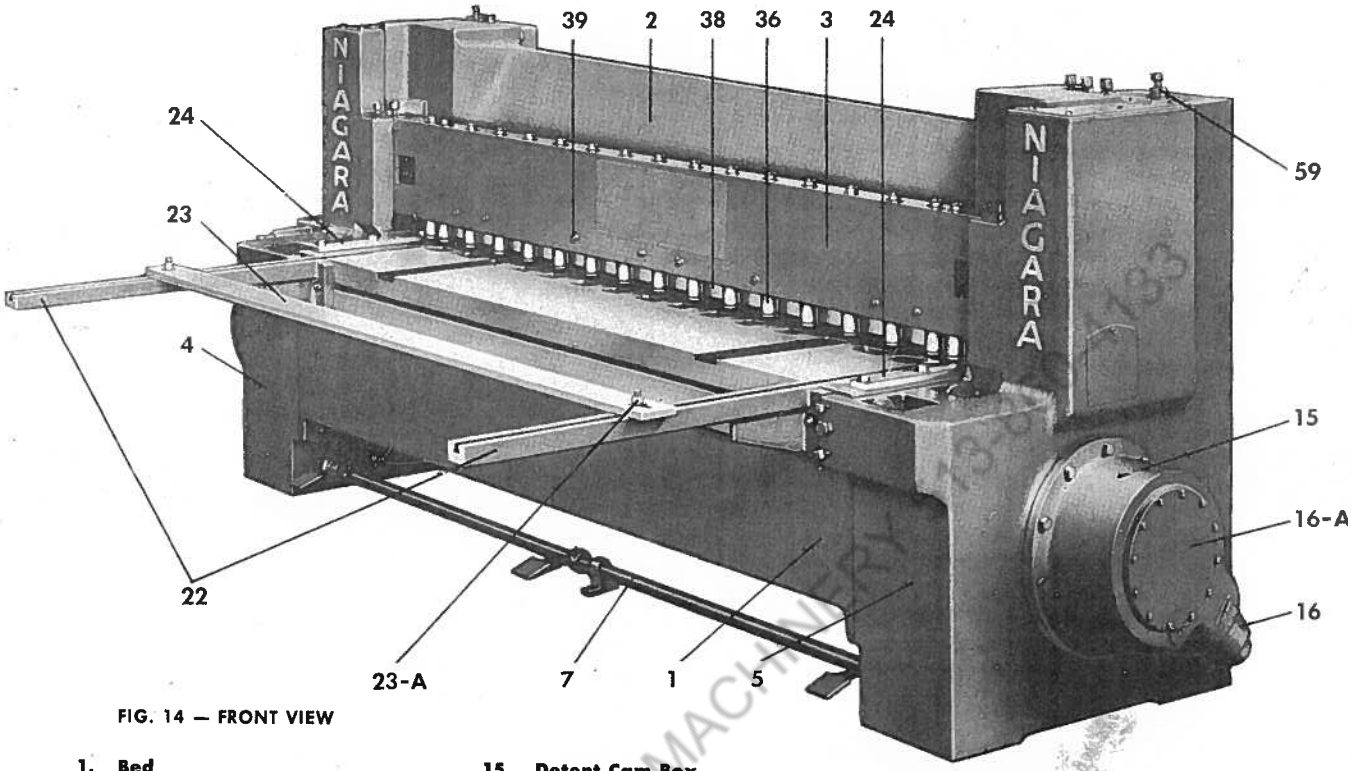


FIG. 14 — FRONT VIEW

1. Bed
2. Cross Head
3. Holddown
4. Left Hand Housing
5. Right Hand Housing
7. Treadle Shaft
15. Detent Cam Box
16. Detent Spring Pot
16-A Detent Cam Box Cover
22. Front Brackets
23. Front Gage
23-A Front Gage Bolts
24. Side Gage
36. Holddown Foot
38. Knife Guard
39. Knife Guard Bolt
59. Counterbalance Spring Rod

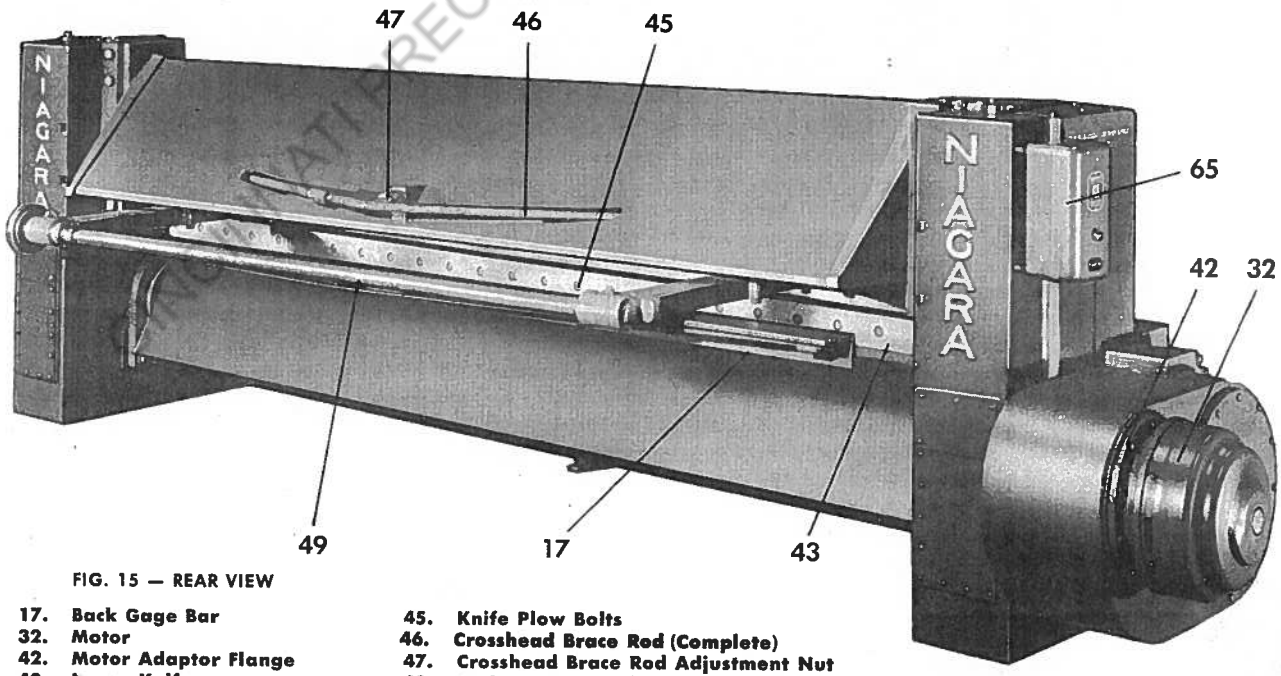
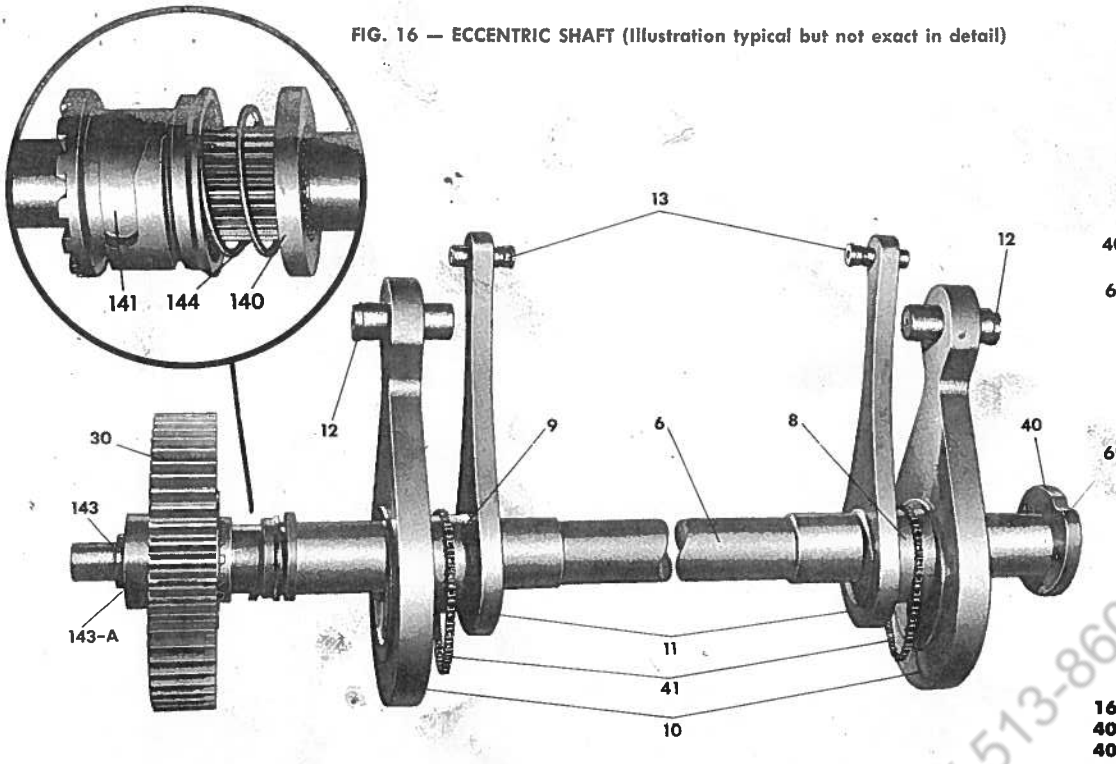


FIG. 15 — REAR VIEW

17. Back Gage Bar
32. Motor
42. Motor Adaptor Flange
43. Lower Knife
*44. Upper Knife
45. Knife Plow Bolts
46. Crosshead Brace Rod (Complete)
47. Crosshead Brace Rod Adjustment Nut
49. Back Gage Squaring Shaft
65. Motor Starter

* Not Illustrated

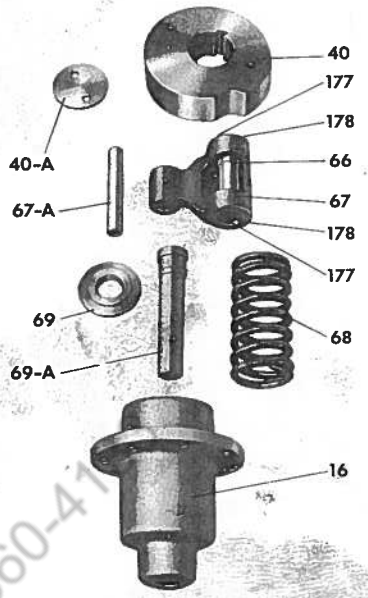
FIG. 16 — ECCENTRIC SHAFT (Illustration typical but not exact in detail)



6. Eccentric Shaft
8. R.H. Eccentric
9. L.H. Eccentric
10. Crosshead Eccentric Straps
11. Holddown Eccentric Straps
12. Crosshead Wrist Pins
13. Holddown Wrist Pins
30. Clutch Gear
40. Detent Cam
41. Eccentric Oiler Chain
140. Single Stroke Cam
141. Clutch Sleeve
143. Locknut
*143-A Lockwasher
144. Clutch Sleeve Spring

* Not Illustrated

FIG. 17 — DETENT BRAKE



16. Detent Spring Pot
40. Detent Cam
40-A Detent Cam Housing Washer
66. Detent Cam Roller
67. Detent Cam Lever
67-A Detent Lever Pin
68. Detent Spring
69. Detent Spring Plunger
69-A Detent Plunger Stem
177. Detent Cam Roller Bearings
178. Detent Cam Roller Snap Rings

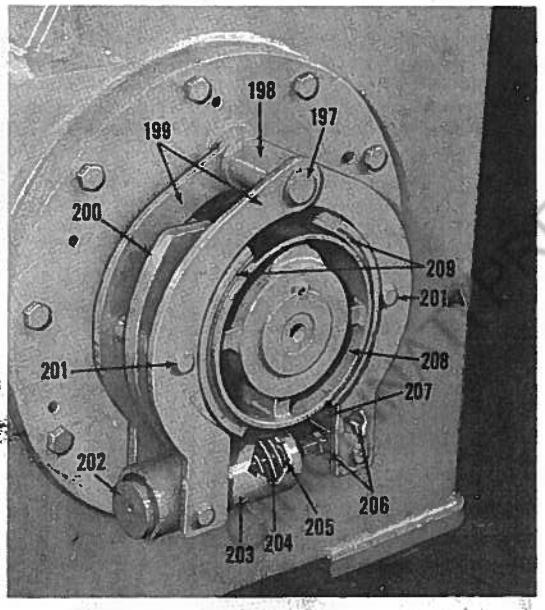
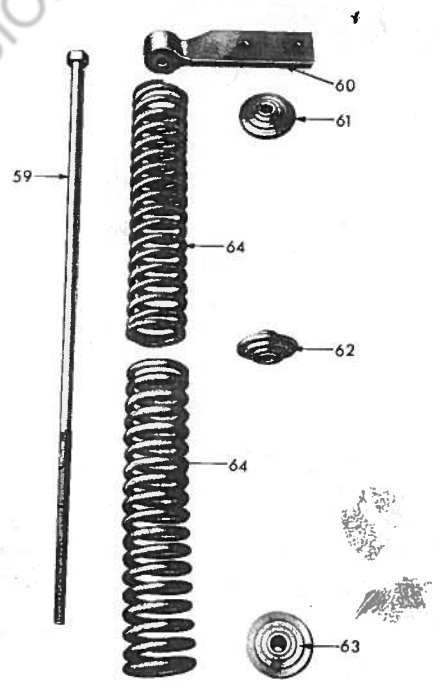


FIG. 17-A — FRICTION BRAKE

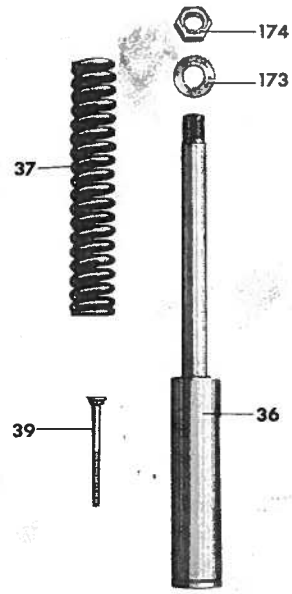
197. Brake Pivot Pin
198. Pivot Spacer
199. Brake Lever Arm
200. Brake Shoe
201. Brake Shoe Pin
201-A. Brake Shoe Pin
202. Spring Rod
203. Spring Rod
204. Spring
205. Formica Bushing
206. Nut
207. Trunnion
208. Brake Collar
209. Brake Lining

FIG. 18 — COUNTERBALANCE



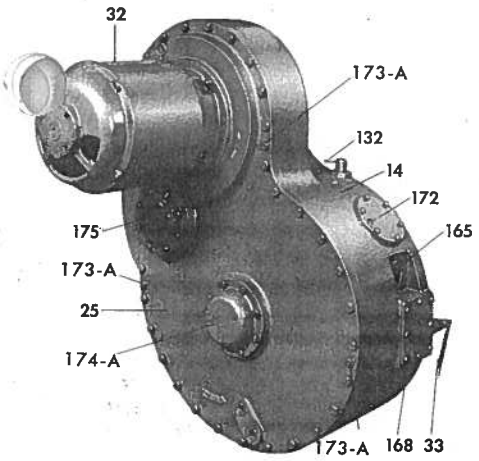
59. Counterbalance Spring Rod
60. Crosshead Spring Bracket
61. Upper Counterbalance Spring Washer
62. Center Counterbalance Spring Washer
63. Lower Counterbalance Spring Washer
64. Counterbalance Springs

FIG. 19 — HOLDDOWN ASSEMBLY AND KNIFE GUARD MOUNTING SCREW



36. Holddown Foot
37. Holddown Spring
39. Knifeguard Bolt
173. Washer
174. Nut

FIG. 20 — SERIES 12 GEAR BOX



14. Gear Box
25. Gear Box Cover
32. Motor
33. Treadle Connection
132. Locking Bar Handle
165. Single Stroke Cam Cover
168. Inspection Cover
172. Oil Fill Cover
173-A. Dowel Pins; Total of Four
174-A. Eccentric Shaft Cover
175. Intermediate Pinion Shaft Cover

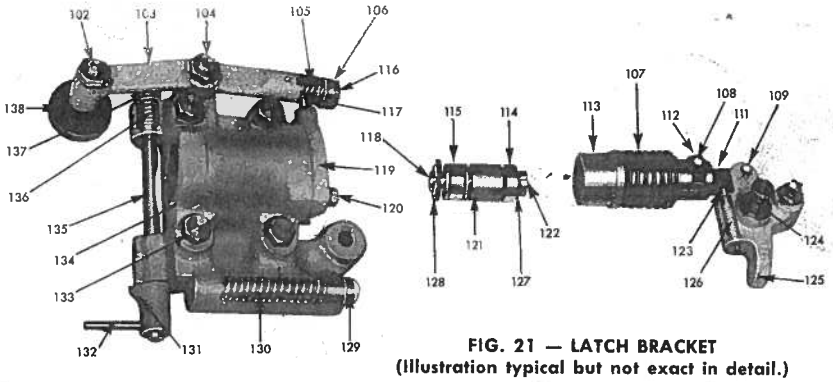


FIG. 21 — LATCH BRACKET
(Illustration typical but not exact in detail.)

102. Cam Roller Shaft
103. Cam Lever
104. Cam Lever Pin
105. Selector Knob Spring
106. Single Stroke Selector Knob
107. Throwout Spring
108. Throwout Pin
109. Latch Hinge Pin
111. Latch
112. Throwout Key
113. Throwout
114. Throwout Bearing Ball
115. Throwout Bearing Needle
116. Selector Knob Pin
117. Sliding Pin
118. Throwout Shaft
119. Throwout Housing End Cover
120. End Cover Cap Screw
121. Spacing Collar
122. Throwout Shaft Lock Nut
123. Latch Spring Pin
124. Bell Crank Pin
125. Bell Crank
126. Latch Spring
127. Lock Washer
128. Throwout Shaft Collar Nuts
129. Treadle Spring Plunger
130. Treadle Spring
131. Locking Bar Indicator
132. Locking Bar Handle
133. Throwout Housing Cap Screw
134. Throwout Housing
135. Locking Bar
136. Locking Bar Spring
137. Locking Bar End Collar
138. Cam Roller

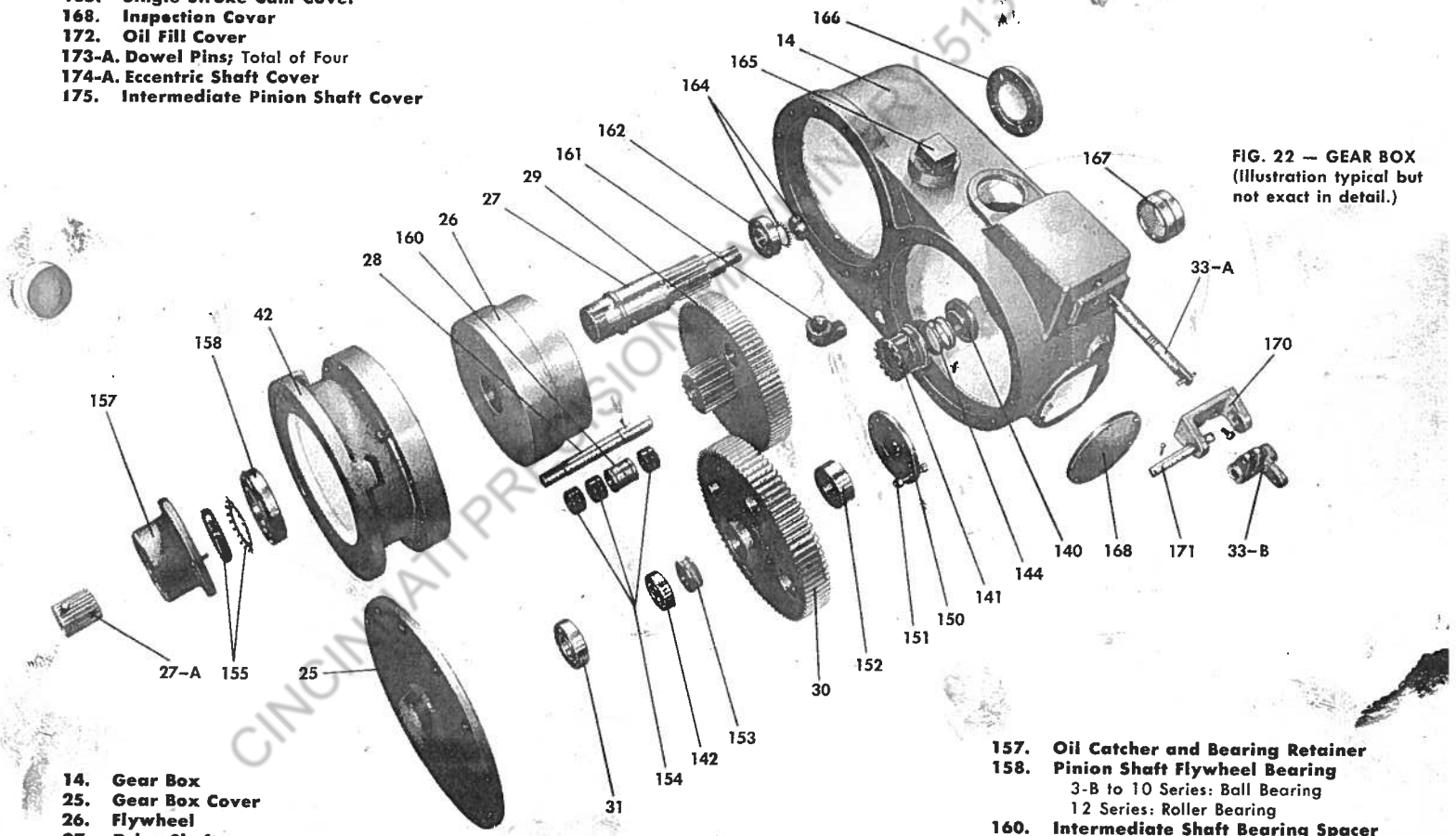


FIG. 22 — GEAR BOX
(Illustration typical but not exact in detail.)

14. Gear Box
25. Gear Box Cover
26. Flywheel
27. Drive Shaft
27-A Splined Motor Coupling
28. Intermediate Shaft
(Does not apply to 10 and 12 Series)
29. Intermediate Gear and Pinion Cluster
30. Clutch Gear
31. Cover Bearing
(Does not apply to 8 and 9 Series)
33-A Treadle Connecting Link
33-B Upper Treadle Lever
42. Motor Adapter Flange
140. Single Stroke Cam
141. Clutch Sleeve
142. Outer Clutch Gear Bearings
3-B to 9 Series: Single Row Ball Bearing;
10 and 12 Series: Timken Tapered Bearing.
144. Clutch Sleeve Spring
150. Clutch Wheel Face
151. Clutch Face Bolt and Nut
152. Inner Clutch Gear Bearing
3-B to 9 Series: Double Row Ball Bearing;
10 and 12 Series: Timken Tapered Bearing.
153. Clutch Gear Bearing Spacer
154. Intermediate Shaft Bearings
3B to 5B Series: 3 Needle Bearings
6 and 7B Series: 4 Needle Bearings
8 and 9 Series: 2 Bronze Bushings
10 and 12 Series: Needle
Bearing Each End of Shaft
155. Locknut and Washer
157. Oil Catcher and Bearing Retainer
158. Pinion Shaft Flywheel Bearing
3-B to 10 Series: Ball Bearing
12 Series: Roller Bearing
160. Intermediate Shaft Bearing Spacer
Does not apply to 10 and 12 Series
161. Oil Level Elbow
162. Pinion Shaft Bearing
3-B to 5-B and 12 Series: Ball Bearing
6 and 7-B Series: Roller Bearings
8 to 10 Series: Double Row Ball Bearings
164. Locknut and Washer
165. Single Stroke Cam Cover
166. Pinion Shaft Bearing Cover
167. Eccentric Shaft Bearing
3-B to 5-B Series: Needle Bearing
6 and 7-B Series: 2 Needle Bearings
8 to 12 Series: Floating Bronze Bushings
168. Inspection Cover
170. Treadle Lever Bracket
171. Treadle Lever Pin

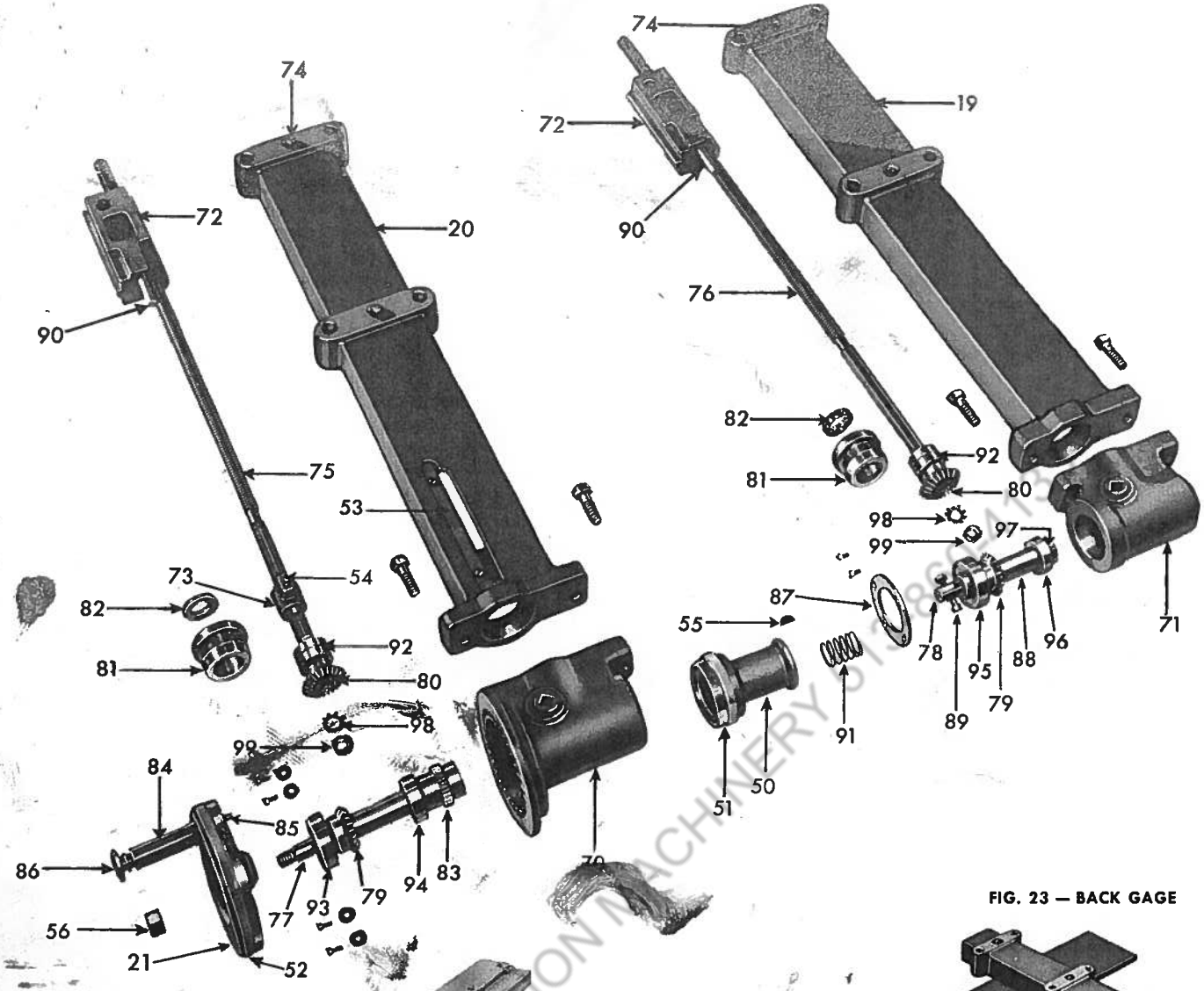


FIG. 23 — BACK GAGE

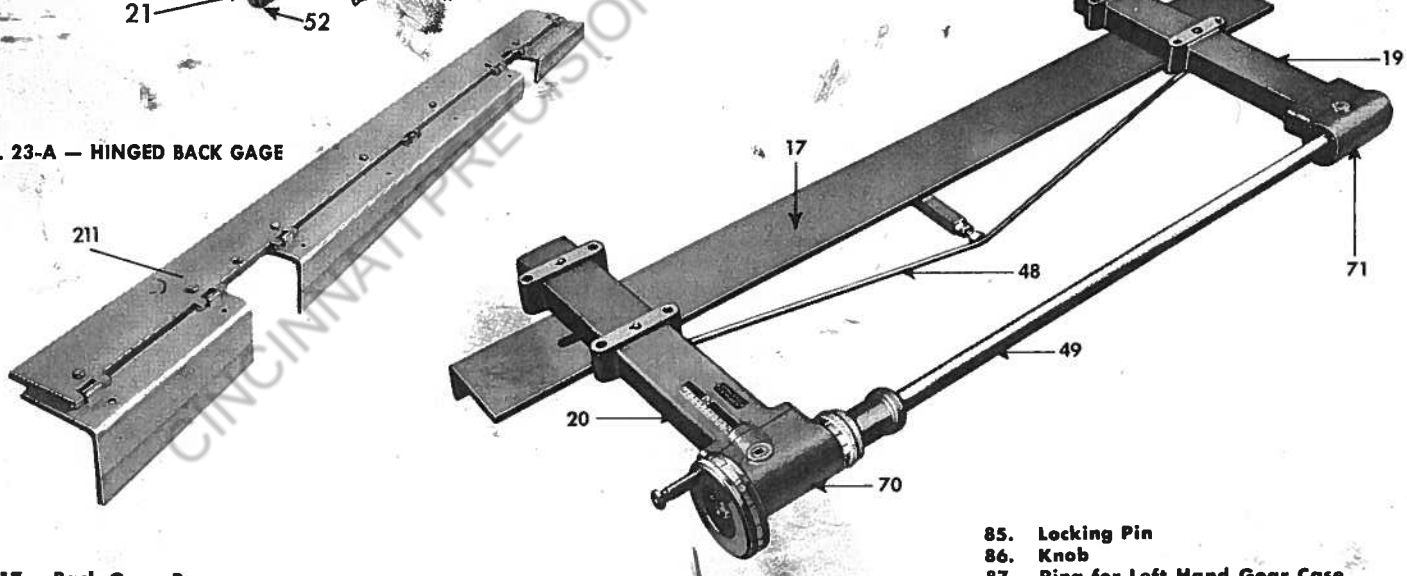


FIG. 23-A — HINGED BACK GAGE

17. Back Gage Bar
19. Left Hand Back Gage Bracket
20. Right Hand Back Gage Bracket
21. Back Gage Handwheel
48. Back Gage Brace Rod
49. Back Gage Squaring Shaft
50. Back Gage Sleeve
51. Locking Sleeve Scale
52. Handwheel Scale
53. Bracket Scale
54. Back Gage Adjusting Screw Indicator Nut
55. Woodruff Key for Locking Sleeve
56. Handwheel Nut
*57. Single Bracket Back Gage Adjusting Screw
*58. Single Bracket Back Gage Slide
70. Right Hand Gear Case
71. Left Hand Gear Case
72. Slides
73. Indicator Nut
74. Bracket Dowels
75. Right Hand Adj. Screw
76. Left Hand Adj. Screw
77. Shaft for Right Hand Gear Case
78. Shaft for Left Hand Gear Case
79. Bevel Gears for Gear Case
80. Bevel Gears for Adj. Screws
81. Retainer Bushings
82. Nuts for Retainer Bushings
83. Coupling Gear
84. Handle
85. Locking Pin
86. Knob
87. Ring for Left Hand Gear Case
88. Spacing Collar for Left Hand Shaft
89. Bolt for Connecting Shaft
90. Stop Pins
91. Spring for Coupling Sleeve
92. Double Bearings for Adj. Screws
93. R.H. Bearing for R.H. Shaft
94. L.H. Bearing for R.H. Shaft
95. R.H. Bearing for L.H. Shaft
96. L.H. Bearing for L.H. Shaft
97. Nut for Left Hand Shaft
98. Lockwashers for Adj. Screws
99. Locknuts for Adj. Screws
*100. Handle Spring
211. Hinged Back Gage Plate (sold as assembly only)

* Not Illustrated

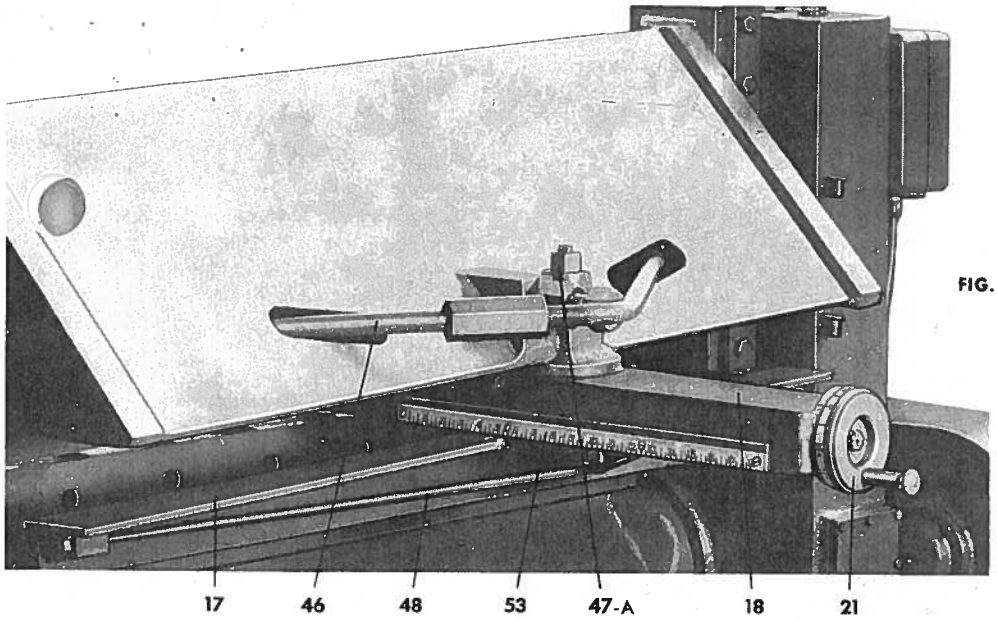


FIG. 24 — SINGLE BRACKET BACK GAGE

17. Back Gage Bar
18. Single Bracket Back Gage
21. Back Gage Handwheel
46. Crosshead Brace Rod (Complete)
47-A. King Pin Bolt and Nut
48. Back Gage Brace Rod
53. Bracket Scale

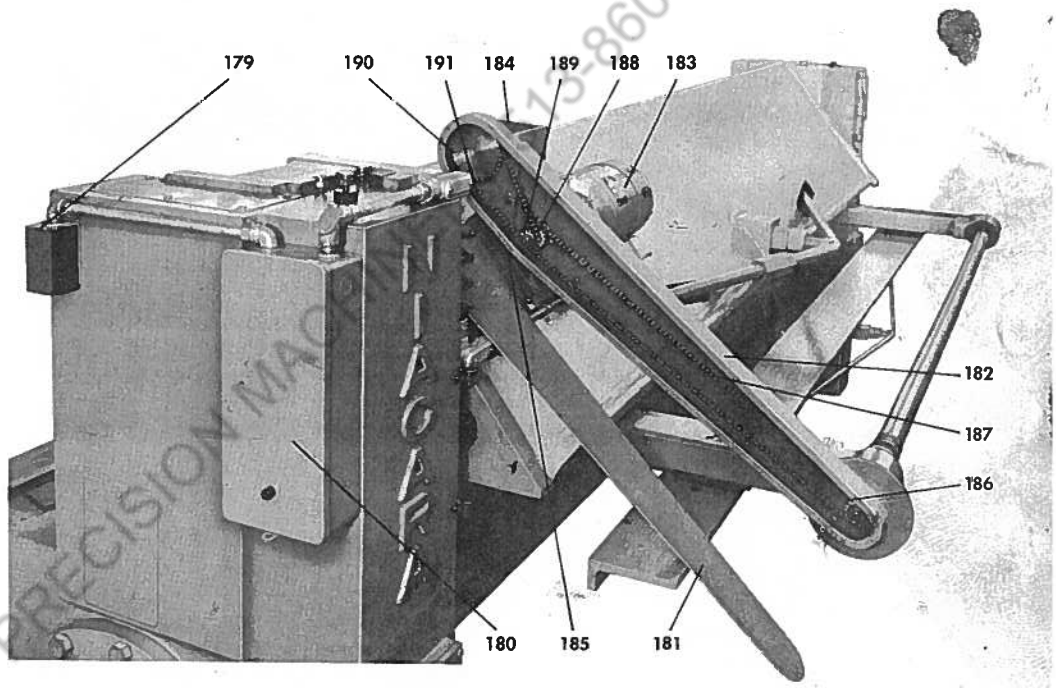


FIG. 25 — POWER OPERATED BACK GAGE

179. Control
180. Starter
181. Chain Guard Cover
182. Chain Guard
183. Motor
184. Counter
185. Mounting Bracket
186. Driven Sprocket and Spacer
187. Back Gage Chain
188. Motor Sprocket
189. Counter Driving Sprocket
190. Counter Sprocket
191. Counter Chain

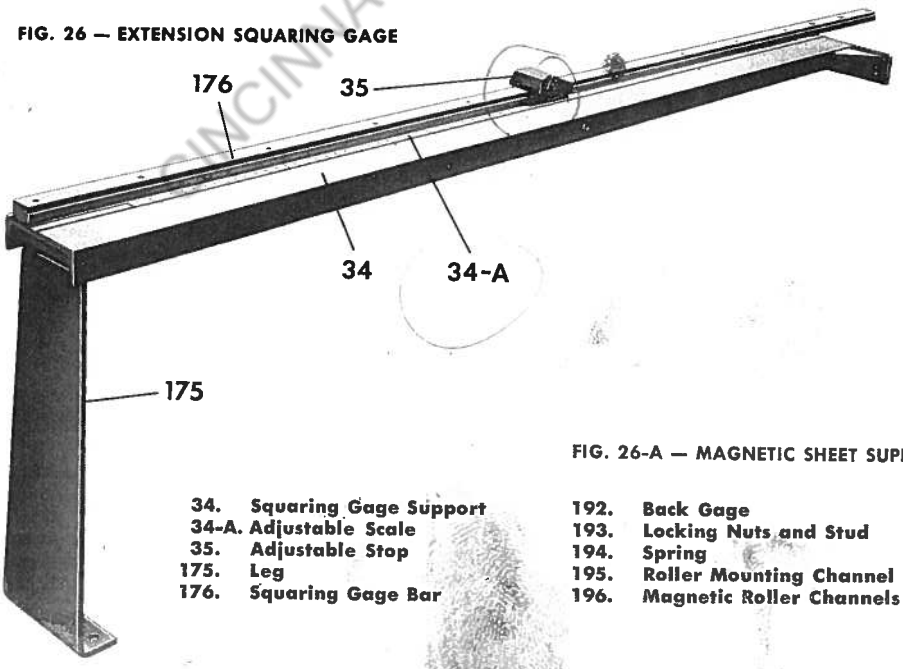


FIG. 26 — EXTENSION SQUARING GAGE

34. Squaring Gage Support
34-A. Adjustable Scale
35. Adjustable Stop
175. Leg
176. Squaring Gage Bar

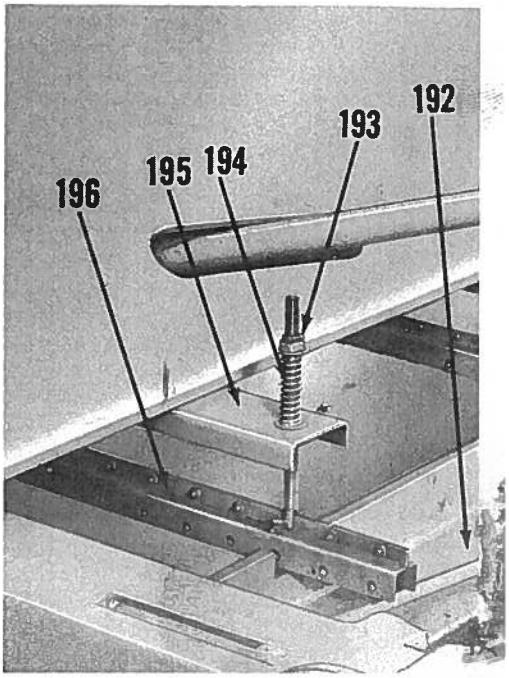


FIG. 26-A — MAGNETIC SHEET SUPPORT

192. Back Gage
193. Locking Nuts and Stud
194. Spring
195. Roller Mounting Channel
196. Magnetic Roller Channels

LUBRICATION CHART

Mobil Oil Company Engineers cooperating with our own staff recommended the following or equivalent lubricants.

Thoroughly oil bearings after each shutdown *before* starting shear and frequently thereafter. Keep bearings and oil clean and free from dirt or grit. The plain bearings of this shear are not designed to accommodate any type of grease. The oil recommended has a special compounding for the purpose and its use is highly advocated. ORDINARY AUTOMOTIVE AND MACHINE OILS ARE NOT CONSIDERED SATISFACTORY.

POINTS OF LUBRICATION	PARTS	LUBRICANT	METHOD OF APPLYING	REMARKS
A	Gear Box	Mobil Compound Oil BB	Fill through plug or cover, top of gear box	Drain and refill after first three months; thereafter, change oil every six months. Maintain oil level.
B	Leg Housings	Mobil Vactra Oil Extra Heavy	Fill through cover on rear of leg	Drain and clean wells once each year. Maintain oil level.
C	Gibs Holddowns and Counterbalance	Mobil Vactra Oil Extra Heavy	Oil cups	Fill oil cups until full before starting shear. After each shutdown, refill cups several times during each shift. Put a few drops of oil on top of each holddown foot.
D	Wrist Pins	Mobil Grease Sovarex L-1	3-B to 8 Series grease gun	Fill until grease shows on both sides of connection. *Keep well lubricated.*
		Mobil Compound Oil BB	9 – 10 – 12 Series oil cups	Fill oil cups until full before starting and after each shutdown. *Keep well lubricated.*
E	Backgage Gearbox	Mobil Grease Sovarex L-1	Fill through plug by spooning	Check every six months.
F	Backgage Screws & Slide	Mobil Grease Sovarex L-1	Spread liberally on screws and slideways	Check every three months.
G	Motor	Follow motor manufacturer's recommendations		

	SERIES SHEAR	3-B	4-B	5-B	6	7-B	8	9	10	12
Gear Box Oil Capacities Given for Each Series Shear	Capacity in Gallons	1½	2	2½	3	3	4	5	6	8
	SERIES SHEAR	3-B	4-B	5-B	6	7-B	8	9	10	12
Leg Housing Oil Capacities. Figure Given Is Total of Both Housings	Capacity in Gallons	5	8	11	14	14	22	29	31	33

POINTS OF LUBRICATION

(SEE CHART ON PAGE 18)

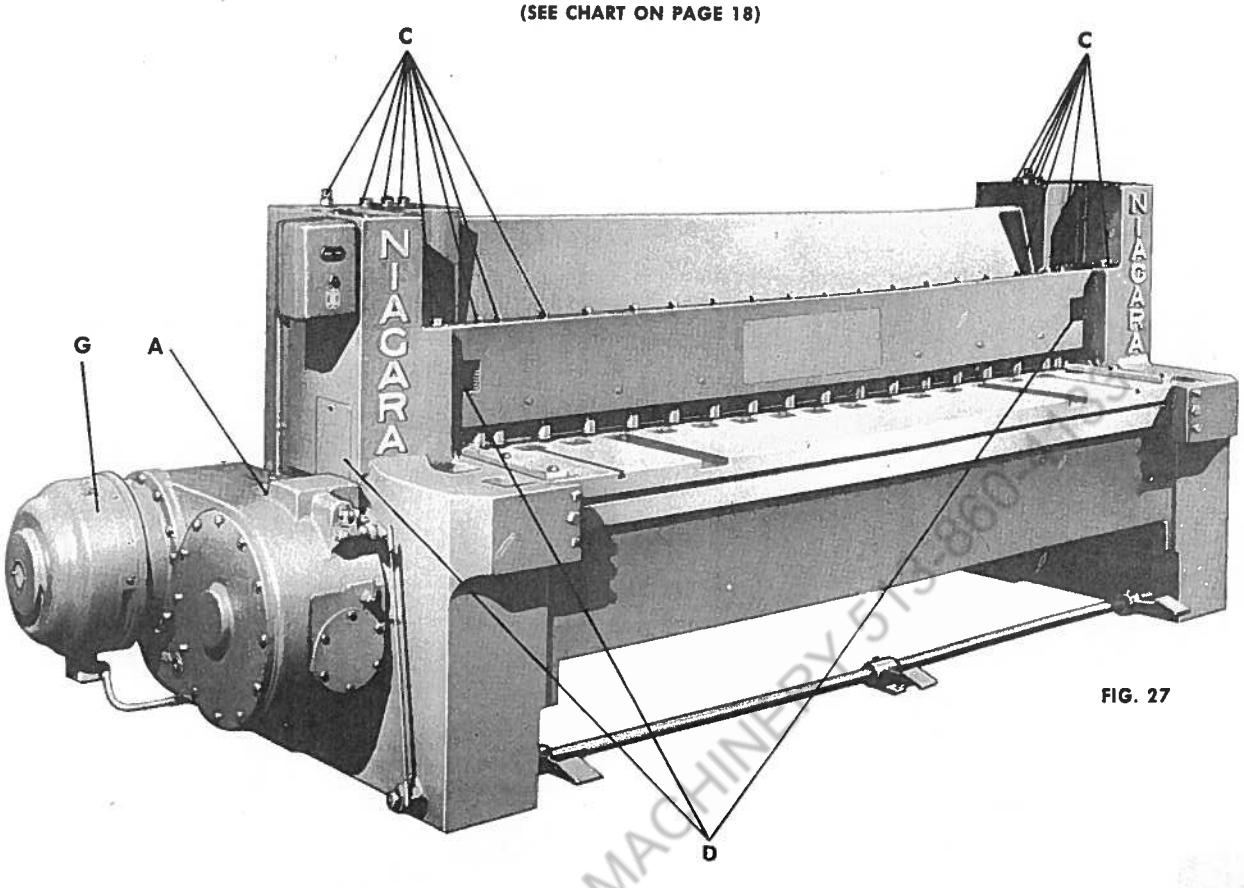


FIG. 27

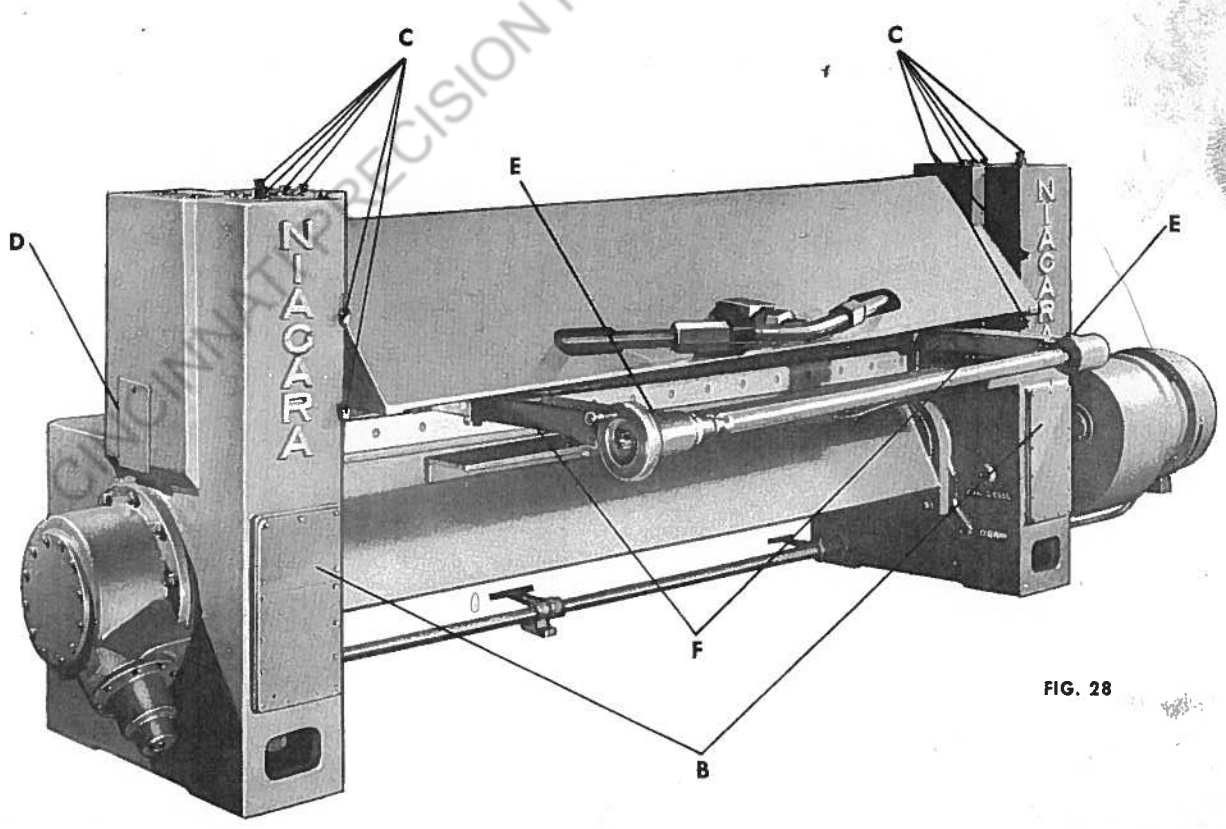
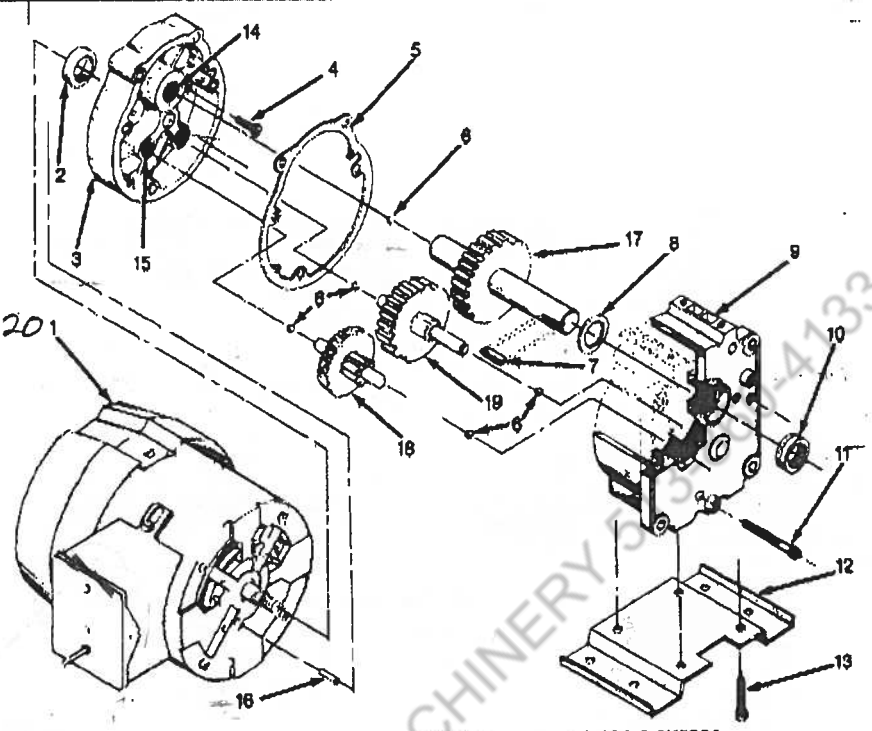


FIG. 28

ANGELA

6K329-A

FORM 6S1853	MODELS 6K325A, 6K328A AND 6K329A
02160	



PARTS
1800-323-06201

START RELAY

Figure 6 — Replacement Parts Illustration for Triple Reduction Models 6K325A, 6K328A & 6K329A

$15.90

PO# 29404

Replacement Parts Common To All Triple Reduction Models

REF. NO.	DESCRIPTION	PART NO.	QTY.
2	Input oil seal (Model 6K325A)	902-051-4411	1
	Input oil seal (Models 6K328A & 6K329A)	902-061-4411	1
3	§Motor adaptor assy.	103-200-0130	1
4	5/8" x 8-32 Screw	883-188-1101	4
5	Gasket	127-200-0100	1
6	‡Thrust balls	908-110-2500	5
7	Output key	130-200-9000	1
8	Hardened washer	109-485-0120	1
9	Gear housing assy.	101-200-0130	1
10	‡Output oil seal	902-101-8411	1
11	2¼" Screw	870-290-5361	5
12	Base plate	125-287-0200	1
13	1/2" Screw	816-104-5081	4
14	†Needle bearing, 0.625	900-410-1062	2
15	†Needle bearing, 0.312	900-410-1031	4
16	†Pin, 0.187 dia.	904-306-1201	2

(†) Included with Gear Housing Assy. (Ref. No. 9).
(‡) Included with Motor Adaptor Assy. (Ref. No. 3).
(§) Model No. 6K329A, Part No. 103-200-0131.

Specific Replacement Parts for Each Triple Reduction Model

MODEL	REF. #1 INPUT MOTOR	REF. #17, LOW SPEED SUB. ASSY.	REF. #18 HIGH SPEED SUB. ASSY.	REF. #19 INTERMEDIATE SPEED SUB. ASSY.
6K325A	9K345	144-527-0110	145-527-0130	145-527-0120
6K328A	9K346	144-523-0110	145-523-0130	145-523-0120
6K329A	9K346	144-524-0110	145-523-0130	145-257-0120

03860 **Relay for Input Motor**

MODEL	RELAY NO.
9K345 9K346	R13195302B000 R13195302B002

ORDER REPLACEMENT PARTS BY CALLING TOLL FREE 1-800-323-0620

Please provide following information:
- Model Number
- Serial Number (if any)
- Part Description and Number as shown in Parts List

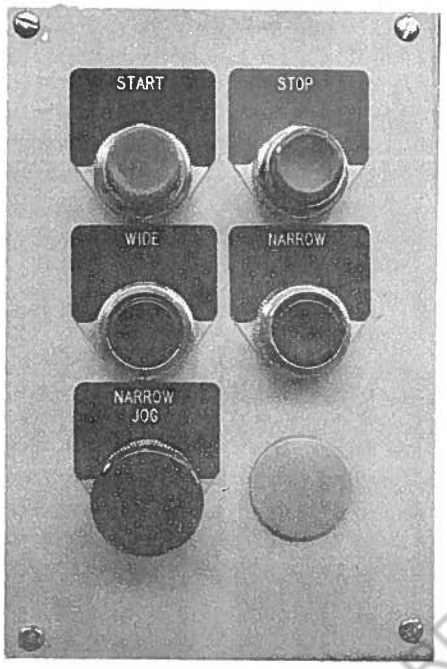
Address parts correspondence to:
Dayton Electric Mfg. Co.
1260 Busch Parkway
Buffalo Grove, IL 60089

NIAGARA

BALL BEARING PARALLEL BACKGAGE (MEDIUM)

INSTRUCTIONS

Form C·22·B



TYPICAL OPERATOR'S STATION
Figure 1

CLEANING

The backgage is protected from rusting during shipment by a rust-proofing compound. This compound should be washed off with an acceptable solvent. Remove any dirt that may have accumulated in transit.

INSTALLATION

1. Attach the gage brackets (Parts No. 94) to the underside of the crosshead with the bracket mounting screws (Parts No. 90).
   IMPORTANT: The brackets must be mounted parallel to each other to prevent binding. Mounting screws should only be hand tight.
2. Install connecting shaft (Part No. 55) using coupling halves (Part No. 53), coupling insert (Part No. 54), and set screw (Part No. 52) on either end.
3. Connect motor leads and counter flex shaft (Part No. 70).
4. Push "WIDE" button and run slides (Parts No. 17) all the way back until one slide hits extreme edge of gage bracket. On the other gage bracket, pull out the adjusting collar and turn counter-clockwise until the slide on this bracket is at the end of its travel all the way back.
5. Install gage bar (Part No. 4) by inserting slide stud (Part No. 16) in the holes provided in the gage bar. Tighten the castle nuts (Parts No. 2) finger tight until you can insert the cotter pins (Parts No. 1).
6. Push "NARROW" button and run gage bar in until it is about 1/4" away from the fixed blade. By pulling out the adjusting collar (Part No. 3) and manually operating each (turning clockwise), the gage bar should be squared against the fixed blade.
7. Push "WIDE" button and run gage bar out past the mounting screws (Parts No. 90). Tighten mounting screws.

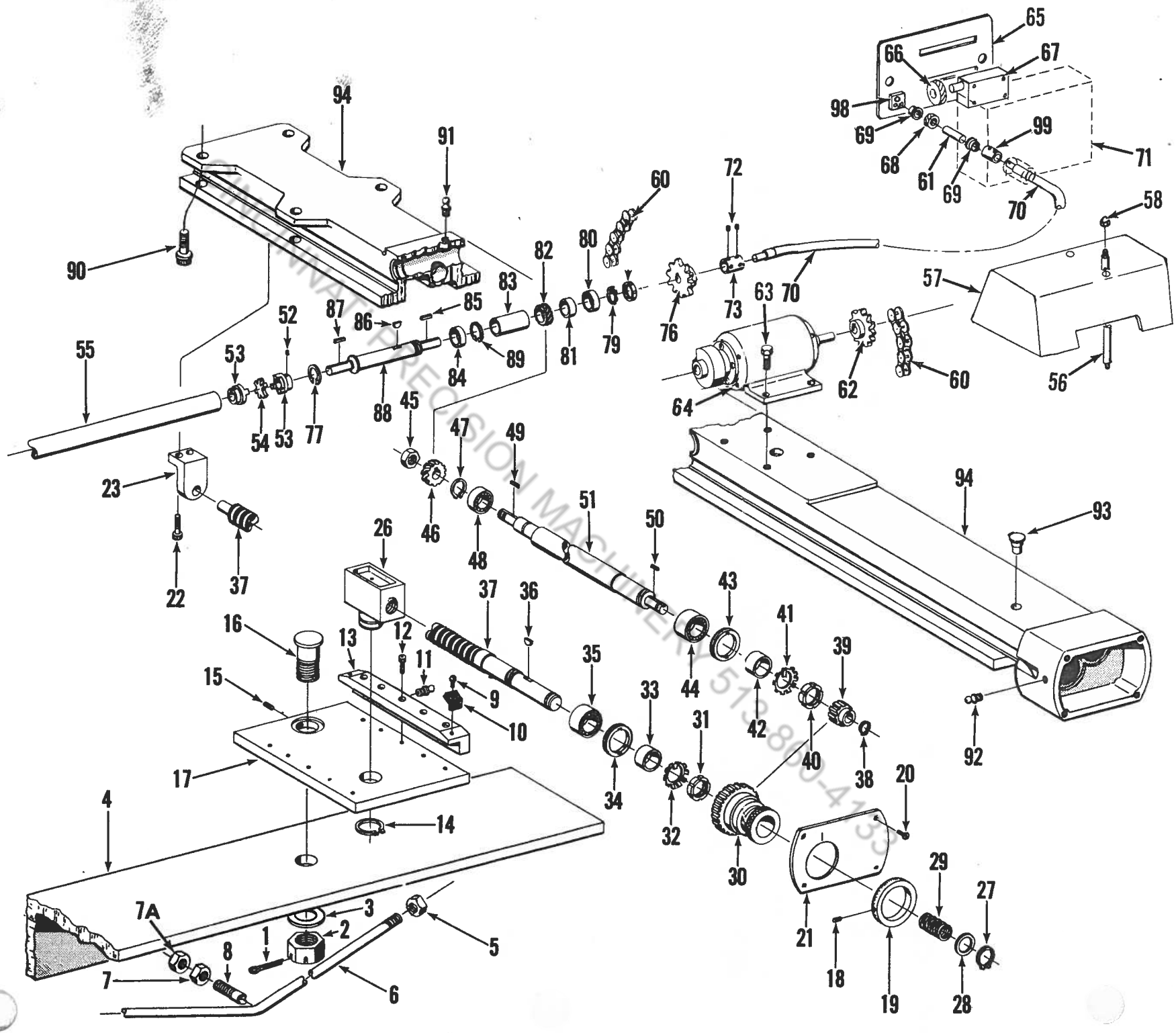
BACKGAGE BAR ADJUSTMENT

The gage bar (Part No. 4) should be set so that the ends of the gage bar are exactly the same distance from the fixed blade as shown on the position indicator (Part No. 67) to the nearest .001". The center of the gage bar is an additional .003" away from the fixed blade. The bow is set in the gage bar because internal stress in the material being sheared distorts the edge and, by contacting only the ends of the sheet, a truer cut will result.

To adjust the gage:

1. With the "WIDE" BUTTON, run the gage bar out to approximately 3" or 4". Using the "NARROW" and the "NARROW JOG" BUTTON, bring the gage bar in until the indicator reads EXACTLY 2".
2. Place the MAIN DISCONNECT SWITCH to the "OFF" position and lock.
3. Install blocks under both ends of the ram.
4. Insert 2" gage block between the fixed blade and the gage bar at one end. Pull out the adjusting collar (Part No. 30) and turn clockwise or counter-clockwise until the gage bar is against the gage block. If the adjusting collar does not re-engage when released, turn it clockwise until it engages in the first notch.
5. Repeat Step 4 at the other end. (Continued on Page 4)

716-893-4070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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.

1. Cotter Pin
2. Castle Nut
3. Washer
4. Gage Bar
5. Brace Rod Nuts
6. Brace Rod
7. Jam Nut
7A Brace Rod Bolt Adjusting Nut
8. Brace Rod Bolt
9. Wiper Fastening Screw
10. Wiper
11. Lube Fitting
12. Slide Cap Fastening Screw
13. Slide Cap
14. Retaining Ring
15. Set Screw
16. Slide Stud
17. Slide
18. Set Screw
19. Indicating Collar
20. Plate Mounting Screw
21. Gear Cover Plate
22. Support Mounting Screw
23. Screw Support
26. Adjusting Nut
27. Retaining Ring
28. Washer
29. Adjusting Collar Spring
30. Adjusting Collar
31. Locknut
32. Lockwasher
33. Bearing Spacer
34. Bearing Nut
35. Bearing
36. Adjusting Collar Key
37. Adjusting Screw
38. Retaining Ring
39. Adjusting Gear
40. Locknut
41. Lockwasher
42. Bearing Spacer
43. Bearing Nut
44. Bearing
45. Retaining Nut
46. Worm Gear
47. Retaining Ring
48. Bearing
49. Worm Gear Key
50. Collar Key
51. Intermediate Shaft
52. Set Screw
53. Coupling Half
54. Coupling Insert
55. Connecting Shaft
56. Mounting Rod
57. Guard Nut
58. Acorn Nut
60. Chain
61. Pinion Shaft
62. Motor Sprocket
63. Motor Mounting Screw
64. Motor with Brake
65. Indicator Cover
66. Counter Helical Gear
67. Counter
68. Shaft Helical Gear
69. Bushing
70. Flexible Shaft
71. Indicator Bracket
72. Set Screw
73. Shaft Adapter
76. Driveshaft Sprocket
77. Outside Retaining Ring
78. Locknut
79. Lockwasher
80. Bearing
81. Gear Spacer
82. Helical Gear
83. Bearing Spacer
84. Bearing
85. Coupling Key (Used only with Part No. 53)
86. Helical Gear Key
87. Coupling Key (Used only with Part No. 53)
88. Drive Shaft
89. Inside Retaining Ring
90. Bracket Mounting Screw
91. Center Gear Case Lube Fitting
92. End Gear Case Lube Fitting
93. Oil Cup
94. Gage Brackets
98. Retainer
99. Coupling

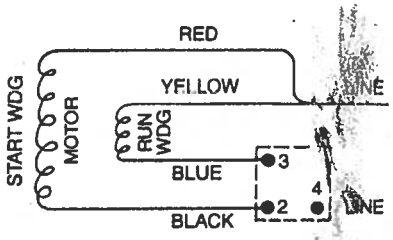
Please read and save this Replacement Parts Manual. Read this manual and the General Operating Instructions carefully before attempting to assemble, install, operate or maintain the product described. Protect yourself and others by observing all safety information. The Safety Instructions are contained in the General Operating Instructions. Failure to comply with the safety instructions accompanying this product could result in personal injury and/or property damage! Retain instructions for future reference.

Dayton® Parallel Shaft High Torque AC Gearmotors

Refer to Form 8S707 for General Operating and Safety Instructions and applicable Warranty.

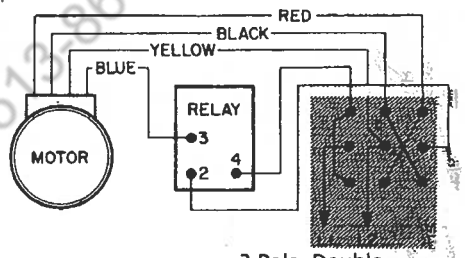
⚠WARNING

Make certain power supply is disconnected before attempting to service or remove any components! If the power disconnect point is out-of-sight, lock it in the open position and tag to prevent unexpected application of power.



NOTE: To reverse rotation interchange red and black leads.

Wiring Diagram



3-Pole, Double Throw Center Off Switch 2X594 Switch Action Vertical

Reversing Switch Diagram

Disassembly

NOTE: Refer to the Replacement Parts Illustrations.

1. Remove the five (5) Torx® flathead screws from the output side of the unit. Suitable Torx® key wrenches may be ordered from Dayton, Stock No. 2A276.
2. Place the unit shaft down and pry off the motor and cover assembly. This will destroy the gasket. Watch so that thrust balls are not dropped and lost. Do not damage seal bead on cover.
3. With housing disassembled, gears can now be removed.
4. Motor can be dismounted by removing four (4) No. 8 screws which pass through the cover and into the motor face. These are special #8-32 x ⅝" long screws with plastic seals under the head, to prevent leakage around the screw heads. New, exact duplicate replacements should be used.
5. Oil seals can be removed by prying out with a screwdriver. Clean the cavity and press new seal squarely in place, lip edge inward towards gear cavity until seal bottoms.

Reassembly

1. Care must be taken that the ¼" diameter thrust balls remain in place during assembly. This can readily be accomplished with a small dab of grease.
2. Clean gear box completely and replace with new lubricant. After all gears are in place, refill the gearcase with Hodson 4111 or Gulf Harmony #121 heavy gear oil. About four ounces (by weight) will be required. Do not mix lubricants.
3. Install a new gasket and place the motor cover assembly on back end of housing. Hold firmly together and replace the five (5) Torx® head screws in face of gear box.
4. Start and stop the motor. The gearing should turn freely without binding and coast slightly as the motor comes to a stop.

Dayton®

For Replacement Parts, call 1-800-323-0620

24 hours a day - 365 days a year

Please provide the following information:
-Model number
-Serial number (if any)
-Part description and number as shown in parts list

Address parts correspondence to:
Grainger Parts Operations
P.O. Box 3074
1657 Shermer Road
Northbrook, IL 60065-3074 U.S.A.

ENGLISH

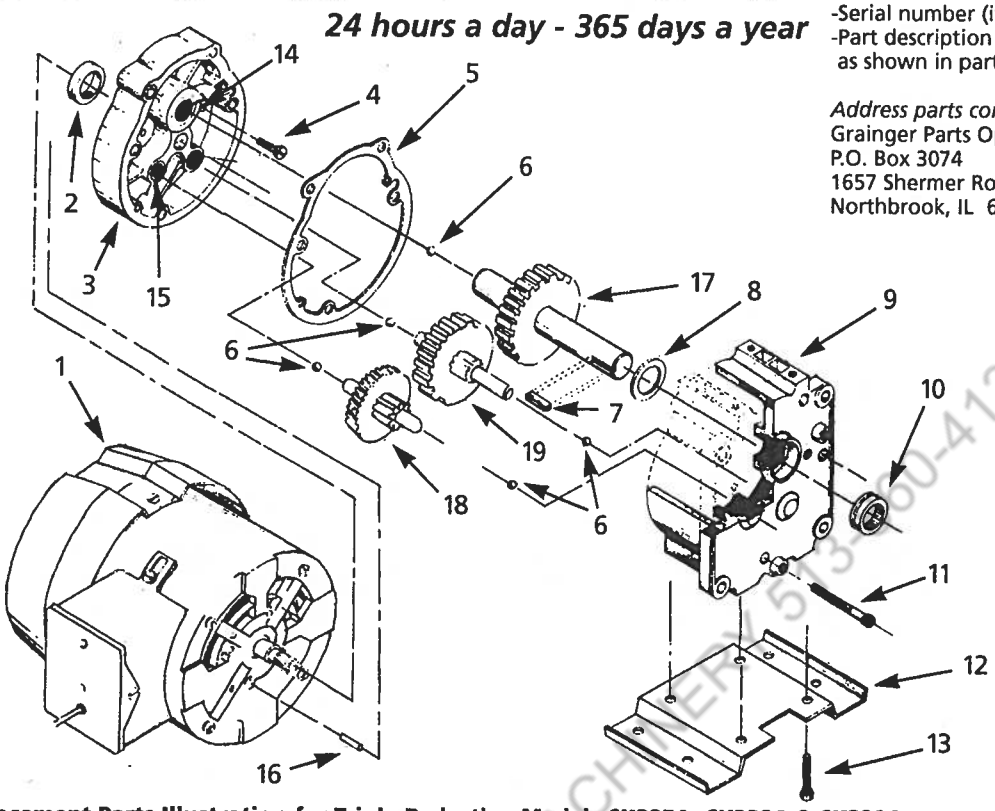


Figure 1 - Replacement Parts Illustration for Triple Reduction Models 6K325A, 6K328A & 6K329A

Replacement Parts Common to all Triple Reduction Models

Ref. No.		Description	Part Number	Qty.
1		Input motor	see table at right	1
2		Input oil seal Model 6K325A	902-051-4411	1
		Input oil seal Models 6K328A & 6K329A	902-081-4411	1
3	§	Motor adapter assy.	103-200-0130	1
4		⅜" x 8-32 Screw	883-188-1101	4
5		Gasket	127-200-0100	1
6	‡	Thrust Balls	908-110-2500	5
7		Output key	130-200-9000	1
8		Hardened washer	109-485-0120	1
9		Gear housing assy.	101-200-0130	1
10	‡	Output oil seal	902-101-8411	1
11		2¼" Screw	870-290-5361	5
12		Base plate	125-287-0200	1
13		½" Screw	816-104-5081	4
14	†	0.625" Needle bearing	900-410-1062	2
15	†	0.312" Needle bearing	900-410-1031	4
16	†	0.187" dia. Pin	904-306-1201	2
17		Low speed sub. assy.	see table at right	1
18		High speed sub. assy.	see table at right	1
19		Interm. speed sub. assy.	see table at right	1
△		Conduit Box and Cover	B85-263-382-000	1

(†) Included with Gear Housing Assy. (Ref. No. 9).
(‡) Included with Motor Adapter Assy. (Ref. No. 3).
(§) Model No. 6K329A, Part No. 103-200-0131.
(△) Not Shown.

Relay for Input Motor

Model	Relay No.
△ 9K345	R131-953-02B-000
△ 9K346	R131-953-02B-002

Specific Replacement Parts for Each Triple Reduction Model

Model	Ref. #1 Input Motor	Ref. #17 Low Speed Sub. Assy.	Ref. #18 High Speed Sub. Assy.	Ref. #19 Inter. Speed Sub. Assy.
6K325A	9K345	144-527-0110	146-527-0130	145-527-0120
6K328A	9K346	144-523-0110	146-523-0130	145-523-0120
6K329A	9K346	144-524-0110	146-523-0130	145-257-0120

For Replacement Parts, call 1-800-323-0620

24 hours a day - 365 days a year

Please provide the following information:
-Model number
-Serial number (if any)
-Part description and number
as shown in parts list

Address parts correspondence to:
Grainger Parts Operations
P.O. Box 3074
1657 Shermer Road
Northbrook, IL 60065-3074 U.S.A.

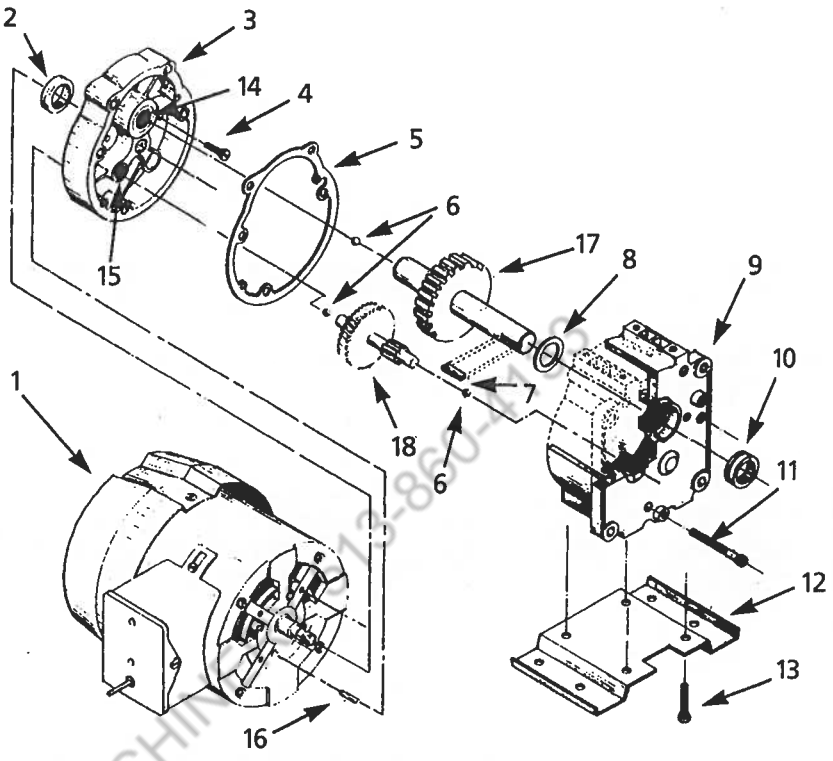


Figure 2 - Replacement Parts Illustration for Double Reduction Models 6K331A, 6K332A & 6K3334A

Replacement Parts List for Models 6K331A, 6K332A and 6K334A

Ref. No	Description	Part No.	Qty.
1	Input motor	see table at right	1
2	‡ Input oil seal	902-081-4411	1
3	Motor adapter assembly	103-200-0130	1
4	⅜"x 8-32 screw	883-188-1101	4
5	Gasket	127-200-0100	1
6	‡ Thrust balls	908-110-2500	3
7	Output key	130-200-9000	1
8	Hardened washer	109-485-0120	1
9	Gear housing assembly	101-200-0130	1
10	‡ Oil seal	902-101-8411	1
11	1¼" screw	870-290-5361	5
12	Base plate	125-287-0200	1
13	½" screw	816-104-5081	4
14	† 0.625" Needle bearing	900-410-1062	2
15	† 0.312" Needle bearing	900-410-1031	2
16	† 0.187" diameter Pin	904-306-1201	2
17	Low Speed Sub. assembly	see table at right	2
18	High Speed Sub. assembly	see table at right	2
△	Conduit Box and Cover	B85-263-382-000	1

(†) Included with Gear Housing Assembly (Ref. No. 9).
(‡) Included with Motor Adapter Assembly (Ref. No. 3).
(△) Not Shown.

Relay for Input Motor

Model	Relay No.
△ 9K346	R131-953-02B-002

Specific Replacement Parts for each Double Reduction Model

Model	Ref #1 Input Motor	Ref #17 Low Speed Sub. Assy.	Ref. #18 High Speed Sub. Assy.
6K331A	9K346	144-525-0110	146-525-0130
6K332A	9K346	144-523-0110	146-526-0130
6K334A	9K346	144-524-0110	146-528-0130

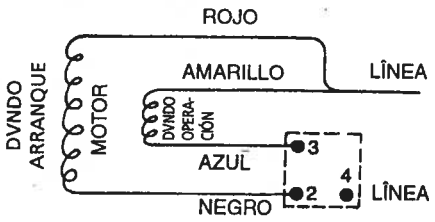
Dayton®

Sirvase leer y guardar esta lista de repuestos. Lea con cuidado este manual e Instrucciones Generales antes de tratar de armar, instalar, manejar o darle servicio al producto descrito en este manual. Protéjase Ud. y a los demás observando todas las reglas de seguridad. Las reglas de seguridad están enumeradas en las Instrucciones Generales de Funcionamiento. El no seguir las instrucciones podría resultar en heridas y/o daños a su propiedad. Guarde este manual como referencia.

Grupos motorreductores de CA, de gran par y con ejes en paralelo Dayton®

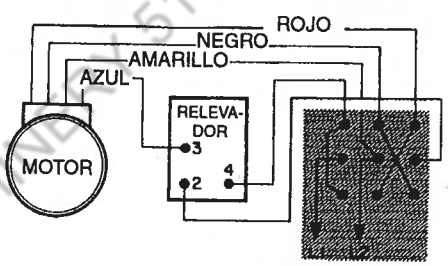
Consulte el formulario 8S707 en el cual se proporcionan las Instrucciones generales de operación y seguridad y la Garantía correspondiente.

⚠ ¡ADVERTENCIA! ***Asegúrese de que el suministro eléctrico está desconectado antes de dar servicio o reparar cualquiera de los componentes. Si el lugar de desconexión del suministro eléctrico no está al alcance de la vista, bloquéelo en la posición de abierto y márquelo con una etiqueta para impedir la aplicación inesperada de electricidad.***



NOTA: Para invertir la rotación intercambie las terminales roja y blanca.

Diagrama de cableado



Interruptor 2x594, de acción vertical, de 3 polos, doble tiro, desconectado al centro.

Diagrama del interruptor invertido

ESPAÑOL

Desmontaje

NOTA: Consulte las ilustraciones de piezas de repuesto.

1. Retire los cinco (5) tornillos de cabeza plana Torx® del lado de salida de la unidad. Las llaves de tuercas apropiadas para Torx® pueden adquirirse por medio de Dayton, No. de pieza 2A276.
2. Coloque el eje de la unidad boca abajo y retire el conjunto del motor y la cubierta haciendo palanca. El empaque se destruirá. Tenga cuidado para que no se caigan y se pierdan las bolas de empuje. No dañe el reborde obturador de la cubierta.
3. Cuando el bastidor esté desarmado, puede retirar los engranajes.
4. Para desmontar el motor, retire los cuatro (4) tornillos del No. 8 que pasan por la cubierta hasta la cara del motor. Estos son tornillos especiales #8-32 x ⅝ de pulgadas de longitud y con obturadores de plástico debajo de la cabeza para impedir fugas por la cabeza del tornillo. Es necesario utilizar tornillos de repuesto nuevos idénticos.
5. Los obturadores de aceite se pueden retirar apalancando con un destornillador. Limpie la cavidad e instale el obturador nuevo en su lugar; empuje el reborde hacia la cavidad de engranajes, hasta que el obturador llegue al fondo.

Montaje

1. Cerciórese de que las bolas de empuje de ¼ de pulgada de diámetro permanezcan en su lugar durante el montaje. Esto puede lograrse fácilmente utilizando un poco de grasa.
2. Limpie por completo la caja de engranajes e instálela con lubricante nuevo. Cuando todos los engranajes estén en su lugar, llene la caja de engranajes con aceite viscoso para engranajes marca Hodson 4111 o Gulf Harmony #121. Necesitará aproximadamente 4 onzas (115 g). No mezcle diferentes marcas de lubricantes.
3. Instale un empaque nuevo y coloque el conjunto de la cubierta y el motor en la parte posterior del bastidor. Sujételos firmemente y coloque los cinco (5) tornillos Torx® de cabeza plana en la cara de la caja de engranajes.
4. Arranque y pare el motor. Los engranajes deben girar libremente sin pegarse y deben continuar un movimiento lento por inercia mientras el motor se detiene.

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