

**NORTON**  
**6" x 18"**  
**Surface Grinder**

**Instruction and Parts Manual**

**Manufactured in the USA by:**  
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## INTRODUCTION

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These instructions cover the following arrangements of this machine;-

- Horizontal wheel spindle, plain bearings
- Horizontal wheel spindle, ball bearings
- Horizontal spindle, ball bearings with integral motor
- Vertical spindle, ball bearings with integral motor
- Hand table traverse and hand cross-feed
- Hydraulic table traverse and hand cross-feed
- Hydraulic table traverse and hydraulic cross-feed
- With wet grinding attachment
- With individual dust exhaust
- For connection to central dust exhaust system

Many combinations of the above featured units are available to suit the requirements of the job and individual preferences. Likewise, in many instances, it is possible to convert a machine already in use to some other arrangement, as, for example, a machine with hand cross-feed can be equipped with the necessary parts and mechanisms to make it an automatic cross-feed machine.

All the horizontal spindles are interchangeable. Consequently a machine originally purchased with a ball bearing spindle can later be equipped with a plain bearing spindle should such a change be desired. In the same way, dry grinding machines can be equipped with wet grinding arrangements.

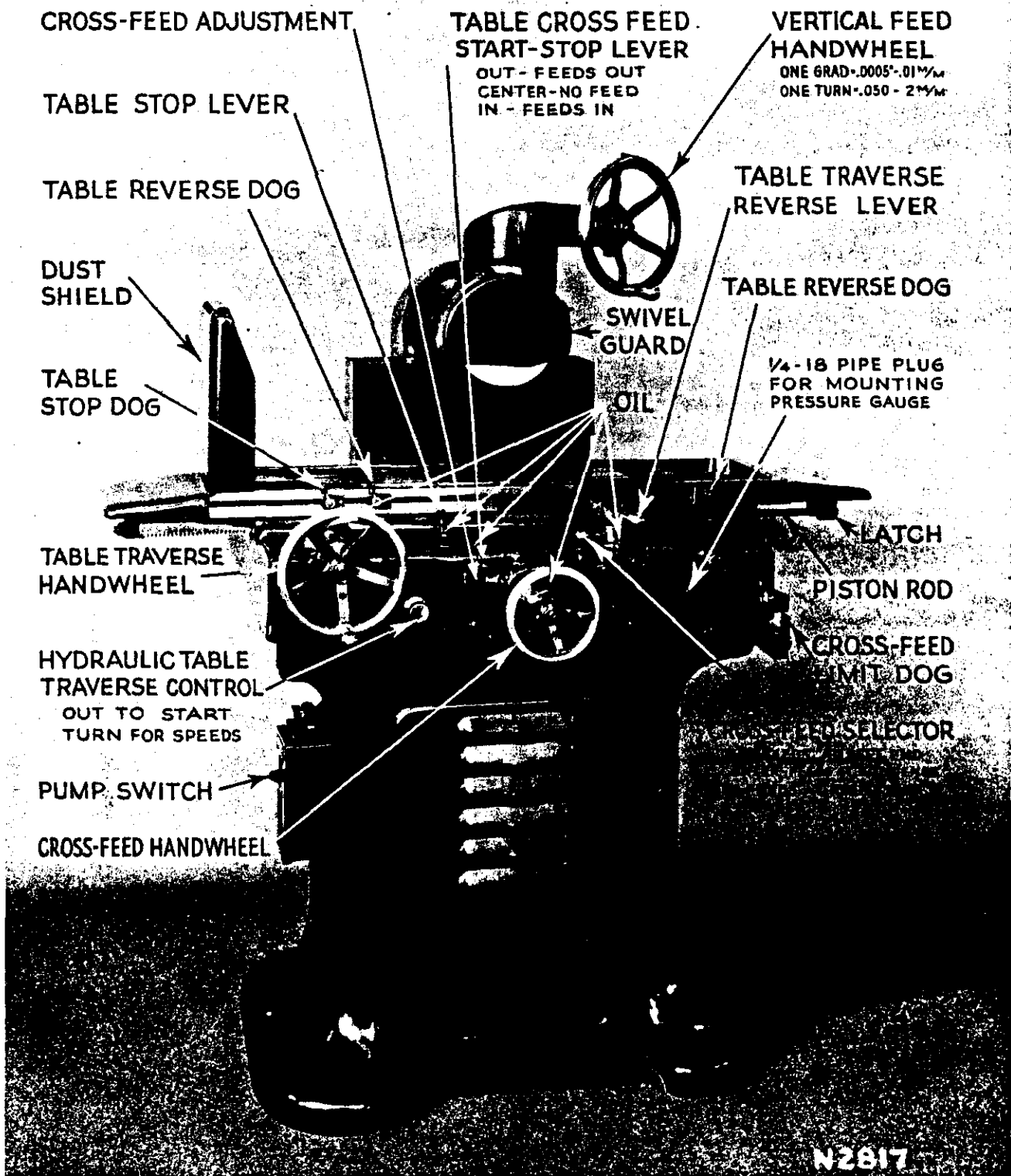
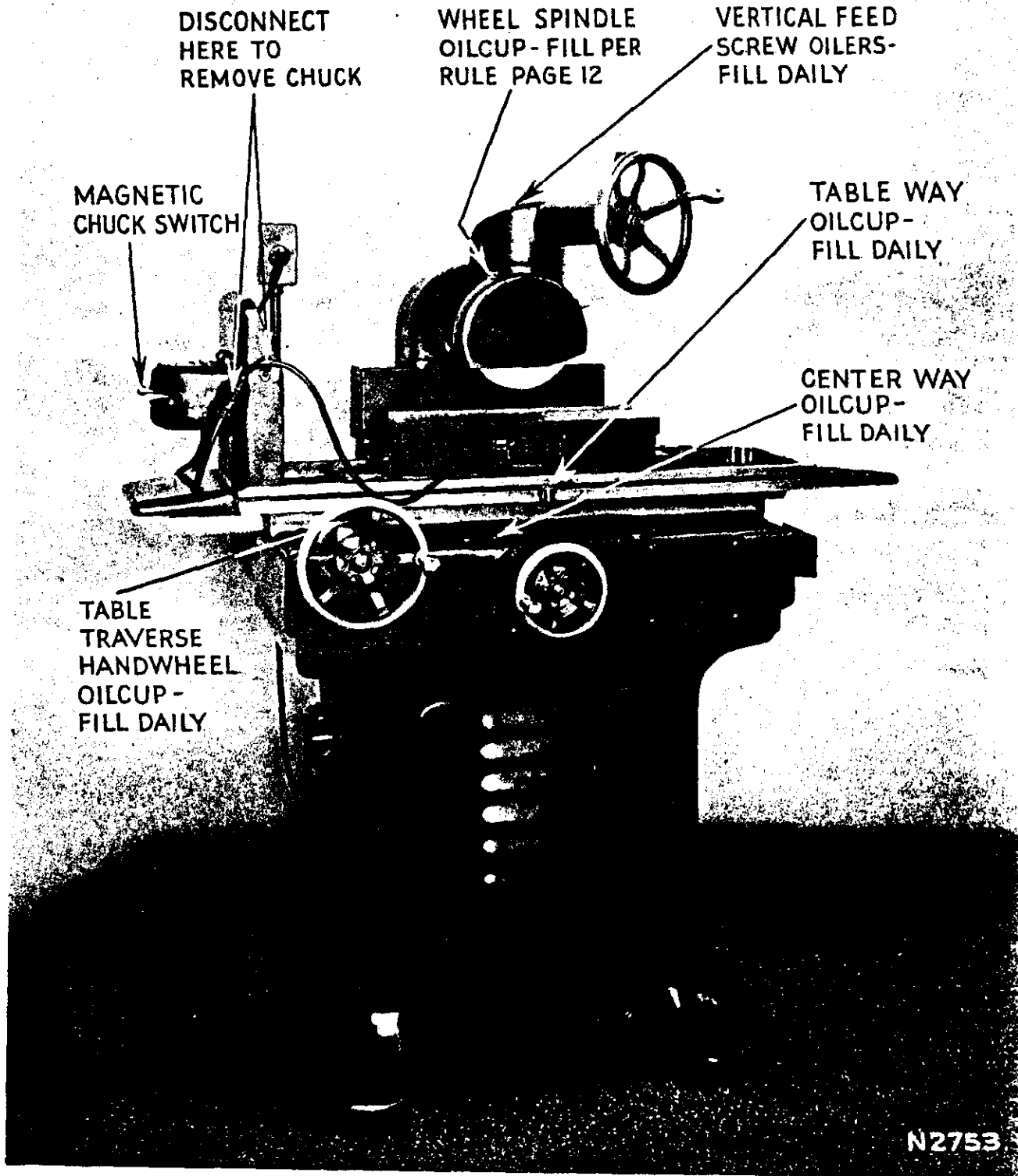


Figure 1 - Photo. N-2817

6" x 18" Surface Grinder with hydraulic table traverse and automatic cross-feed arranged for dry grinding.



N2753

Figure 2 - Photo. N-2753

6" x 18" Surface Grinder with hand table traverse  
and hand cross-feed arrangement.

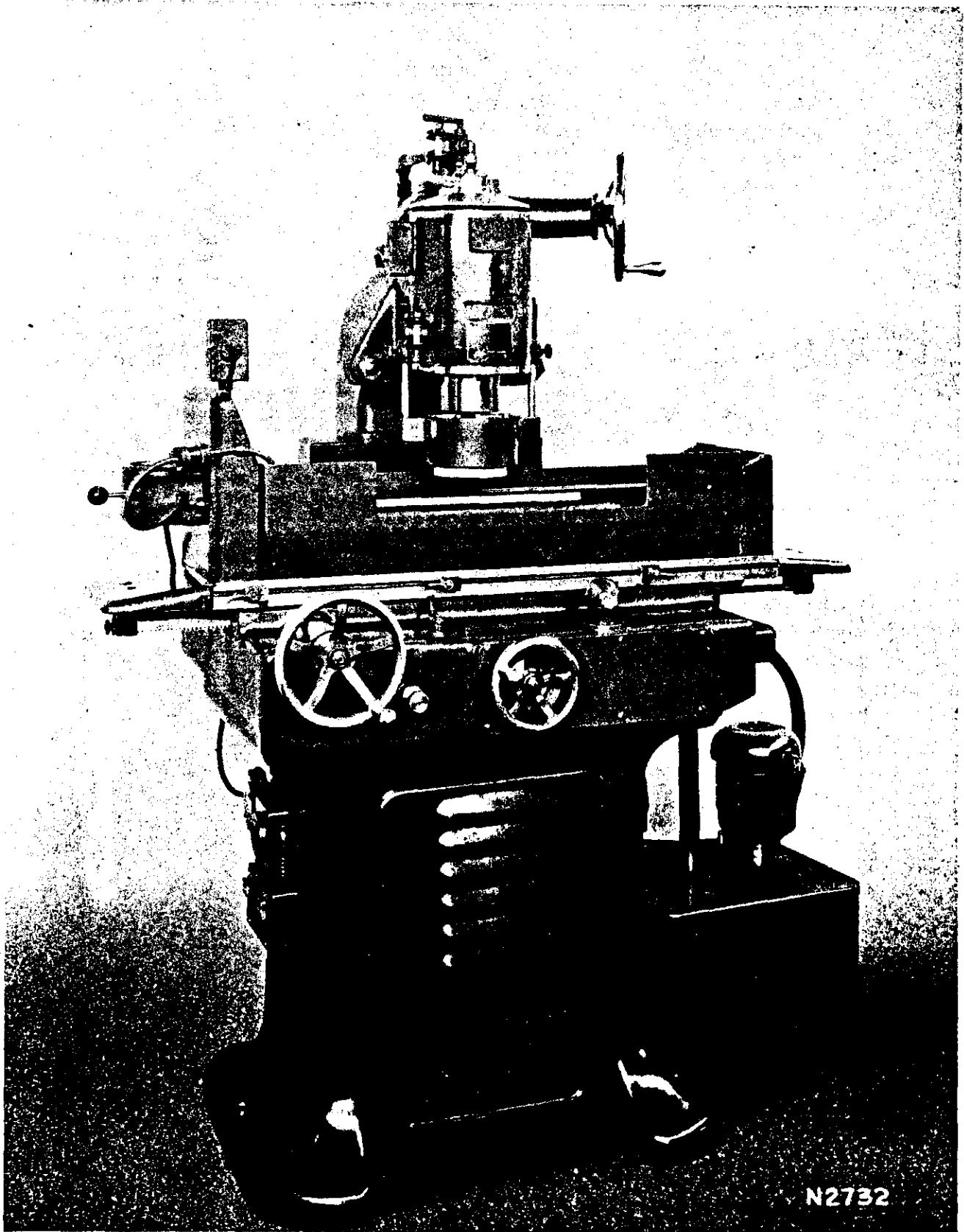


FIGURE 3 (N-2732)

The 6" x 18" surface grinder with vertical spindle driven by integral motor and using a cup wheel, arranged with hydraulic table traverse and hand cross-feed for wet grinding on a magnetic chuck.

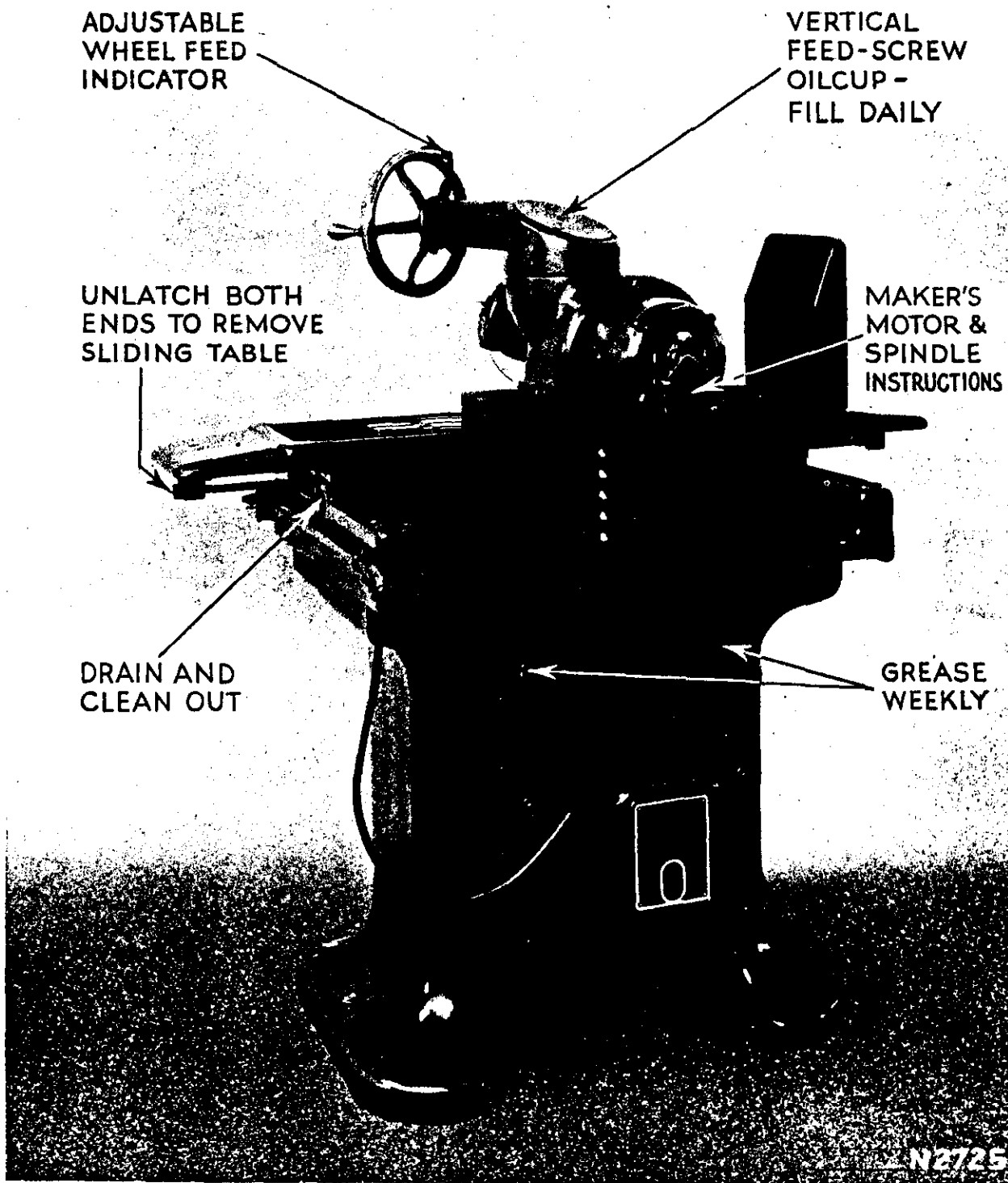


Figure 4 - Photo. N-2725

6" x 18" Surface Grinder with hydraulic table traverse  
and integral-driven X10 horizontal spindle.



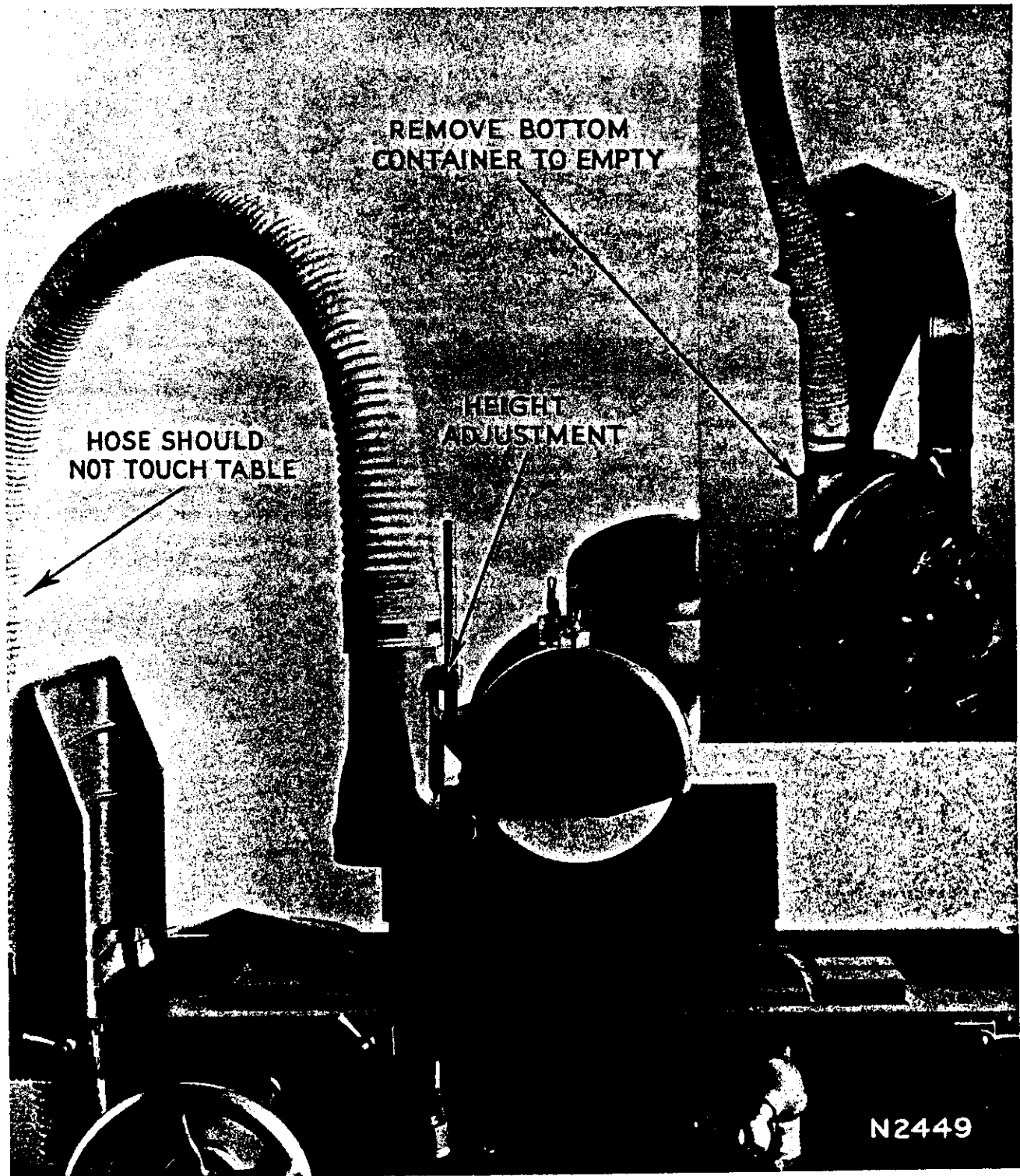


Figure 5 - Photo. N-2449

6" x 18" Surface Grinder with individual dust exhaust arrangement. Insert shows exhaust unit and collector as it stands on floor at rear of machine.

## OPERATION

There is very little reassembling to do upon receipt of a Norton 6 x 18" surface grinder. On export shipments to some countries custom requirements make it necessary to ship motors and other electrical equipment separately. In this case, of course, these units must be mounted after the machine is received. In the majority of cases, however, the motors and magnetic chucks are shipped mounted on the machine.

### Uncrating and Handling

After uncrating the machine, remove the heavy grease from the bright parts with gasoline or kerosene. Move the machine to the position it is to occupy and level it from front to back and from side to side, working from the finished surface of the sliding table. Secure the machine to the floor by means of lag screws for which holes in the foot of the base are provided. Be careful in lifting the machine with a crane. A good way to do this is to use two steel bars about 2½" in diameter and about 4' long. Place one bar under each end of the upper part of the base where it flares out to support the saddle. A sling can then be rigged to these bars and the machine lifted with little difficulty. Of course, it is also possible to place the sling directly on the base but in this case, care must be observed not to allow it to press against any of the lighter members or sections and break them when the machine is lifted. Use wooden wedges under edge of base in levelling machine.

The hand wheels are readily mounted after which the motors can be connected. Also wire the magnetic chuck to direct current with the proper characteristics.

### Mounting Grinding Wheel

The grinding wheels are packed separately, although included with the crate or box in which the machine is shipped. Figure 6 shows a section through a horizontal, plain bearing wheel spindle. It will be observed that the grinding wheel is mounted on a sleeve or collet which in turn is mounted on the end of the spindle. A special wrench fits the nut holding the collet to the spindle. Another special wrench is provided for the flange which holds the wheel on the collet. If a variety of work is to be ground, requiring several different wheels and necessitating frequent wheel change, the best practice is to obtain a collet for each wheel and then leave the wheel mounted permanently on this collet.

Vertical spindle machines have a somewhat different construction as shown in Figure 7. In this case, a wheel chuck is held to the end of the spindle by four cap screws. These are indicated in Figure 8. Removing these screws permits dismantling the chuck complete with the wheel. The wheel is held to the chuck by a flange and four cap screws. It is an easier operation when changing grinding wheels to remove the chuck and change the grinding wheel at a bench rather than to remove the grinding wheel from the chuck while it is mounted on the spindle.

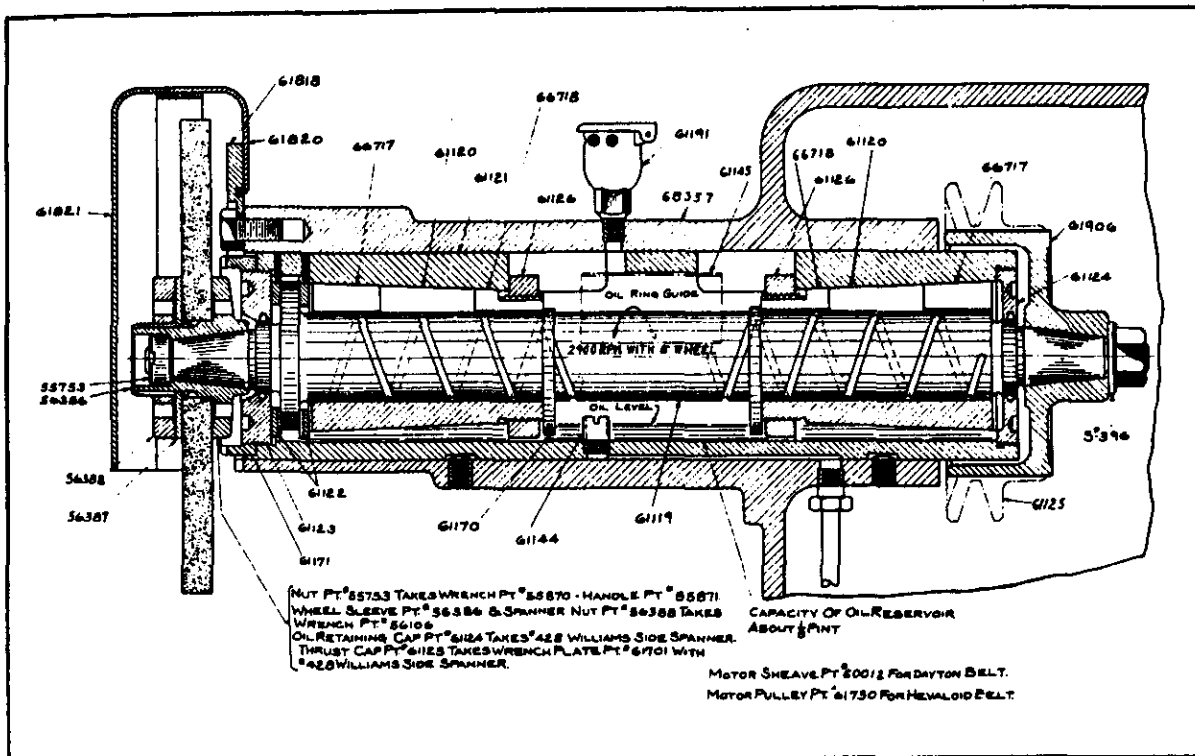


FIGURE 6 (NC2786)

Section through plain bearing wheel spindle.

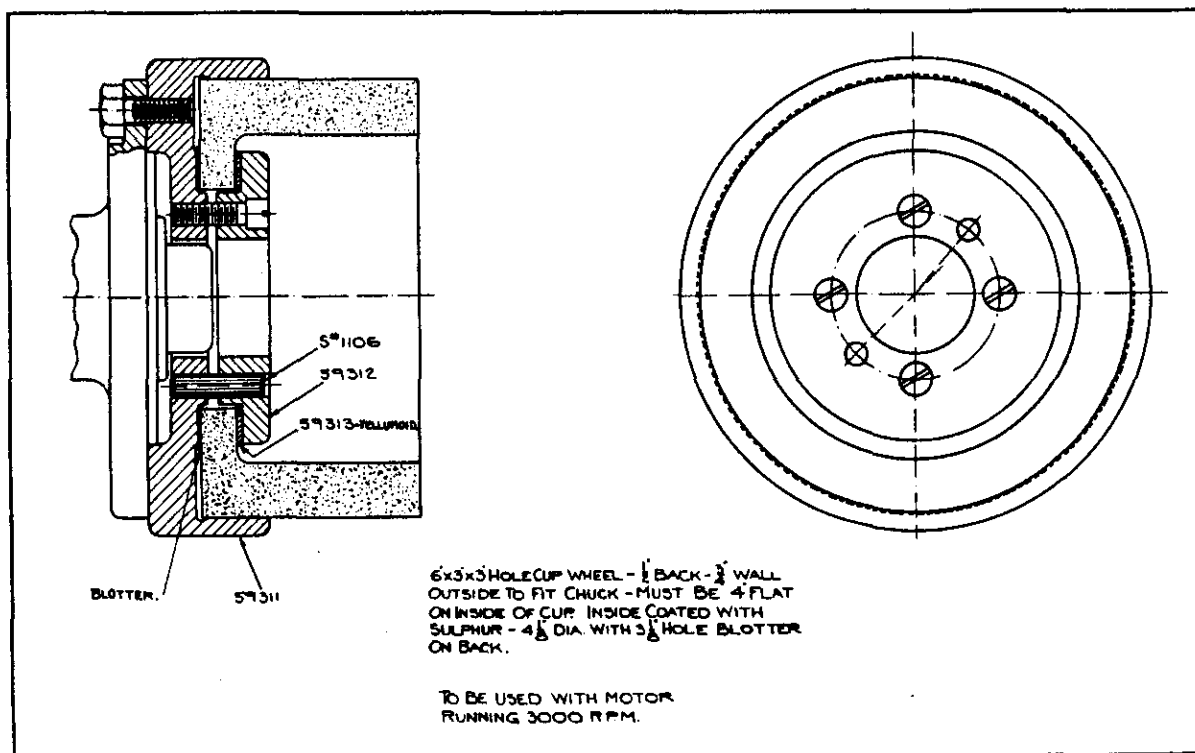


FIGURE 7 (NC 2740)

Section through wheel mounting on vertical spindle machine.

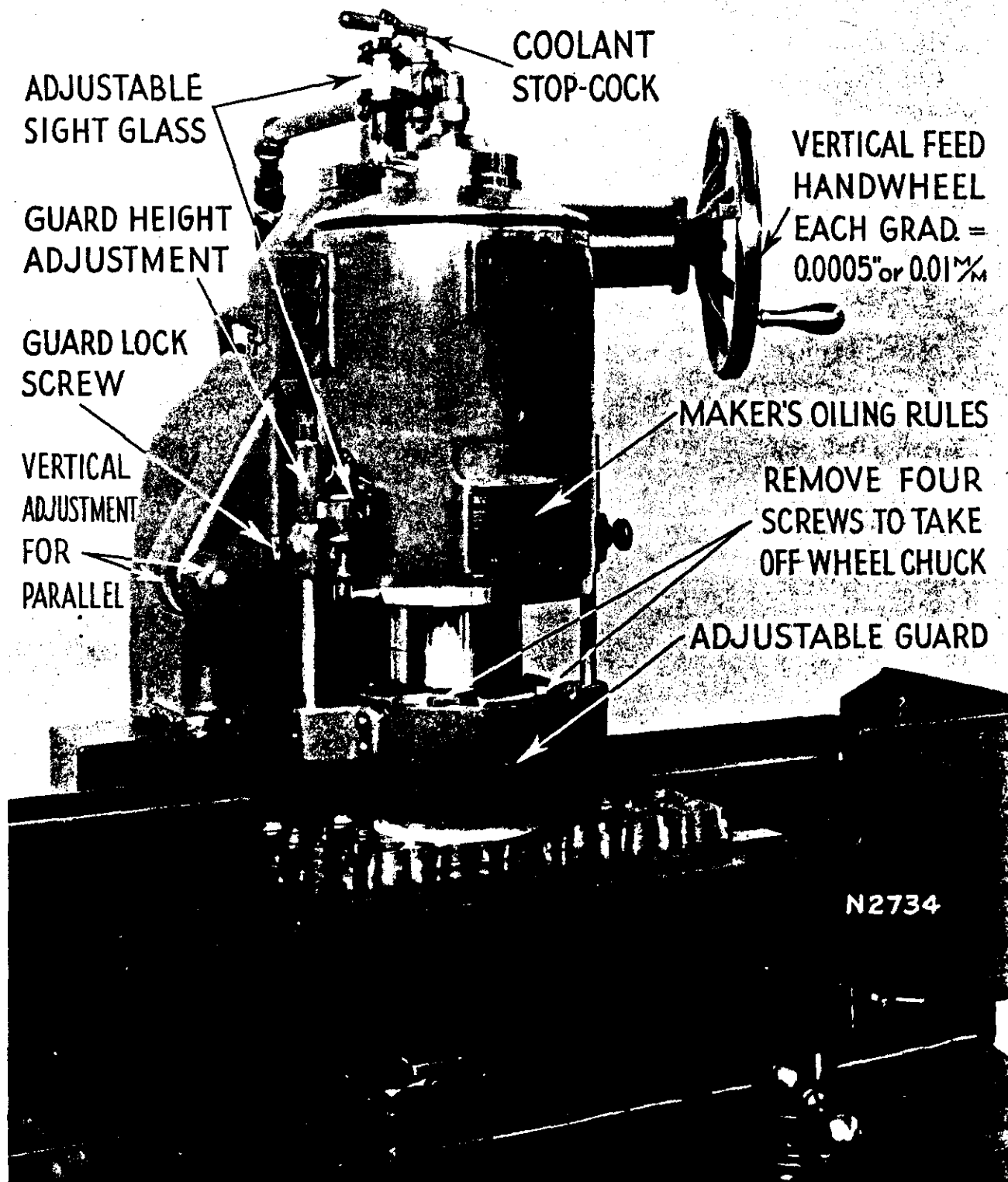


Figure 8 - Photo. N-2734

Integral-drive XLO vertical spindle on 6" x 18"  
Surface Grinder arranged for wet grinding.

## Greasing and Oiling

Care should be taken in greasing and oiling this machine. Figures 1, 2, 8, 9 and 11 will give an indication as to where lubrication should be applied, as will the special lubrication tag attached to the machine. All oil cups should be replenished and grease cups filled frequently. The oil cup on the wheel spindle should be filled daily, oil being added until an overflow is noted from the pipe at the back in the belt recess.

## Oil for Hydraulic System

Because of our satisfactory experience with this product we recommend that Gargoyl D.T.E. light oil (S.U.V. 225 at 100° F.) be used in the hydraulic system and to this end we supply with each machine a quantity of this oil. The oil should be poured directly into the base through the front opening until the pump below the motor is entirely submerged.

## Table Dogs

In continuing to set up the machine, place and lock the table reverse dogs approximately in line with the ends of the magnetic chuck or, if this unit is not used, in line with the ends of the finished table surface, approximate correct positioning being indicated in Fig. 5, Page 8.

## Wet and Dry Grinding

If the machine is equipped for wet grinding put a quantity of grinding compound (shipped with the machine) in the tank filled with water. Instructions on the can will give the correct proportions. If the machine is equipped for dry grinding attach the dust hood to the wheel guard and connect the hood to either the central or individual exhaust system, the latter type being shown in Figure 5.

## Operating Levers

Now locate the various operating levers, especially the table reverse lever, the cross-feed start-stop lever and the table traverse knob. (See Figure 1.) Be sure the grinding wheel is clear of the table top and the magnetic chuck, and also that the table traverse knob is pushed in. Start the hydraulic pump motor.

## Starting the Table

If the machine is equipped with an automatic cross-feed, set the start-stop lever in neutral. Rotate the table traverse knob as far as possible to the right and then pull out. Now slowly rotate the knob to the left, opening the vee port. The table should start to move. Experience will demonstrate that the table should be started by a direct pull and without rotation of the knob. Be sure the hand wheel traversing the table is disengaged. Rotate the knob still further to the left which will increase the speed of the table's traverse. At slow speeds the table may move intermittently

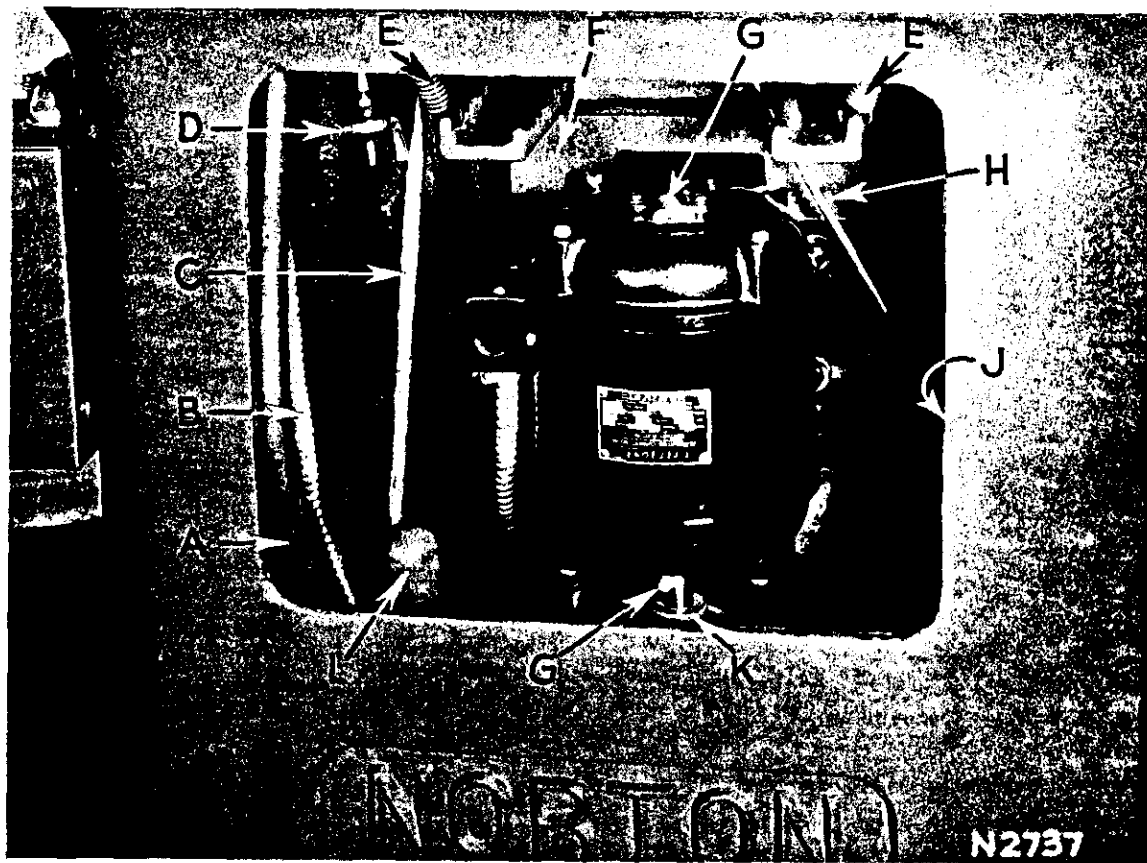


Figure 9 - Photo. N-2737

Interior of base showing hydraulic supply pipes and method of suspending motor and pump unit.

- |  |  |
|--|--|
| A - Hydraulic Table Traverse Supply Pipe   | F - Motor-unit Frame                                 |
| B - Lead-lined Motor Cable   | G - Motor Grease Cup<br>Fill three times yearly      |
| C - Table Traverse Exhaust   | H - Center Way Drain-pipe                            |
| D - Ways Lubrication Adjustment<br>Open to reduce flow of oil.                           | J - Cross-feed Supply Pipe<br>(Behind wall of base.) |
| E - Motor Suspension Springs   | K - Motor-Pump Flexible Coupling                     |
| L - Hydraulic Relief Valve - Remove cap and<br>turn screw downward to increase pressure. |  |

but complete traversing of the table at high speed will remove trapped air from the hydraulic cylinder. Smooth action at slow speed comes when all air has been expelled. It is unlikely any surface grinding operation you expect to perform will be done with the table travelling at the slow speed. For greatest efficiency in surface grinding traverse the table at its maximum speed. At slow speed the grinding wheel will act harder and may burn the work.

#### Cross Feed Dogs

Now stop the table traverse and set the cross-feed dogs which are shown in Figure 10. Move the saddle back and forth with the cross-feed hand wheel and observe the action produced by these dogs. You will notice that, as the point on the lever shown in Figure 10 rides up onto the dog, the handle

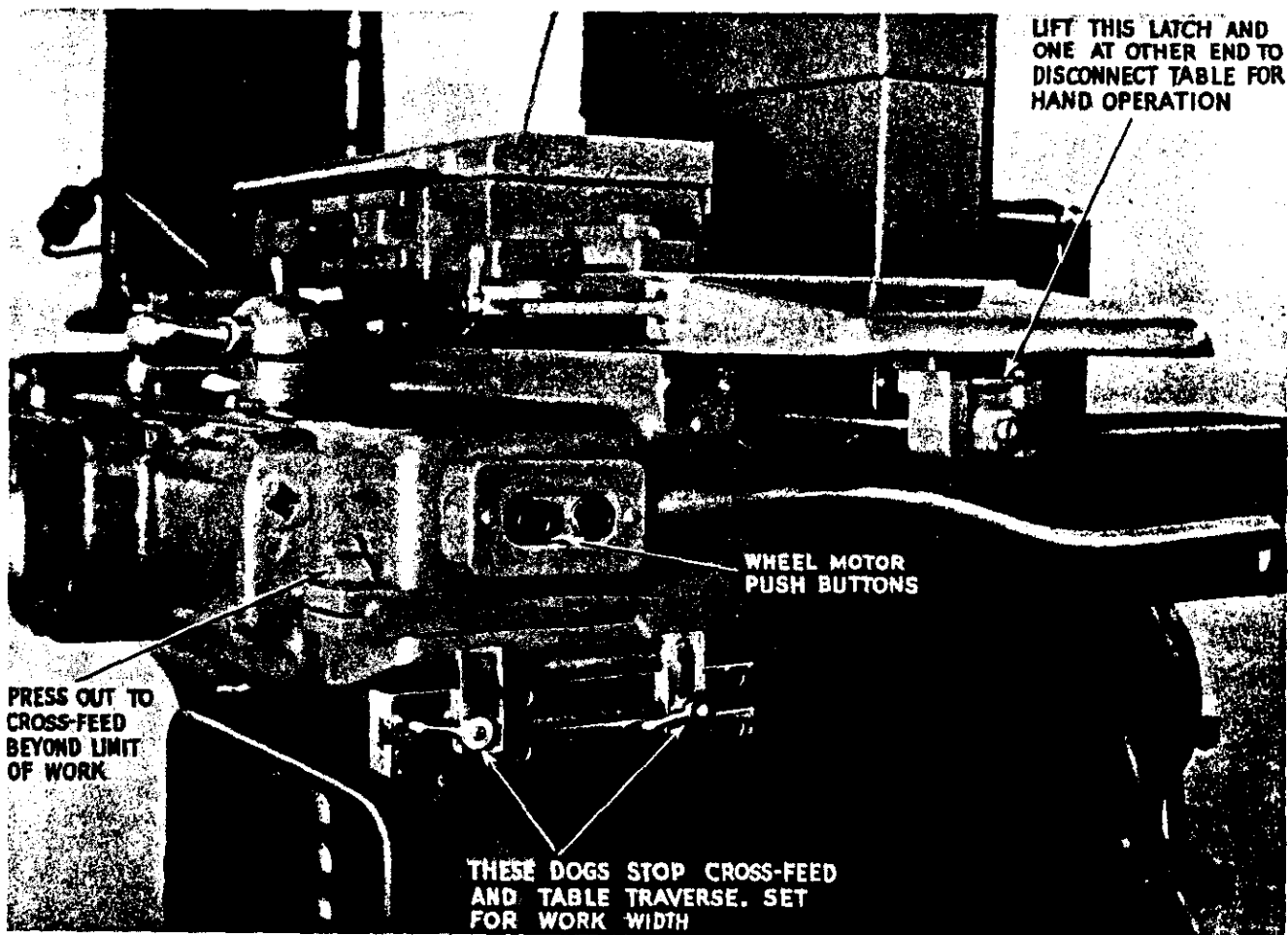


Figure 10 - (N2307)

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 Cross-feed dogs, wheel motor push buttons and table  
 release latch

of the reverse lever is raised. Consequently, that portion of the reverse lever which normally contacts the table reverse dogs is depressed sufficiently to allow the left table reverse dog to pass over it. With the table travelling to the right it continues until the table stop dog contacts the table stop lever (see Figure 1). This lever operates the table traverse knob pushing it in and thus closing the vee port and consequently stopping the table traverse.

Now run the saddle forward by hand until the forward cross-feed dog is just clear of the point on the lever. Set the cross-feed lever in the center position which causes the saddle to be fed at each reversal. Then set the cross-feed selector at the innermost position and again start the table by pulling out on the table traverse knob. The saddle should feed in automatically at each reversal.

#### Setting the Amount of Cross-Feed

If the saddle does not feed at first, turn the knurled screw directly at the left of the cross-feed hand-wheel outward until the feed starts. The amount of cross-feed at each reversal is adjusted by positioning this screw. The table will continue traversing and the cross-feed feeding until the rear cross-feed dog contacts the point on the lever shown in

Figure 10. The table and cross-feed are then both stopped automatically with the table surface to the right of the grinding wheel in what is known as the loading position.

### Truing the Grinding Wheel

The next step is to true the grinding wheel. If a magnetic chuck is used the diamond holder can be held on the face of the chuck. If no chuck is used the diamond holder can be clamped to the table surface by means of a bolt in the tee slot of the table. Move the table until the diamond is directly under the center of the wheel spindle. Then lower the grinding wheel until it touches the diamond lightly. Cross-feed the saddle by hand until the diamond passes beyond the edge of the wheel and then feed down about 0.0005" and feed the diamond back across the wheel to the opposite edge. Repeat this procedure until, by the sound of the wheel in contact with the diamond, it is certain that the entire circumference of the wheel has been trued.

If a roughing operation is to be performed a comparatively fast traverse of the diamond across the wheel face is used. A fine finish requires a slower traverse. In fact for the finest finish possible the diamond should be moved as slowly as possible across the wheel face without any down-feed of the wheel during the last several passes.

### Grinding the Work

Before beginning to grind, set the table reverse, cross-feed and table-stop dogs, the first two for length and the third to stop the table in the loading position. Set the cross-feed start-stop lever in neutral and, after loading, switch on the magnetic chuck if one is to be used. With the wheel running, start the table and, with one edge of the work under the wheel, feed down until sparks show and then feed an additional amount for the depth of cut required. Turn on the coolant, throw the start-stop lever in or out to feed the work across the wheel and with the cross-feed selector set to move the table at one end or the other, or both ends of the traverse, pull out the traverse knob to start the operation.

After the work has passed under the wheel to the other limit of the saddle, the table will stop in the loading position. If the work has been ground sufficiently, the machine may be reloaded. After reloading, or to make a second pass to remove more stock, reverse the table reverse lever, again set the depth of cut and reverse the cross-feed start-stop lever. Start the machine as before, repeating the cycle described.

## SERVICING

### Table Ways

To inspect the table ways, simply unlatch the table from each end of the hydraulic piston after which two men can easily lift the table from the saddle. This latch is shown in Figure 10.



## Saddle

The saddle can also be readily removed. With the table removed as in the preceding paragraph, the saddle should be run as far forward as possible, after which the guards at the rear are removed by taking out the half-dozen screws and the springs holding them in place. Now, reaching through the front of the base, the rubber supply and copper discharge pipes are disconnected after which the saddle may be lifted upward and off its ways. In the event a crane or hoist is not available it is suggested that four men be pressed into service in making this change since it will be found that this number make an easy task of a job which might cause damage to the machine if attempted by fewer men. In replacing the saddle it is advisable to have some one turn the cross-feed handwheel so that the nut may engage the screw properly.

## Spindle Bearing (Plain) and End-Thrust Adjustment

The grinding wheel spindle should never be adjusted cold. Always run it for some time until the housing feels quite warm to the hand. Then remove the cartridge from the rear and perform your adjustments with the spindle held lightly in a vise or by some other means on a bench. There are two screws, one in front and one at the rear on the underside of the cartridge housing. These are shown in Figure 6. Back them off, remove the wheel with its collet and the spindle drive belt after which the spindle can be withdrawn from the rear.

The bearings are adjusted by drawing them into the tapered portions of the cartridge with the spanner nuts 61126. One eighth of a revolution of the nut reduces the bearing diameter approximately 0.001".

Like the spindle bearings, the end-thrust has been set at the factory but in time may require some readjustment. This can be accomplished by removing the wheel-guard cover, wheel and wheel collet, giving access to a check nut 61171 and an adjusting nut 61123. A flange on the spindle runs between two bronze thrust plates 61122. These plates are held between the spindle bearing and the adjusting nut. By taking this nut up until it is tight and then backing it off about 1/8" on its periphery a clearance of .001" in the end thrust is provided.

## Ball Bearing Spindle

Ball bearing spindle cartridges are made by the Ex-Cell-O Aircraft & Tool Corporation of 1200 Oakman Boulevard, Detroit, Michigan. The following instructions are taken from what they have to say with regard to the care and adjustment of these spindles.

Before placing the spindle cartridge in service unscrew the oilers and pour 1/8-pint of clean spindle oil into each oil hole. This fills the pockets at the bottom of the cartridge and insures that the spindle obtains oil from the start. This should be done as often as the cartridge has been off the machine

or so handled as to drain these pockets, otherwise the bearings may be without oil for two or three days while these pockets are filling.

After being flushed with oil the spindle will require very little lubrication, one or two drops per minute is sufficient. Keep oiler filled and the cover on to eliminate chance of water and foreign material working into the bearings. If the oiler stops feeding investigate immediately. Be sure and keep oiler tight.

Do not use anything but a high grade spindle oil, -- Standard spindle oil or its equivalent is recommended.\*

X-L-O bearings are interchangeable as a unit but the individual parts are not; that is, the inner or outer races on one bearing would not be interchangeable with other X-L-O bearings, and bearing assemblies must be kept together just as received by you without mixing the parts of the bearings. To insure against mixing of the parts you will find a serial number etched on one end of the inner race. Also a serial number is etched on the end face of one of the outer races. You will also find the same serial number etched on the outer cylindrical surface of both outer races. In assembling the bearings the serial number on the inner race should be mated with the outer race having the same serial number so that the numbers on both outer and inner races face in the same direction. The outer races should be so assembled that the etched numbers on the cylindrical outer surface should be as nearly as possible opposite to one another.

Never tighten up bolts on cold spindle when placed in hot bracket. Wait until spindle becomes same temperature as bracket. At no time should these bolts be tighter than necessary to prevent spindle body turning in bracket.

Never hammer the spindle to locate pulley while assembled. This will start bearing failures.

Do not operate with any loose nuts.

Always plug oil cup holes when cartridge is removed from machine. Store cartridges in a place free from dirt and grit.

If the spindle cartridge needs repairs you will save money, time and obtain a new spindle warranty by returning it to the X-L-O Service Department. Do not tear spindle down before returning as it is then very difficult to determine cause of failure. Always mention serial number stamped on spindle body when writing.

\*Norton Company has found that the light oil for the hydraulic traverse system is satisfactory as a ball bearing lubricant.

## Replacing Spindle

To replace the spindle, insert the cartridge in the housing and slide it forward until the rear of the cartridge is flush with the rear face of the housing. Take up on the set screw on the under side of the housing. On some machines these screws are used to locate the spindle in its housing, but in no case should they be tightened enough to cause the spindle to stick. These screws should be used merely to locate and keep the spindle from turning. Check the alignment of the spindle by a straight-edge from the motor sheave to the spindle sheave, making allowance for the float in the motor shaft.

## Mounting Spindle Belt

In mounting the driving belts following the removal of the spindle from the machine, the operator is reminded that the better the alignment of the motor with the spindle, the better will be the production and the longer the belt life. A straight-edge must be used if correct alignment is to be achieved.

## Vee Type Belt

To place the vee belt type of drive on the machine, raise the motor upward, hook the belt into the motor sheave and into the groove on the spindle pulley. Lower the motor until a slight tension is established in the belt. Since the vee belt obtains its traction through a wedging action, tension should be only enough to overcome vibration.

## Hevaloid Belt

In locating the flat Hevaloid belt on its pulleys, even greater care must be exercised. If a spindle has been removed from the housing, it must be replaced in exactly the same position. The belt pulleys must be exactly in alignment and any variation from this alignment will cause the Hevaloid belt to stretch on one side, causing it eventually to be entirely ruined. Pulley alignment should always be checked with a straight edge. Since the unusual construction of this belt demands a certain tension for perfect performance, the marks on the belt should be carefully observed. With the belt in place, the pulleys should be allowed to run for a minute or so to distribute the tension evenly throughout the belt and the marks again checked. It will be found that if the belt is carefully lined up and taken proper care of, it will have an indefinite life and will more than pay for itself in perfect performance. The belt itself is of an elastic nature, is practically impervious to the effects of lubricants, and depends on its "tacky" surface for its great driving power. Do not use a belt dressing of any variety.

## Exclusive Feature

The use of the Hevaloid belt on the 6 x 18" Surface Grinding Machine is a feature exclusive with Norton Company.

### Vertical Slide Gib

The vertical slide has a gib on the right side as one faces the rear of the machine. This gib can be adjusted by backing off the checknuts provided and taking up their set screws.

### Vertical Spindle

Vertical spindles are of the integral motor type and have ball bearings. They are made by the Ex-Cell-O Aircraft and Tool Corp. The head is held by three large cap screws which pass through clear holes in the head and thence into the vertical slide. To adjust the head for vertical alignment in the plane parallel with the table traverse, loosen the three screws and then take up or back off on the smaller set screws in the sides. This adjustment is shown in Figure 8.

### Hydraulic Pressure

A 1/4" - 18 pipe-plug is shown in Figure 1. By removing this plug, (first making sure that the pump motor is not running), and mounting a gauge in the tapped hole, the pressure on the hydraulic system may be determined. After mounting the gauge, pull out on the table traverse knob and rotate it to the extreme right so the table stops. Then move the cross-feed lever into either the inner or outer position (depending on the position of the reverse lever) and oil will be allowed to flow through the cross-feed valve and cylinder to the gauge. Pressure should be maintained at approximately 55 lbs., although on a machine with hand cross-feed slightly lower pressures may be selected.

The hydraulic pressure relief valve, shown in Figure 9, is adjusted by removing the cap and turning down (clockwise) on the enclosed screw to increase the pressure and vice versa.

## CONSTRUCTION

The same base, table and saddle are used in making up all models of the 6 x 18" Surface Grinder. In addition, all horizontal spindle machines use the same vertical slide. Vertical spindle machines require a different type slide, it being possible, however, to convert a horizontal spindle machine to a vertical spindle machine by a simple interchange of parts.

### The Hydraulic System

A diagram of the hydraulic system as used in machines with hydraulic table traverse and automatic cross-feed is shown in Figure 11. The pump, direct driven by its own motor through a flexible coupling, draws oil from the reservoir in the base, which has a capacity of about 6½ gallons (24½ liters). The proper height of oil in the base is to keep the pump completely submerged at all times. Oil is poured directly into the base through the front.

We recommend that Gargoyl D.T.B. light oil (S.U.V.225 @ 100° F.) be used in the hydraulic system since, while other oil may fulfill all requirements of performance and economy, we have had success with this product.

The pump is mounted in the base on a spring-hung frame as shown in Figure 9 and turns in a clockwise direction. The hose leading upward on the left connects with the table traverse and speed control valves, while that on the right leads to the automatic cross-feed valve. Copper pipes serve as exhaust outlets for these units. Each pipe and hose is fitted with a union accessible from the front of the machine which are disconnected when the motor-pump unit is to be removed from the machine. The motor may then be pulled forward and out as the suspending springs are disengaged.

The operator should see that both halves of the flexible coupling between the pump and motor are kept tight on their respective shafts and also pressed tightly together. Looseness of these flanges will cause rapid destruction of the coupling disc.

As in Figure 11, oil from the pump enters the reverse valve in two places and passes to either side of the table cylinder, depending on the position of the valve. Oil exhausts from a vee port in the speed control piston, a notch which, when it is pushed inward seals the port, allowing no oil to escape and hence stopping the table movement, the oil by-passing through the exhaust line.

Turning the table traverse knob to the right closes the vee port, reducing the speed of the table until it is brought to a stop. The table should not be stopped in this manner since it causes oil pressure to build up until the relief valve opens at 55 pounds, a pressure which if vented continually causes the oil to heat up and also throws an unnecessary load on the pump motor. Stop the table traverse only by thrusting in on the table traverse knob, using the rotation of this knob only to set the traverse speeds.

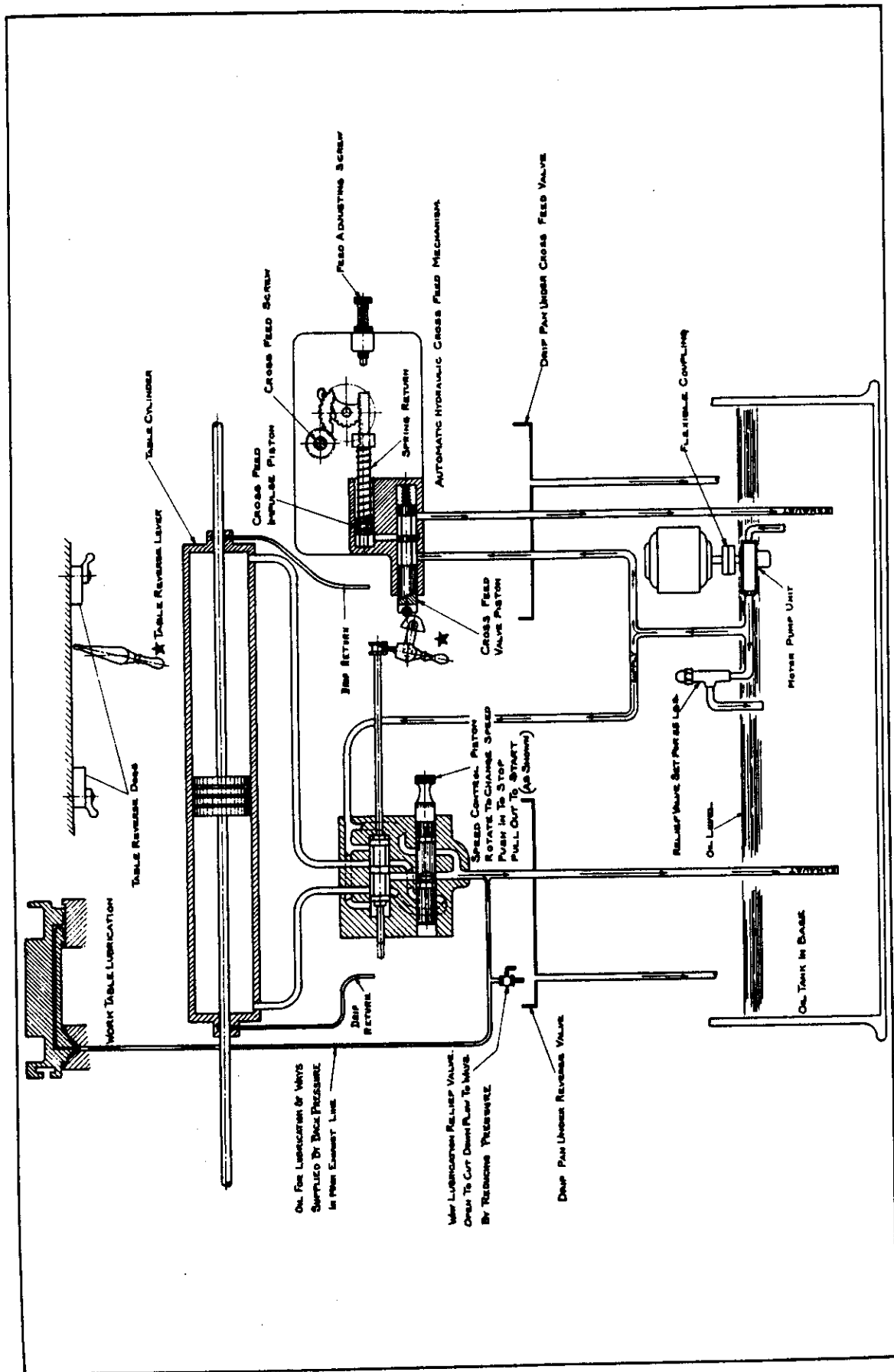


FIGURE 11 (NB 3529)  
 Diagram of hydraulic system

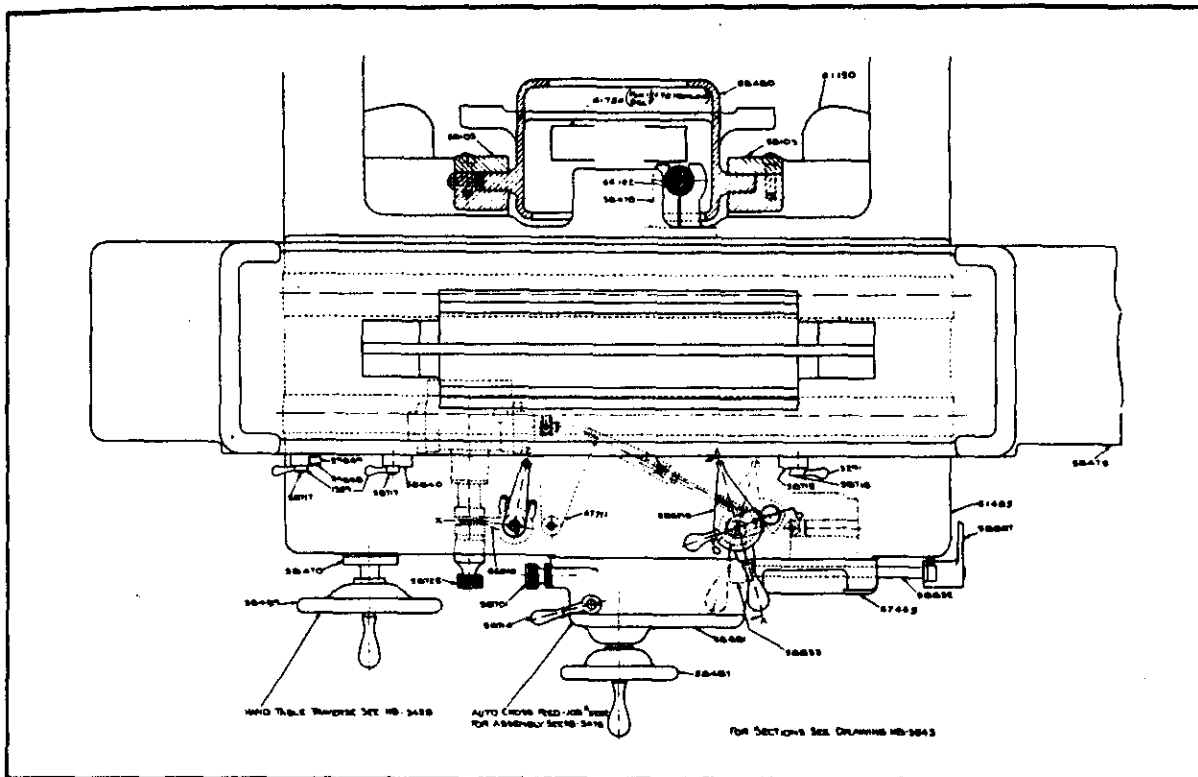


FIGURE 12 (NB3478)

General plan showing relationship of various levers. See also Figure 14.

### Reverse and Speed Control Valves

Figure 12 is a general plan showing the relationship of the various levers to the table traverse and cross-feed valves. The reverse and speed control valves which are built into a single unit are shown in more detail in Figure 13. Oil is admitted at P-1 and P-2. The valve is shown in the neutral position (which it never occupies permanently) but when at the extreme left admits oil through P-2 and passes it to the left end of the cylinder. Simultaneously oil is being displaced from the right end of the cylinder through the exhaust port and then through the vent port of the speed control valve. Turning this valve to the right reduces the size of the opening through which the oil is discharged and consequently reduces the speed of the table.

Referring to Figure 14 it will be observed that as the table moves to the right the reverse dog contacts the reverse lever and a spring 59362 in the linkage to the bell crank which operates the reverse valve is compressed slightly. Then the reverse lever and consequently the reverse valve piston

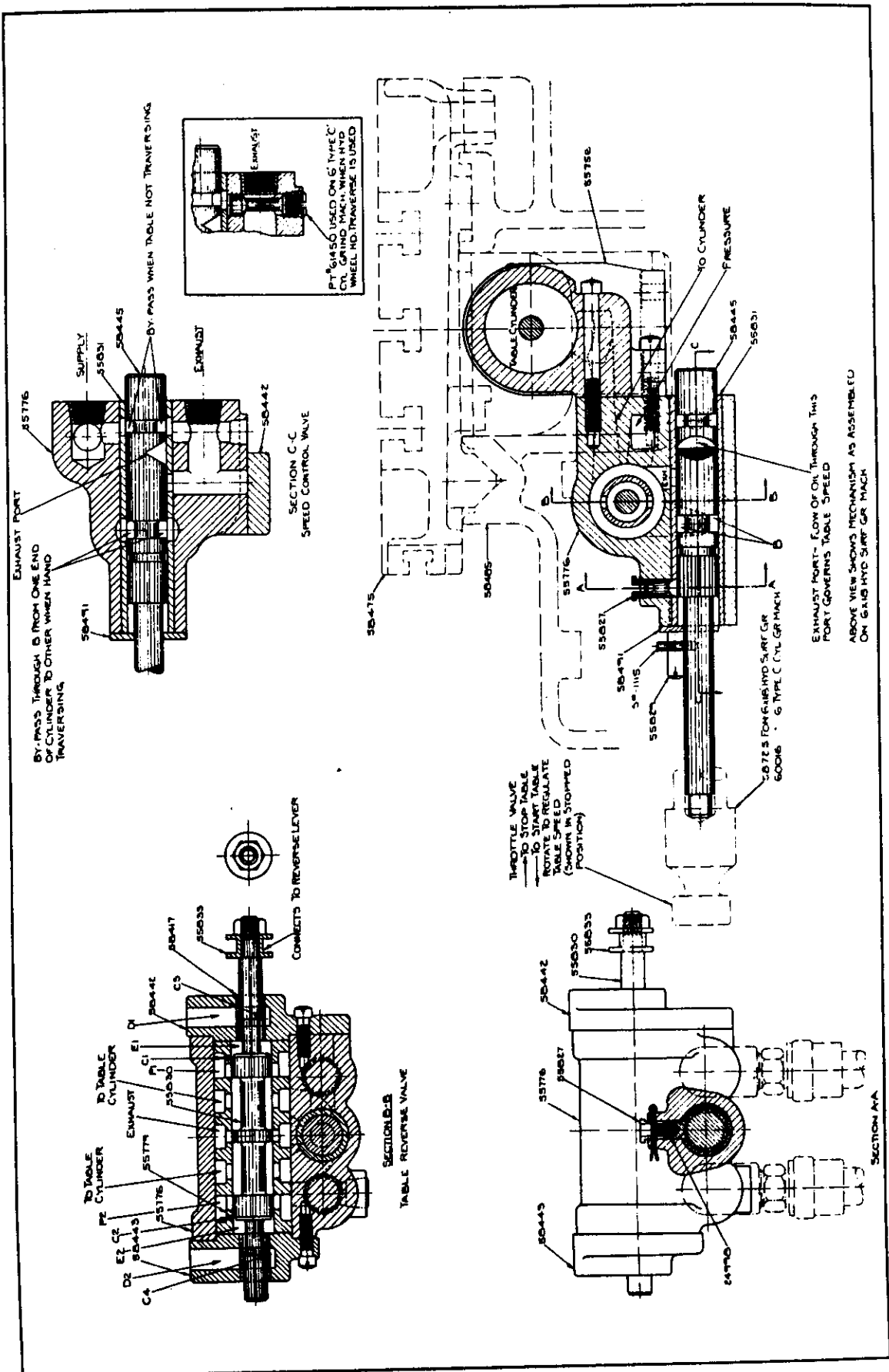


FIGURE 13 (NB3461)

Table reverse and speed control valves.



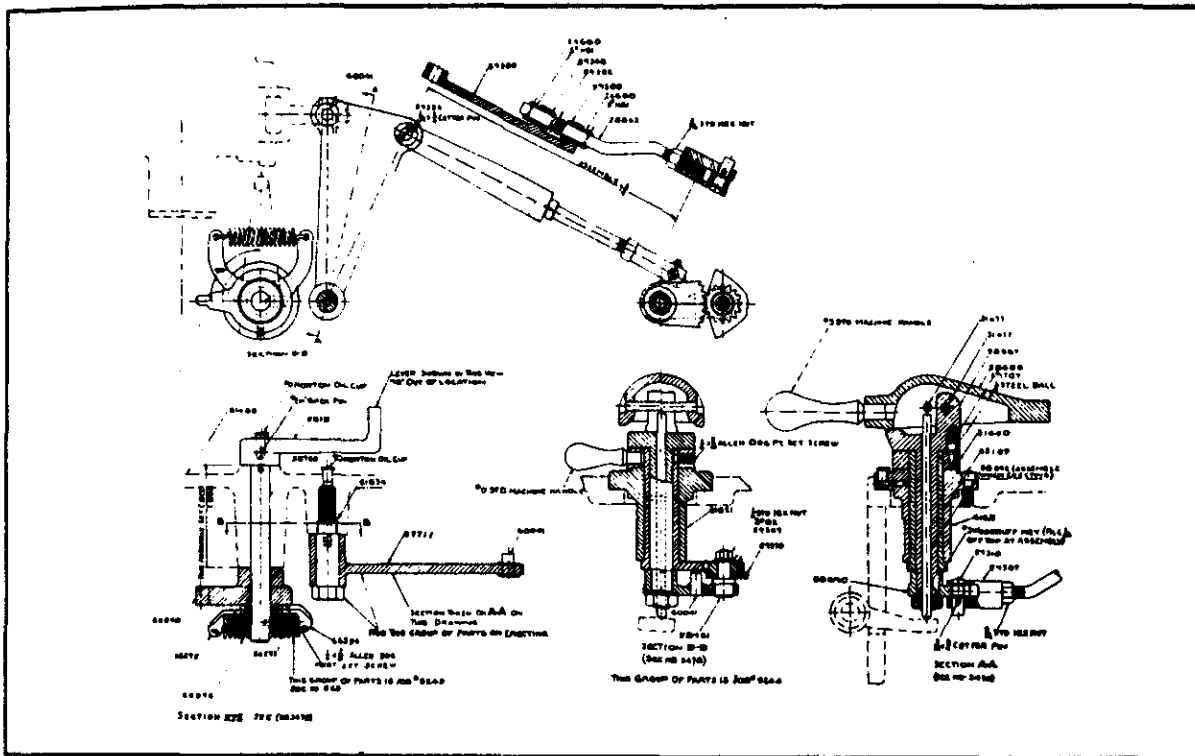
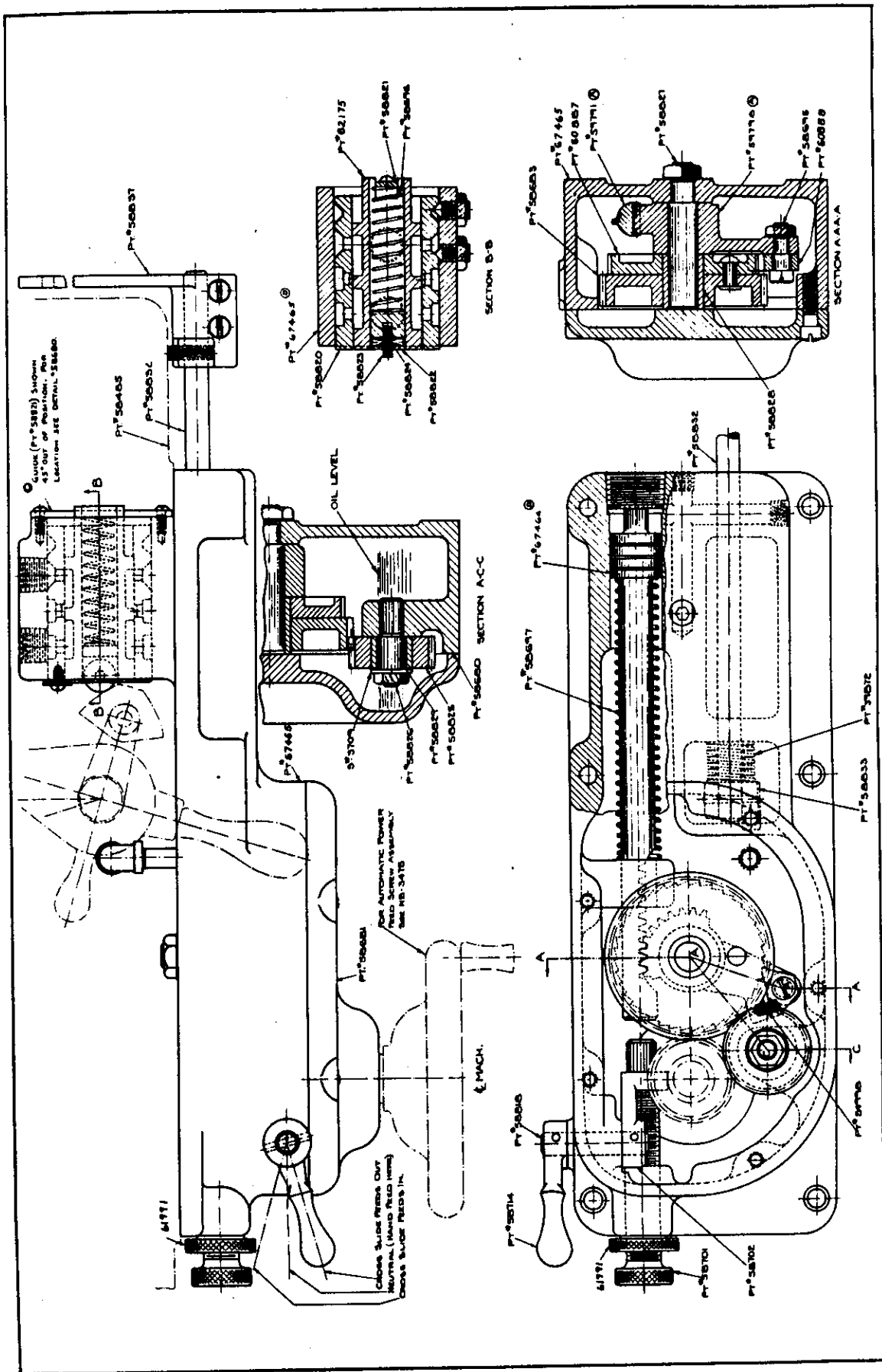


FIGURE 14 (NB3543)

Sections through operating levers. See also Figure 12.

shown in Figure 13 is moved from the left toward the neutral position. As it does so oil is drawn in through C-4 from chamber D-2 simultaneously forcing oil out through C-1 against the pressure in P-1. Eventually a point is reached where C-1 and C-4 begin to close and C-2 and C-3 to open. Consequently pressure begins to build up at the left and diminish at the right. This occurs with the valve near the neutral position and, therefore, with the table decelerating. As the table slows down and stops the pressure on the spring in the linkage is released allowing the spring to expand and continue moving the valve piston, aided now by pressure through C-2, to the right. Were it not for oil being forced out through C-3 into D-1 (and ultimately back into the reservoir) this action would occur so suddenly that a decided shock would result. It is this alternate changing of pressures in chambers E-1 and E-2 that makes this valve unique. The valve sleeve 55779 is pressed into and equalized very carefully in the body 55776.

The piston is sweated to the piston rod which is latched to each end of the table and packed with self-adjusting chevron packings. Constant, uniform pressure is maintained on these packings by a spring. By raising the latches at the ends of the table, the latter is disconnected completely in a few seconds after which it can be lifted from the saddle, or hand operated entirely independently of the hydraulic system, if desired.



**FIGURE 15 (NB3476)**  
 The automatic cross-feed

## Hand Traverse

The hand table traverse unit consists simply of a shaft mounted in ball bearings and on which is a pinion meshing with a rack under the table. The unit on hydraulic traverse machines is made so an outward pull disengages the handwheel, allowing it to remain at rest while the table is traversed by power. This unit is removed by disconnecting the cap directly back of the handwheel and pulling out the shaft, pinion and assembled ball bearings.

## Cross Feed

The automatic cross feed unit is shown in Figure 15. Figure 14 also shows some of the mechanism, especially that part which may be set to operate at each alternating or each consecutive reversal of the table. If it is necessary to remove the unit from the machine, disconnect the feed and discharge pipes at the right inside the base. Remove the cap screws and pull the unit off the front of the saddle bracket.

The operation of this unit is simple and needs little explanation. As the table reverses, the reverse lever swings through a horizontal arc. To the reverse lever is attached a cam 59370 (Figure 14) with two high points which operate the valve piston 62175 shown in Section BB of Figure 15. Each time the valve piston is moved pressure is admitted back of the small piston 67464 shown in the large view in the lower left of the drawing. This pressure moves the piston to the left against the action of the long spring 58697 until the opposite end of the piston strikes the knurled screw 58701. The rack on the piston rod operates a ratchet which in turn, through a set of gears, actuates the feed screw. The start-stop lever 58714 throws the pinion 58682 (Figure 16) one way or the other to reverse the direction of rotation of the feed-screw or to make the cross-feed inoperative.

It is sometimes found that there is an apparent oil leakage around the cross-feed handwheel and few operators know how to correct this condition. Actually the cause is found in a clogged up drain-hole leading from the chamber in back of the handwheel. Remove the handwheel unit as in the second paragraph above and remove the obstruction with a straw or pipe cleaner.

## Vertical Feed

The vertical feed for the grinding wheel is shown in Figure 18. This also is simple and needs no explanation.

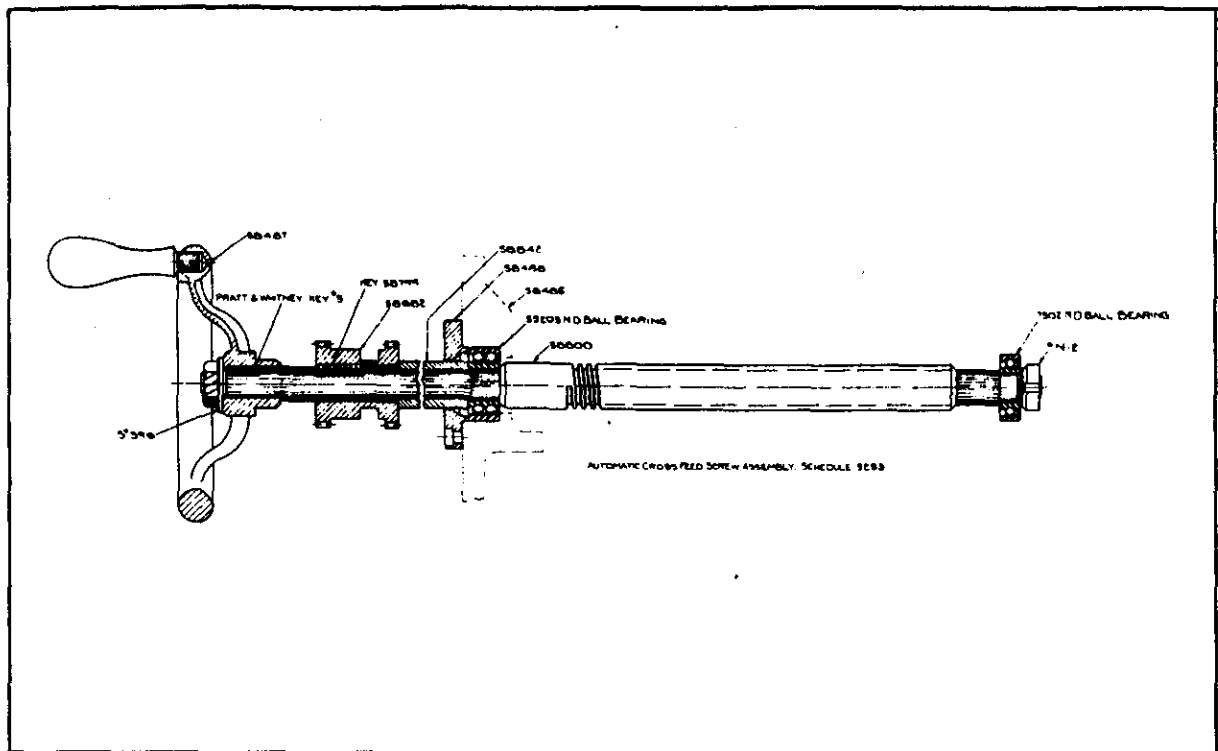


FIGURE 16 (NB3475)

Feed screw for automatic cross feed assembly

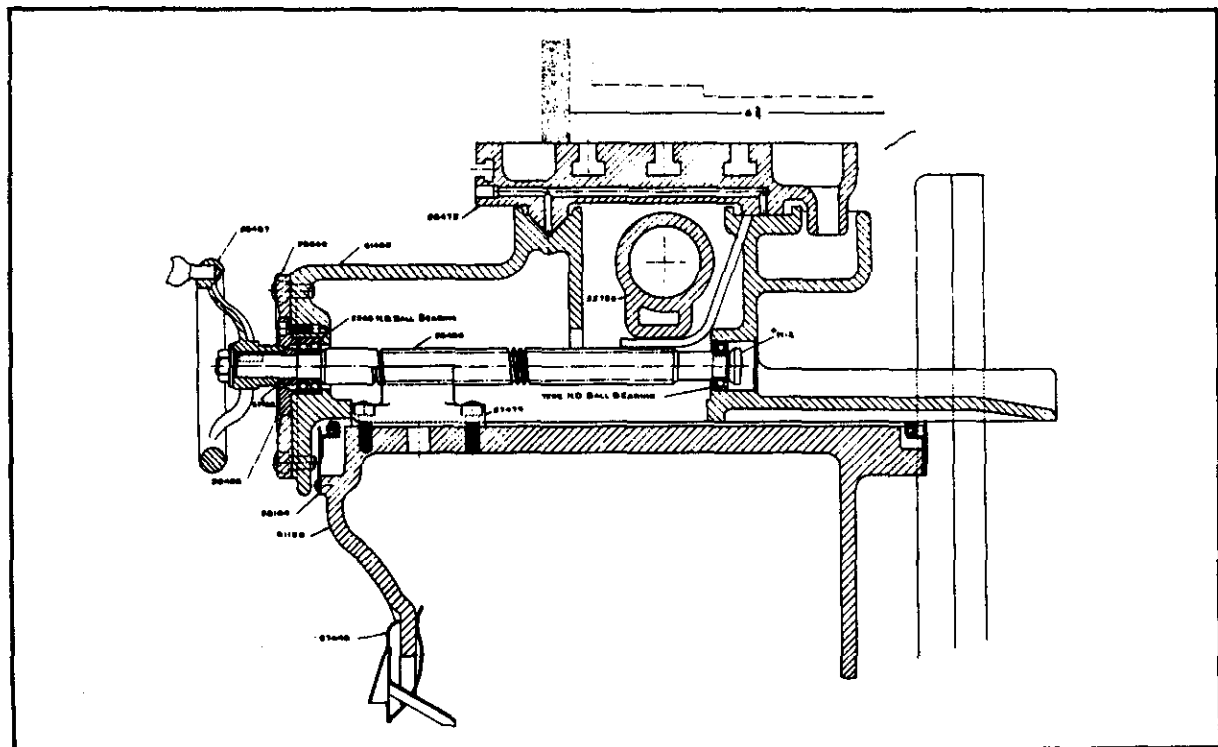


FIGURE 17 (NB3463)

Hand cross-feed screw assembled in saddle. When a machine is equipped with automatic cross-feed this feed screw is replaced by the upper one shown in Figure 16.

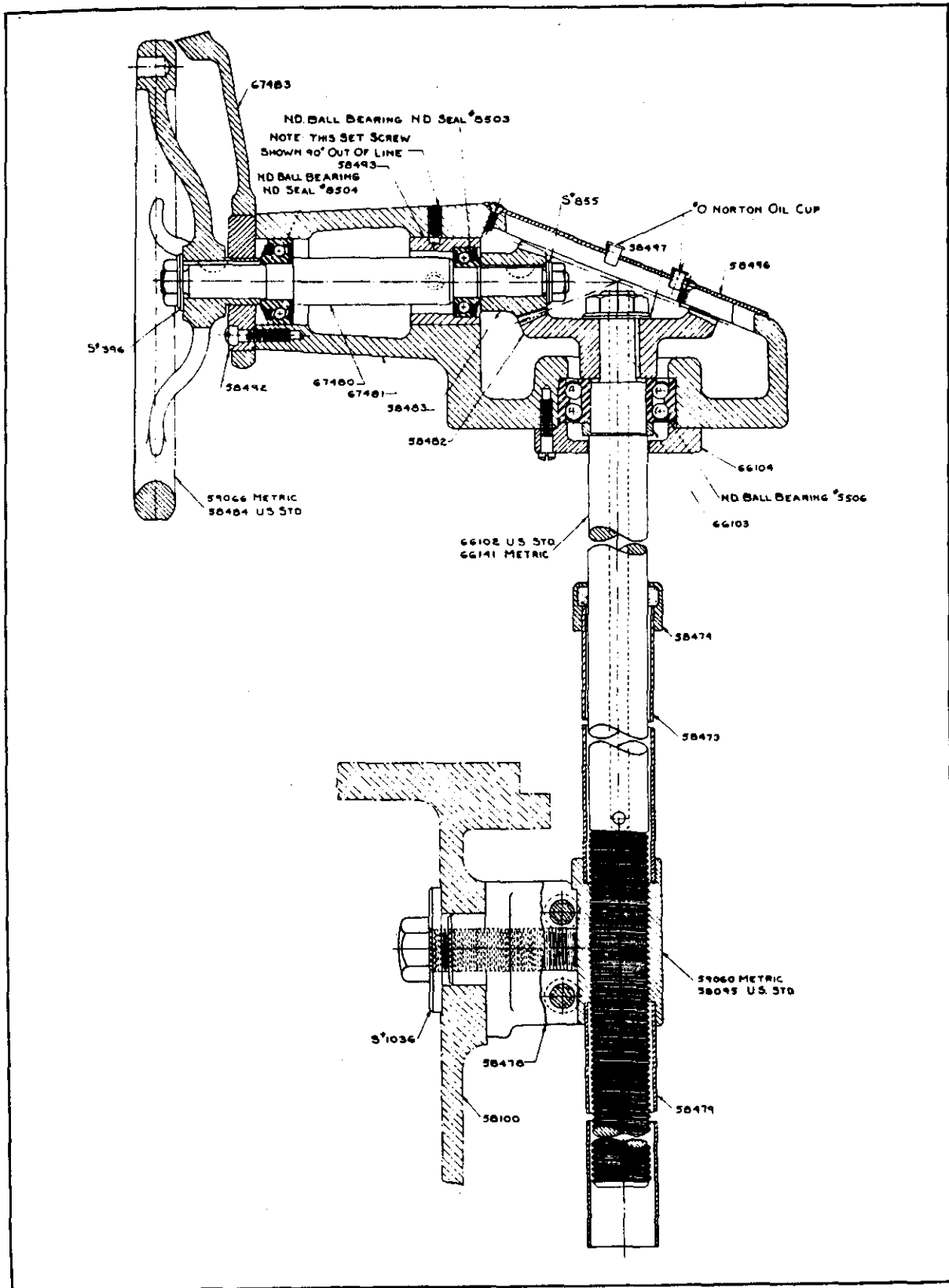


FIGURE 18 (NB3978)  
 Vertical feed screw assembly.

### In the Event of Difficulty

It is often found, especially among workmen unfamiliar with hydraulic machine operation, that any difficulty causes them to become confused and helpless. Should any problem with this surface grinder arise, read this booklet through carefully and in the majority of the cases the remedy will be found herein. For instance, should the table refuse to start, the workman will first assure himself that the hydraulic pump motor is running. If it is not, trouble should be looked for in the motor itself, its wiring or starting switch. If the motor is running, trouble should be sought in the hydraulic line in the shape of a broken hose or loose connection.

Using this method of tracking down trouble, the average mechanic can run and maintain the Surface Grinder with perfect assurance. If, however, a difficulty arises that does not respond to this treatment, a letter, wire or phone call to the company's home office or one of its several branch offices will bring assistance. To cooperate in this help which Norton Company is glad to furnish, the machine owner or operator is asked to give full information as to the serial number of the machine, when it was purchased and full particulars on the nature of the trouble. Frequently it is found that difficulties may be settled by correspondence or over the wire if the machine man is explicit in his description of his problem, saving the cost of sending a service man to his assistance.

Parts  
Catalog  
687-A

**NORTON**

**HYDRAULIC  
SURFACE  
GRINDING  
MACHINE**

# PARTS

## Index

## Cross Index of Part Numbers

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Wheel Spindle, Plain Bearing	Plate 3 (SE-523-A)	6	6S-206 — 210	6
Wheel Spindles, Ball Bearing	Plate 4 (SE-525-A)	7	6S-215 — 220	2
Hand Table Trav. Unit and Operating Levers	Plate 5 (SE-772-A)	8	6S-245 — 269	1
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Table Valve	Plate 8 (")	11	6S-534 — 553	5
			6S-554 — 593	8

## Wheel Spindle Repair

### **NORTON Plain Bearing Type**

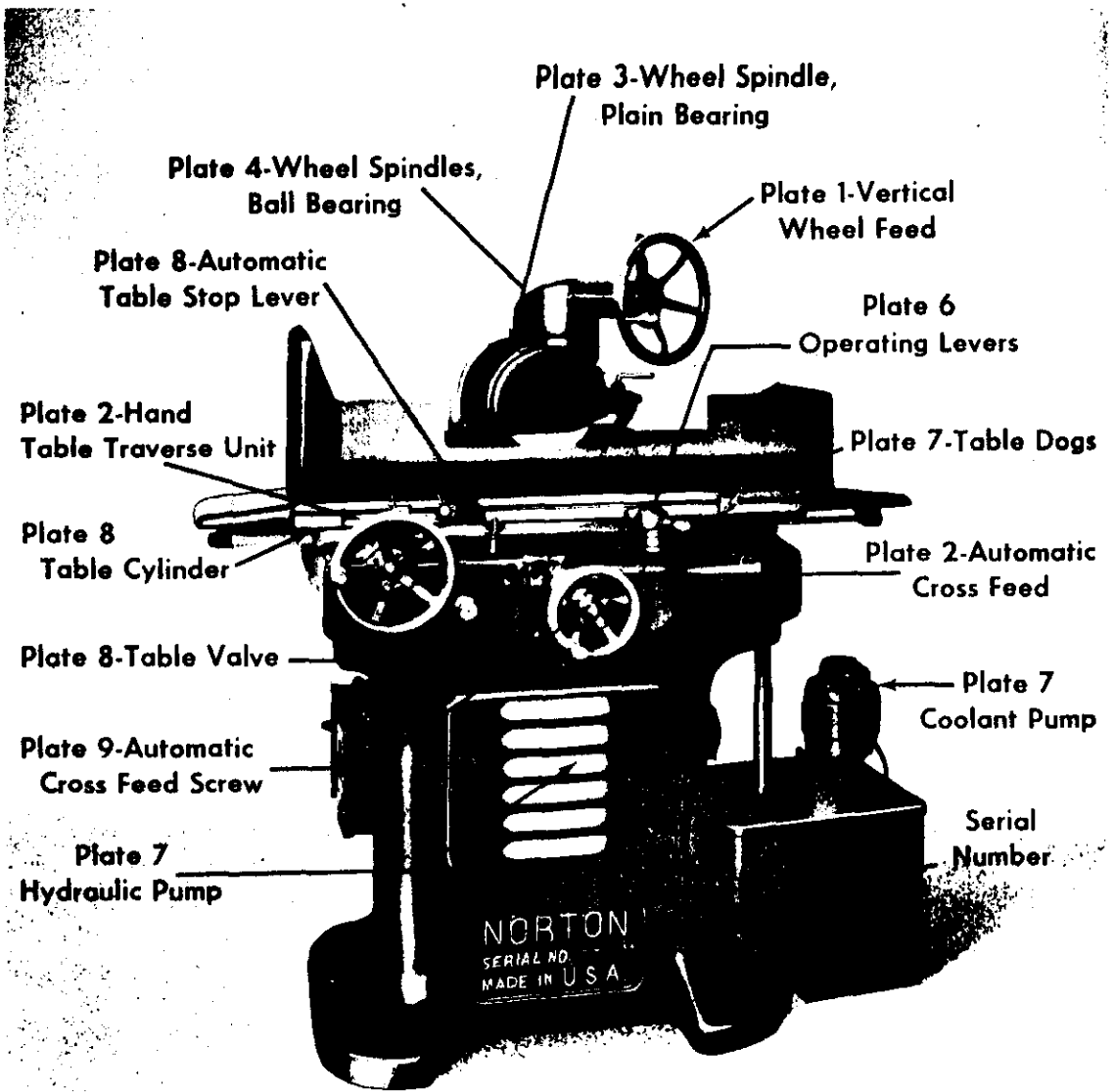
Norton Company recommends that these spindles be returned to our factory for repair.

Personnel experienced in this particular work and special testing equipment are available here for this job.

### **Ball Bearing Type**

Ball bearing spindles must be returned to the manufacturer for repair.





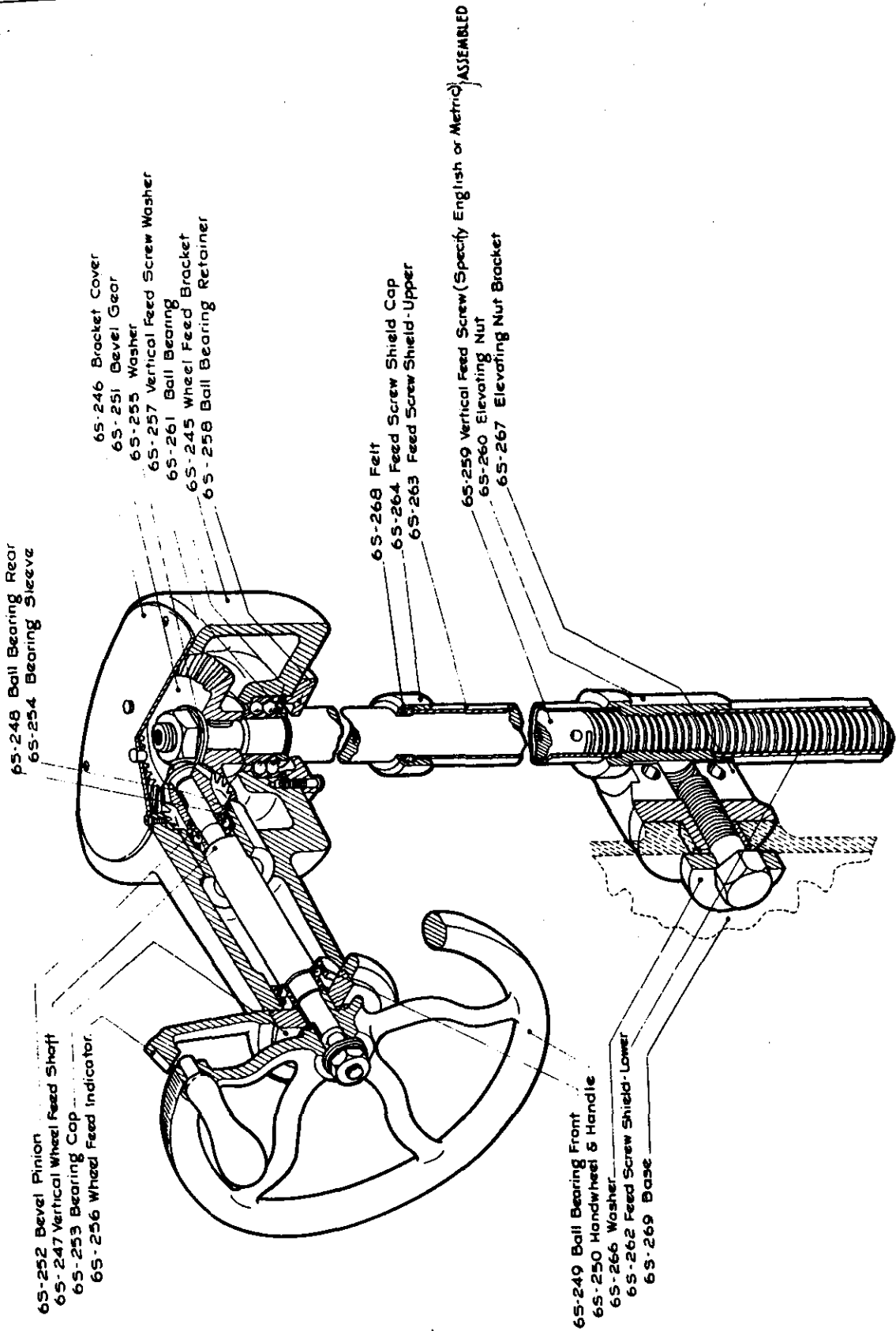
**FIGURE . . . 10**

*6" x 18" Surface Grinder with hydraulic table traverse, automatic cross feed, and wet grinding attachment.*

This illustration is designed to provide quick reference to the plate on which a desired part is to be found.

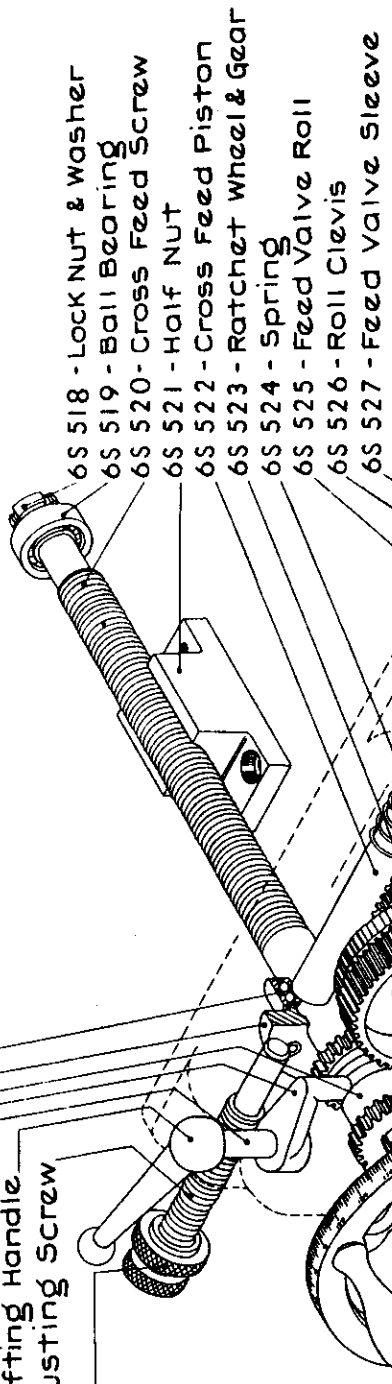
While the material in this section covers a majority of the arrangements supplied with these machines, it has not been feasible to attempt coverage of all.

Where no reference can be found for a desired item, communication of this is requested, upon receipt of which, all possible information will be sent.



**VERTICAL WHEEL FEED**

- 6S 500-Ball Bearing
- 6S 501 -Cross Feed Cap
- 6S 502-Sliding Gear
- 6S 503-Cross Feed Shifting Lever
- 6S 504-Reverse Lever Shaft
- 6S 505-Cross Feed Shifting Handle
- 6S 506-Cross Feed Adjusting Screw
- 6S 507-Check Nut

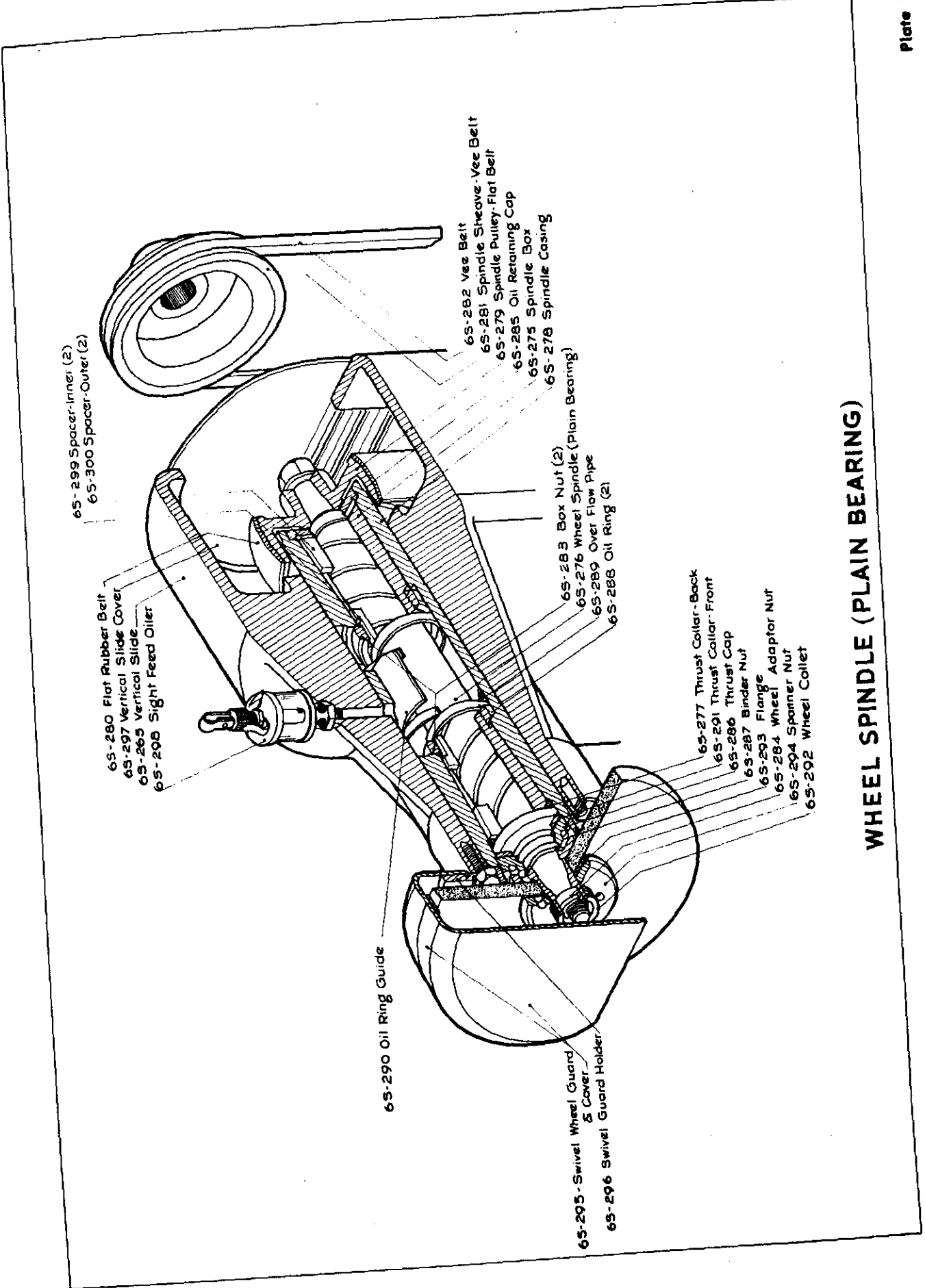


- 6S 518 - Lock Nut & Washer
- 6S 519 - Ball Bearing
- 6S 520 - Cross Feed Screw
- 6S 521 - Half Nut
- 6S 522 - Cross Feed Piston
- 6S 523 - Ratchet Wheel & Gear
- 6S 524 - Spring
- 6S 525 - Feed Valve Roll
- 6S 526 - Roll Clevis
- 6S 527 - Feed Valve Sleeve

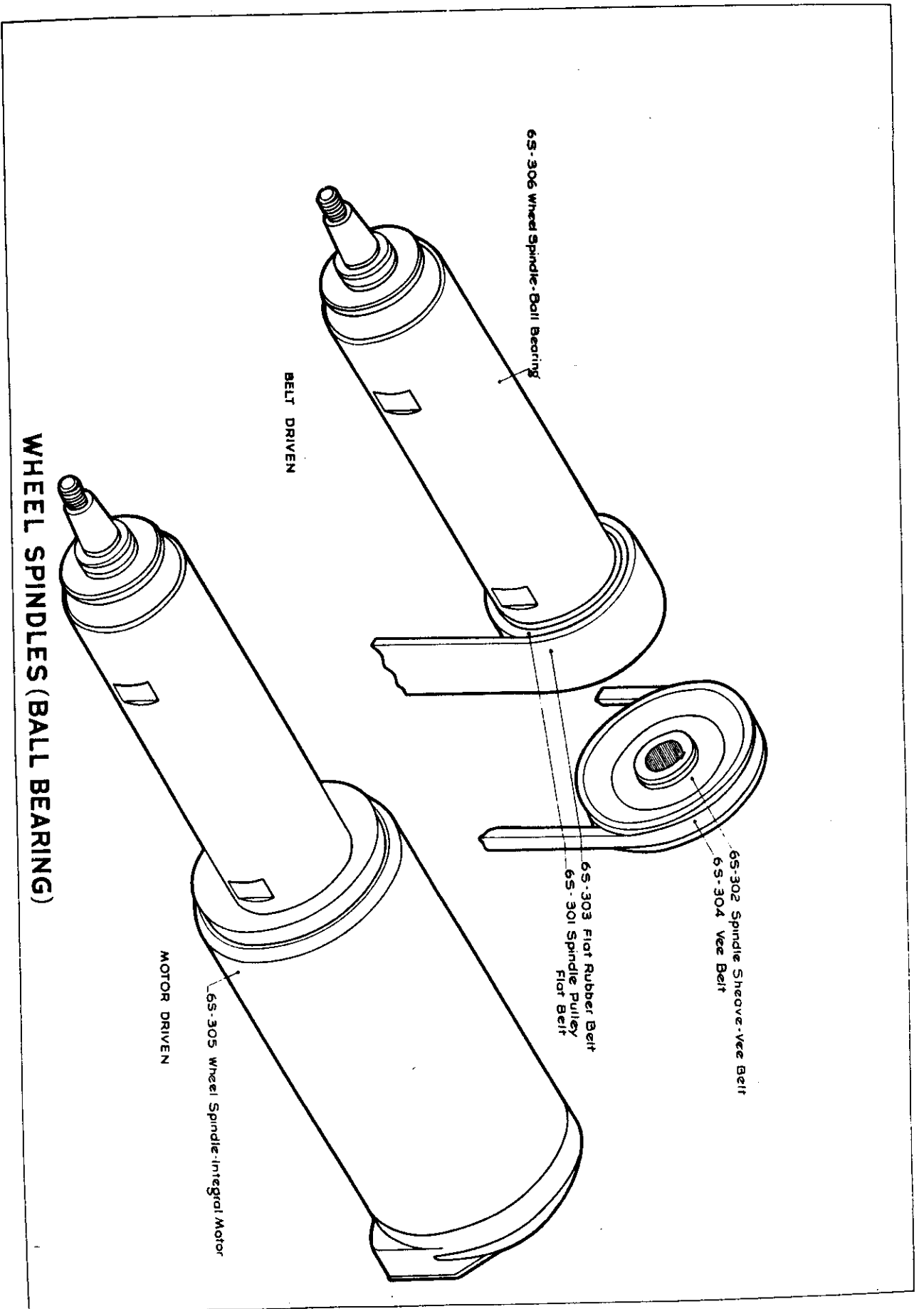
- 6S 508 - Cross Feed Hand Wheel
- 6S 509 - Handle
- 6S 510 - Feed Screw Key
- 6S 511 - Feed Screw Collar
- 6S 512 - Idler Gear
- 6S 513 - Idler Gear Stud
- 6S 514 - Ratchet Wheel Shaft
- 6S 515 - Ratchet Wheel Bushing
- 6S 516 - Wire Spring
- 6S 517 - Shoulder Screw

- 6S 528 - Valve Piston Guide
- 6S 529 - Feed Valve Piston
- 6S 530 - Wire Spring
- 6S 531 - Automatic Cross Feed Apron
- 6S 532 - Pawl Arm Segment Gear
- 6S 533 - Pawl

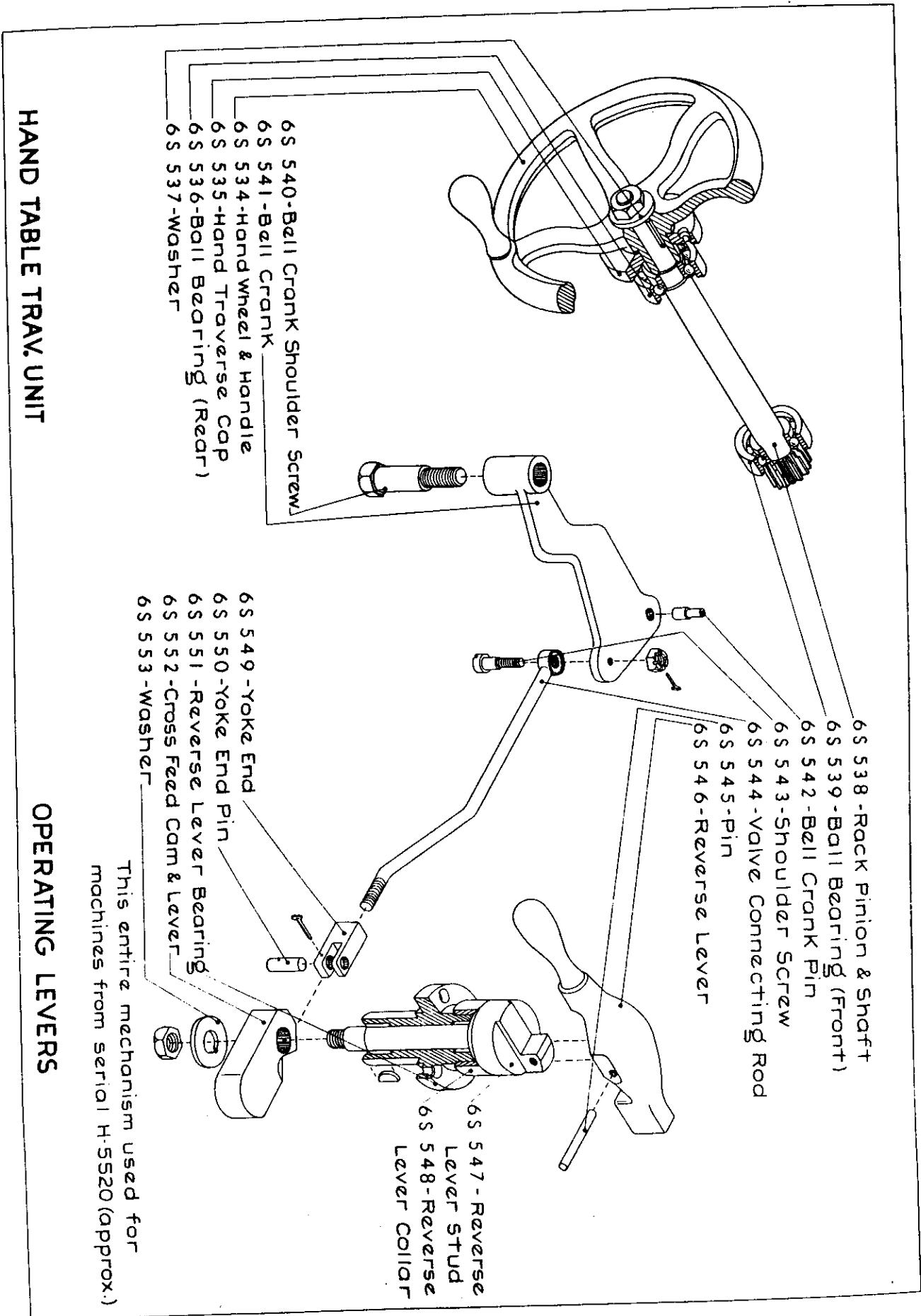
**AUTOMATIC CROSS FEED & SCREW**



**WHEEL SPINDLE (PLAIN BEARING)**



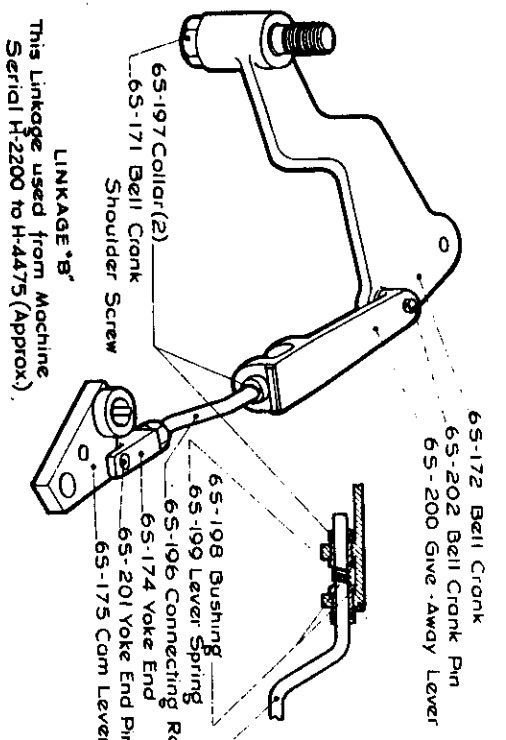
SE-525-A



**HAND TABLE TRAY UNIT**

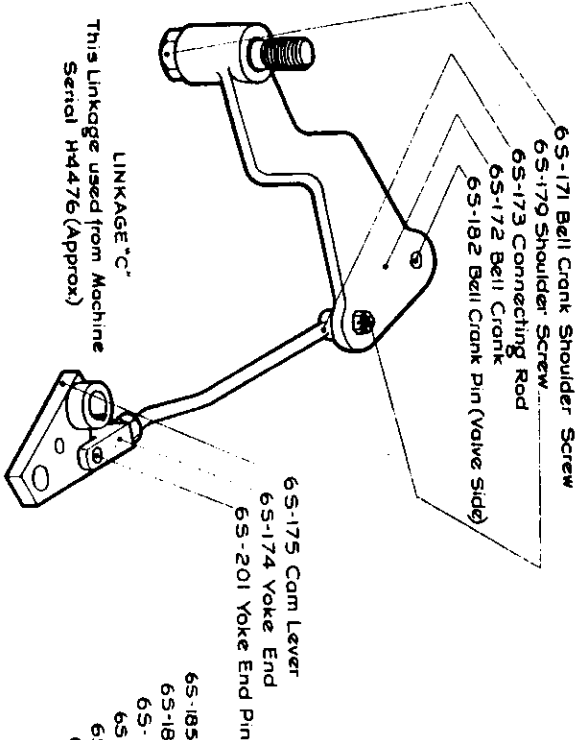
**OPERATING LEVERS**

This entire mechanism used for machines from serial H-5520 (approx.)



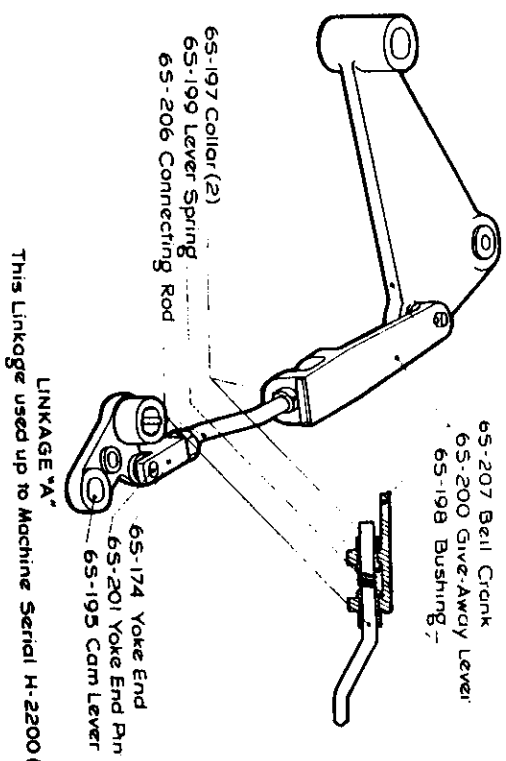
This Linkage used from Machine Serial H-2200 to H-4475 (Approx.)

LINKAGE "B"



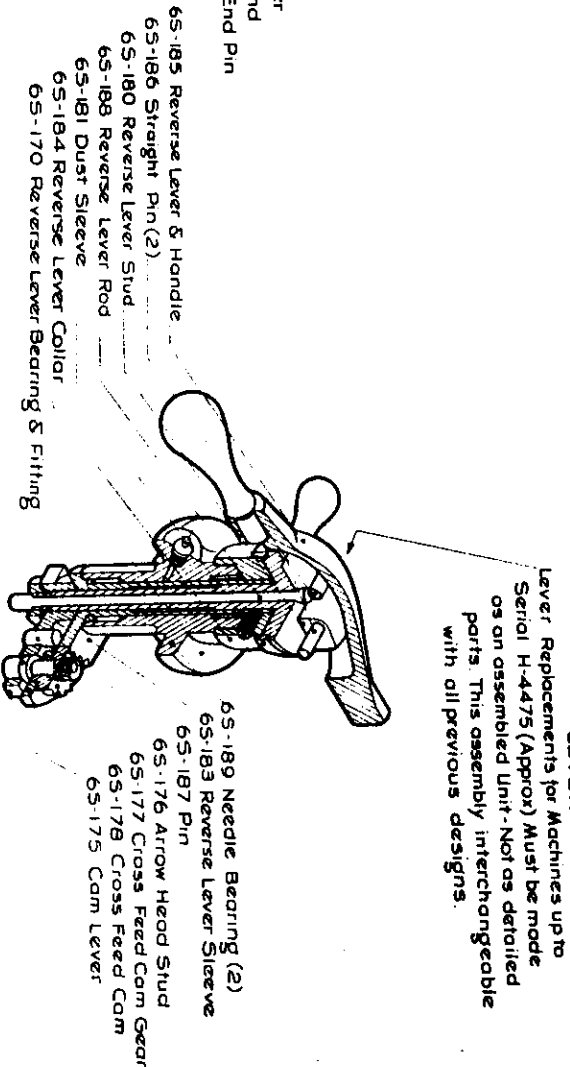
This Linkage used from Machine Serial H4476 (Approx.)

LINKAGE "C"



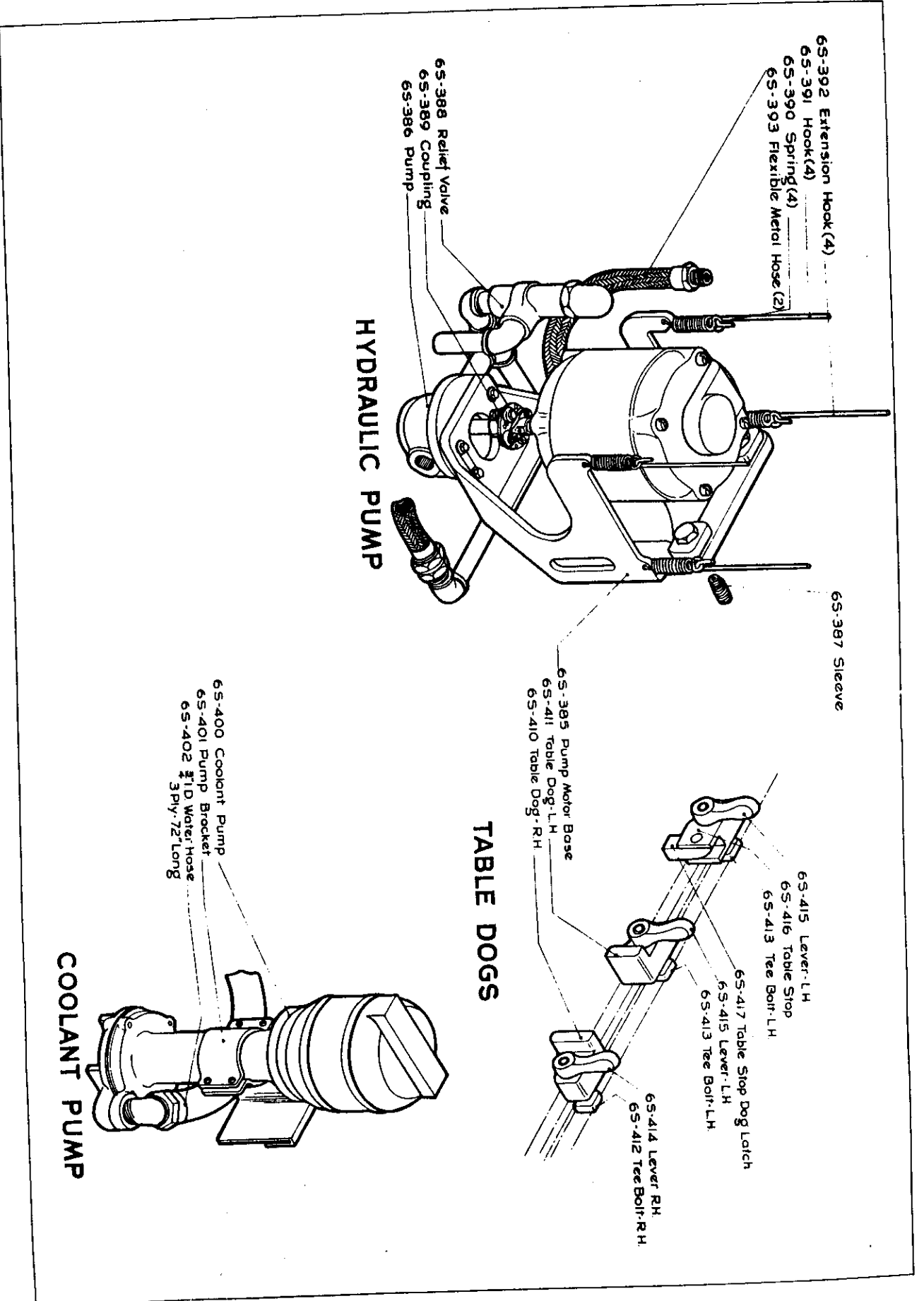
This Linkage used up to Machine Serial H-2200 (Approx.)

LINKAGE "A"



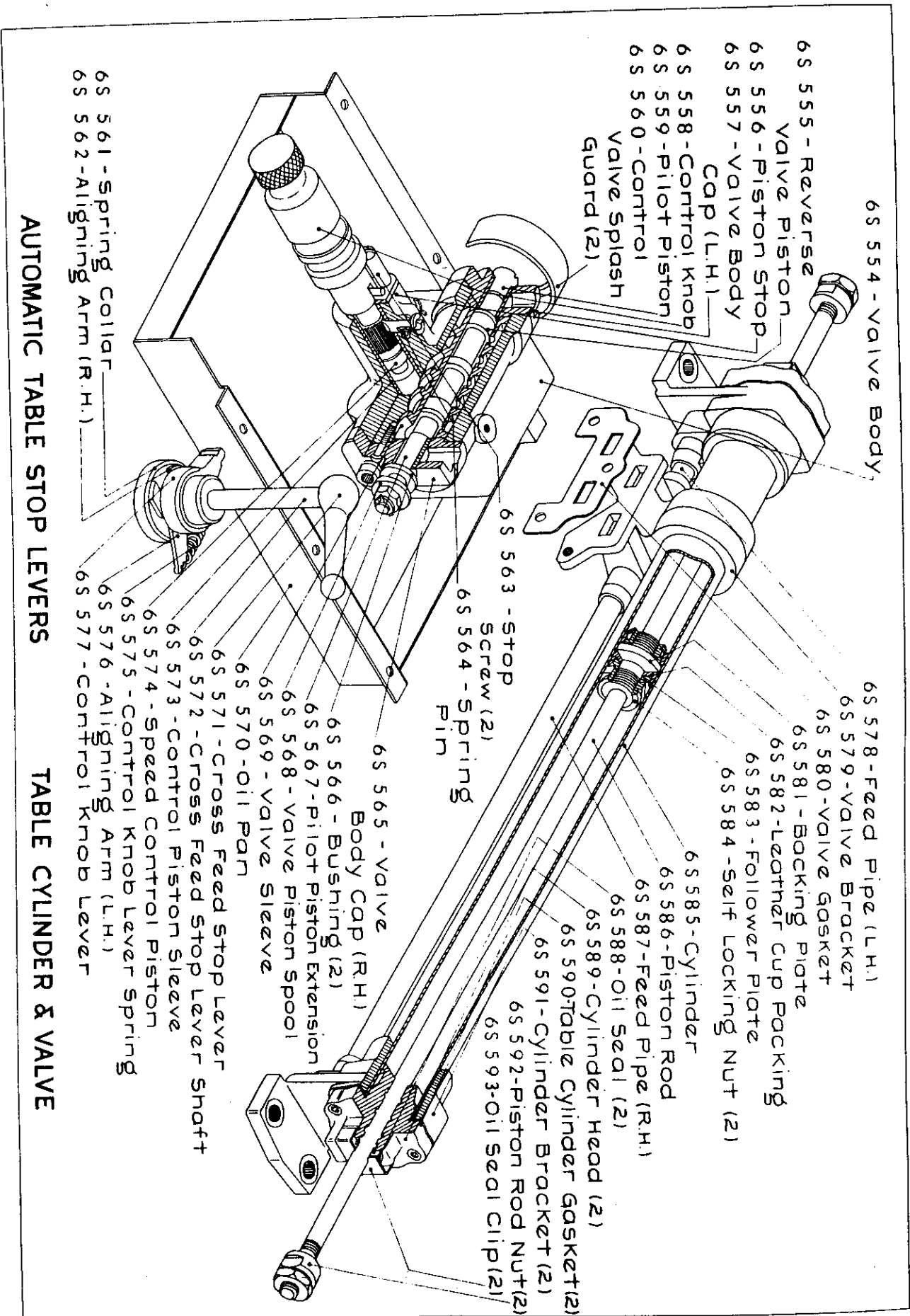
LEVER  
Lever Replacements for Machines up to Serial H-4475 (Approx.) Must be made as on assembled Unit - Not as detailed parts. This assembly interchangeable with all previous designs.

OPERATING LEVERS



SE-531-A





**AUTOMATIC TABLE STOP LEVERS**

**TABLE CYLINDER & VALVE**