TM 9-4910-447-10

DEPARTMENT OF THE ARMY TECHNICAL MANUAL

OPERATOR'S MANUAL

GRINDING MACHINE CRANKSHAFT

(STORM VULCAN MODEL 15A)

(4910-540-6103)

HEADQUARTERS, DEPARTMENT OF THE ARMY

FEBRUARY 1965

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HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D. C., *8 February 1965*

TM 5-4910-447-10 is published for the information and use of all concerned.

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NG: State AG (3)
USAR: None.
For explanation of abbreviations used, see AR 320-50.

TM 9-4910-447-10
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HEADQUARTERS
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WASHINGTON, D.C., *29 June 1973*

Operator's Manual

GRINDING MACHINE CRANKSHAFT (STORM VULCAN MODEL 15A) (4910-540-6103)

TM 9-4910-447-10, 8 February 1965 is changed as follows:

Page 31. Add the following paragraphs:

Recommendations for Maintenance Publications Improvements.

You can improve this manual by calling attention to errors and by recommending improvements using DA Form 2028 (Recommended Changes to Publications) or by a letter and mailing direct to Commander, US Army Weapons Command, ATTN: AMSWE-MAS-SP, Rock Island, IL 61201. A reply will be furnished direct to you.

Components of the End Item.

Parts included with the end item and considered as components of the end item configuration are listed in the following table:

Table 1. Components of the End Item

Components	Part No.	(FSCM)	Qty
ARBOR, GRINDING WHEEL:	15A200-1	(83658)	1
BLUNT CENTER:	146-2D	(83658)	1
BLUNT CENTER:	146-2E	(83658)	1
CENTERING FIXTURE ASSEMBLY:	15M	(83658)	1
CHUCK, UNIVERSAL JAW:	3108-52	(55130)	1
CHUCK, UNIVERSAL JAW:	3208-52	(55130)	1
COUNTERWEIGHT, IRON:	15A30-36	(83658)	1
COUNTERWEIGHT, IRON:	15A30-37	(83658)	2
COUNTERWEIGHT, IRON:	15A30-35	(83658)	5
COUNTERWEIGHT, LEAD:	15A30-38	(83658)	5
DRIVER DOG ASSEMBLY:	15A113M1	(83658)	1
DRIVER DOG ASSEMBLY:	15A112M1	(83658)	1
EL GRINDING COMPOUND:	1420-6A	(83658)	5
FIXTURE, DRESSING, ABRASIVE:	15A90	(83658)	1
FIXTURE, DRESSING, ABRASIVE:	15A201	(83658)	1
FLOOR LEVELING PADS:	1420-3	(83658)	4
GAGE:	50M1	(83658)	11
GUARD, BACK TABLE WAY:	15A10-14	(83658)	20
GUARD, WHEEL GRINDER-GRINDING MACHINE:	15A10-25	(83658)	2
GUARD, WHEEL GRINDER-GRINDING MACHINE:	15A10-26	(83658)	2
GUARD, WHEEL GRINDER-GRINDING MACHINE:	15A60-29	(83658)	1
GUARD, WHEEL GRINDER-GRINDING MACHINE:	15A10-30	(83658)	1
GUARD, WHEEL GRINDER-GRINDING MACHINE:	15A10-27	(83658)	1
INDICATOR ASSEMBLY:	15A80	(83658)	1
INDICATOR, DIAL:	35B30	(21938)	1

Table 1. Components of the End Item—Continued

Components	Part No.	(FSCM)	Qty
MOUNT, SLEEVE TYPE, GRINDING WHEEL:	15A51	(83658)	2
MOUNTING PLATE:	1420-4	(83658)	4
NIB, DIAMOND, WHEEL DRESSING:	15A90-2	(83658)	1
POINTER CENTER:	147-20	(83658)	1
REST, STEADY, ASSEMBLY:	15A70	(83658)	2
SHOE, LOWER SAW, STEADY REST:	15A70-9	(83658)	10
SHOE, UPPER JAW, STEADY REST:	15A70-10	(83658)	10
SPACER, COUNTERWEIGHT STUD:	15A30-41	(83658)	4
SPACER, COUNTERWEIGHT STUD:	15A30-42	(83658)	4
STUD, COUNTERWEIGHT:	15A30-34	(83658)	4
STUD NUT, COUNTERWEIGHT:	15A30-74	(83658)	4
STUD NUT, COUNTERWEIGHT:	15A30-75	(83658)	4
STUD NUT, COUNTERWEIGHT:	15A30-76	(83658)	4
V-WAY BACK GUARD:	15A10-45	(83658)	2
WHEEL, ABRASIVE:	A545L5VG	(10646)	1
WHEEL, ABRASIVE:	A545L5VG	(10646)	1
Y-DRIVER ASSEMBLY:	15A111L	(83658)	1
Y-DRIVER ASSEMBLY:	15A111R	(83658)	1
Y-DRIVER BAR:	15A111-7A	(83658)	1

Page 32. Appendix is superseded as follows:

APPENDIX
BASIC ISSUE ITEMS LIST
AND
ITEMS TROOP INSTALLED OR AUTHORIZED LIST

Section I. INTRODUCTION

1. Scope.

This appendix lists basic issue items and items troop installed or authorized required by the crew/operator for operation of the grinding machine crankshaft.

2. General.

This Basic Issue Items List and Items Troop Installed or Authorized List is divided into the following sections:

a. Basic Issue Items List—Section II. A list in alphabetical sequence of items which are furnished with, and must be turned in with, the end item.

b. Items Troop Installed or Authorized List. Not applicable.

3. Explanation of Columns.

The following provides an explanation of columns found in the tabular listings:

a. Federal Stock Number. Indicates the Federal stock number assigned to the item and will be used for requisitioning purposes.

b. Description. Indicates the Federal item name and a minimum description required to identify the item. The last line indicates the reference number followed by the applicable Federal Supply Code for Manufacturer (FSCM) in parentheses. The FSCM is used as an element in item identification to designate manufacturer or distributor or Government agency, etc., and is identified in SB 708-42.

Items that are included in kits and sets and listed below the name of the kit or set with quantity of each item in the kit or set indicated in front of the item name.

c. Unit of Measure (U/M). Indicates the standard or basic quantity by which the listed item is used in performing the actual maintenance function. This measure is expressed by a two-character alphabetical abbreviation, e.g., ea, in., pr, etc., and is the basis used to indicate quantities. When the unit of measure differs from the unit of issue, the lowest unit of issue that will satisfy the required units of measure will be requisitioned.

d. Quantity Furnished with Equipment (Basic Issue Items Only). Indicates the quantity of the item furnished with the equipment.

e. Quantity Authorized (Items Troop Installed or Authorized Only). Indicates the quantity authorized to be used with the equipment.

f. Illustration (Basic Issue Items Only). This column is divided as follows:

(1) *Figure Number.* Indicates the figure number of the illustration in which the item is shown.

(2) *Item Number.* Indicates the item number used to identify each item called out in the illustration.

Basic Issue Items List

(1) Federal stock No.	(2) Description	(3) Unit of meas	(4) Qty furn with equip	(5) Illustration	
				(a) Fig. No.	(b) Item No.
5120-198-5409	KEY, SOCKET HEAD SCREW: GGGK00275 (81348)	EA	1		
5120-240-5268	KEY, SOCKET HEAD SCREW: GGGK00275 (81348)	EA	1		
5120-935-4641	KEY, SOCKET HEAD SCREW: GGGK275 (81348)	EA	1		
5210-240-5292	KEY, SOCKET HEAD SCREW: GGGK00275 (81348)	EA	1		
5210-240-5300	KEY, SOCKET HEAD SCREW: GGGK00275 (81348)	EA	1		
5210-242-7410	KEY, SOCKET HEAD SCREW: GGGK00275 (81348)	EA	1		
5210-242-7411	KEY, SOCKET HEAD SCREW: GGGK00275 (81348)	EA	1		
5120-228-9517	WRENCH, BOX AND OPEN END: GGGW636 (81348)	EA	1	15A	
5120-293-0244	WRENCH, OPEN END, FIXED: 60B9521-2 (81996)	EA	1		
5120-277-1242	WRENCH, OPEN END, FIXED: GGGW00636 (81348)	EA	1		
5120-777-3441	WRENCH, SOCKET: 60B9521-2 (83658)	EA	1		

By Order of the Secretary of the Army:

CREIGHTON W. ABRAMS
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Chief of Staff

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To be distributed in accordance with DA Form 12-38, (qty rqr block No. 250) Organizational maintenance requirements for Truck, Utility 1/4-Ton, M151, and DA Form 12-40, (qty rqr block no. 136) Organizational maintenance requirements for Rifle, 5.56MM, M16, M16A1.

NG: State AG (3)

USAR: None.

☆U.S. GOVERNMENT PRINTING OFFICE: 1973—769620/1050

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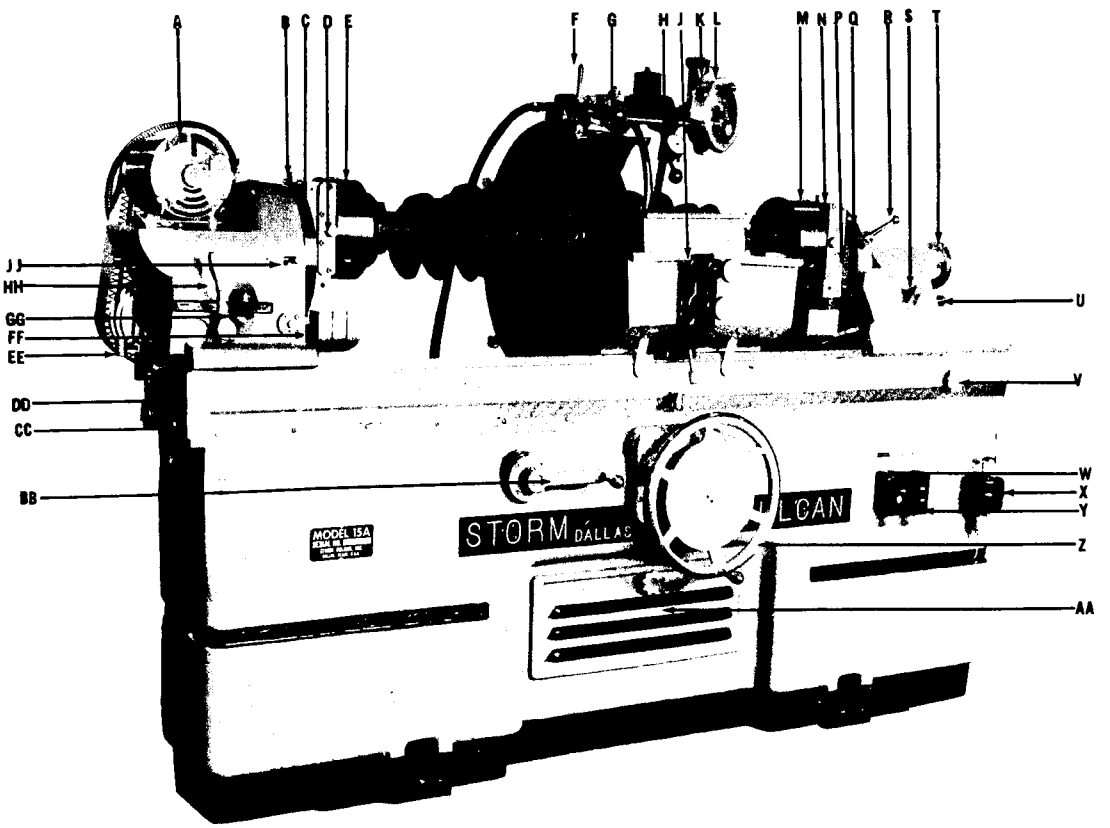


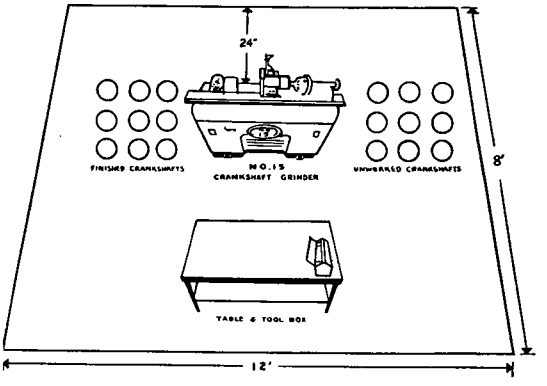
Figure 1

A. Headstock Motor
B. Elevating Screw
C. Headstock Work Head
D. Cross Slide Adjusting Screw
E. Headstock Chuck
F. Coolant Valve
G. Grinding Wheel
H. Arnold Gauge
J. Steady Rest
K. Feed-up Dial
L. Feed-up Hand Wheel
M. Tailstock Chuck
N. Elevating Head
P. Throw Scale
Q. Tailstock Work Head
R. Tailstock Spindle Lock Handle
S. Tailstock Lock Nut
T. Tailstock Hand Wheel
U. Tailstock Workhead Lock Shaft
V. Taper Adjustment Knob
W. Headstock & Coolant Motor Switch
X. "One Shot" Oiling System
Y. Grinding Motor Switch
Z. Table Traverse Hand Wheel
AA. Coolant Tank Door
BB. Wheelhead Retraction Lever
CC. Bottom Table
DD. Top Table
EE. Oil Cup
FF. Counterweights
GG. Headstock Lock Nut
HH. Headstock Clutch Lever
JJ. Workhead Lock Shaft

300 - BEFORE ASSEMBLY

301—SPACE REQUIRED

The No. 15A Crankshaft Grinder measures 54" high, 42" wide and 88" long. When positioning the machine select a site that will give the operator complete freedom of movement and space in front of the machine for a table. The floor plan sketch at the right has been found to be very effective. Note that a minimum of 24" space back of the machine is allowed for easy accessibility for cleaning and oiling. The space required for front table travel is 108".



302—LIGHTING

It is suggested that a large fluorescent lighting fixture be placed over the machine . . . its exact placement should be left up to the individual operator. On high precision work, good lighting for the entire working area will lessen operator fatigue and speed up production.

303—CHECK LIST OF EQUIPMENT

A packing list is sent with the machine. Carefully check and see that everything is received in good order. Claims for shortages should be made immediately.

400 - INSTALLATION

401—POSITIONING

First, carefully remove machine from skids and place in position on four mounting pads and plates (steel mounting plates go on TOP of mounting pads)—plates and pads are furnished as extra equipment. These mounting pads absorb vibration from other machines in the shop or outside sources that might cause a poor grinding finish. The machine should be placed on a solid concrete floor. Next, wipe off all anti-rust grease with clean rags.

402—ASSEMBLY

Remove back table hold-down straps and bolt back table end way-guards in place. Remove front table hold-down straps. Place table traverse handwheel in position and lock tight with set-screw furnished. Remove the grinding wheel guard cover and carefully place grinding wheel on spindle and draw up tight on the spindle ta-

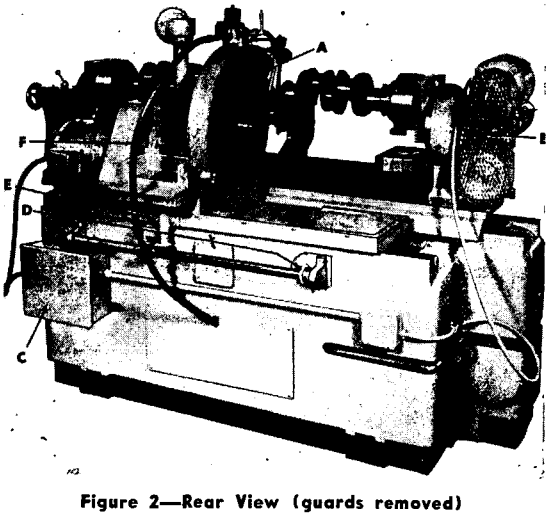


Figure 2—Rear View (guards removed)

per. Be careful not to scar or mar the taper on the spindle or in the grinding wheel mount when mounting or removing the grinding wheel. Install Arnold Gauge on grinding wheel guard with bolt furnished. All necessary information for installation, use and maintenance of the Arnold Gauge is furnished in the crate in which it was delivered to you.

403—LEVELING

The machine should be perfectly level to insure proper operation and lubrication. Use a precision type carpenter's or machinist's spirit level. Extend the tables to the end and place the level on the flat portion of the Vee ways. The machine must be level, length-wise and cross-wise.

404—ELECTRICAL

The No. 15A is equipped with three motors: the ½ H.P. work drive motor; the 3 H.P. wheel head motor; and the 1/10 H.P. coolant pump motor. According to customer specificiations, these motors are furnished single or three phase and to specified voltage. The switch at the right operates the wheel head motor, and the switch at the left operates the work head and coolant pump motors simultaneously.

The electrical compartment at the right rear of the machine houses a magnetic starter for the 3 H.P. motor and two overload relays, one for the ½ H.P. motor and one for the 1/10 H.P. motor. The compartment cover has a wiring diagram on the rear of it. Use this wiring diagram when tracing wires or servicing electrical equipment.

The magnetic starter and overload relays have heater coils in them whose amperage rating corresponds with the amperage rating of their respective motors. Be sure to always maintain this rating when purchasing new heater coils.

WIRING MACHINE TO POWER SOURCE

The entire electrical system was completely wired at the factory so that the only remaining connection to be made is to the electrical compartment. To connect, remove the compartment cover, bring the outside wires into the compartment through the hole in the bottom of it. Attach the wires to the terminal board at the bottom. One of the terminals is attached to the compartment for ground. Be sure to always bring a ground wire into this compartment and attach it to the ground terminal of the terminal board. Attach the remaining wires to the terminal board.

THREE PHASE CIRCUIT

Machines equipped with 3 phase motors were wired at the factory so that all motors were "in-phase," that is, they all ran in their proper direction when connected to one common 3 phase power source. Should the motors revolve backward after connecting the power source to the terminal board, reverse the leads at the terminal board. This will reverse the direction of all motors since they all derive their electric power from the terminal board.

500 - PREPARATION FOR WORK

501—HEADSTOCK AND HEADSTOCK WORK HEAD (Fig. 3)

The work head (M, Fig. 3) has three available speeds: 40, 60, and 80 r.p.m. These speeds are selected by changing the belt on the three-step motor pulley and driven pulley.

The clutch lever (EE, Fig. 1) starts and stops the rotation of the work head.

The head lock shaft (K, Fig. 3) locks the work head in a vertical position.

The lock nut (J, Fig. 3) anchors the entire headstock assembly to the front table.

The elevating screw dial (B, Fig. 3), is calibrated to .001". This screw raises or lowers the elevating head (C, Fig. 3). The scale (L, Fig. 3) is used in conjunction with dial (B, Fig. 3).

The dial and the scale are direct reading, for example, when the dial is revolved one complete revolution, the dial and scale will read that they have moved the elevating head .125". In reality, the elevating head has moved only half that amount, .0625". This eliminates the necessity of the operator dividing the stroke by two to obtain the setting.

The cross slide is adjusted with the nut (H, Fig. 3) and is used for trueing the crankshaft when grinding main bearing journals only.

NOTE: When trueing and grinding rod bearing journals, the cross slide must be in the neutral position at center.

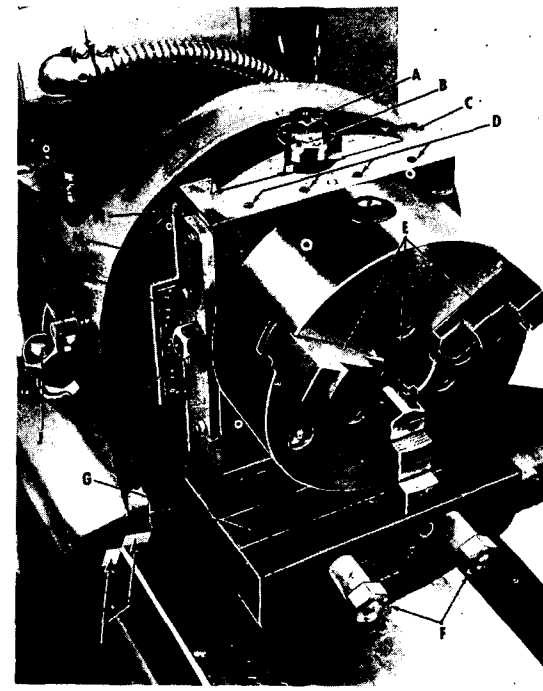


Figure 3—Headstock Work Head

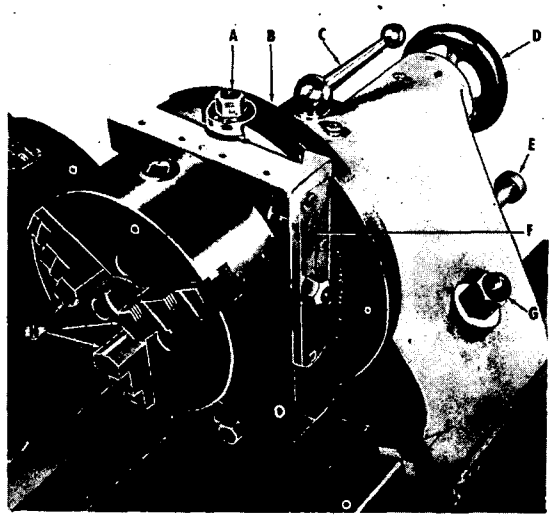


Figure 4—Tailstock

WORK HEAD (Figure 4)

The operation of the tailstock work head (B), elevating screw (A), head lock shaft (E), lock nut (G), and closs slide (F), are all identical with the headstock, and are always used in conjunction with these corresponding parts.

The tailstock spindle is spring loaded to prevent excessive side pressure on the crankshaft when mounting.

The hand wheel (D, Fig. 4) moves the spindle and work head assembly to the right or left.

The spindle lock (C, Fig. 4) locks the spindle to the housing.

Wear Strips: (P. Fig. 3) (J, Fig. 4) Both the workstock and tailstock are equipped with hardened, precision ground steel strips placed between the housings and the table surface. If realignment of headstock and tailstock becomes necessary, it is easily done by shimming between the housings and these steel wear strips.

503—WHEEL HEAD (Figure 5)

The wheel head consists of:

(G), the grinding wheel and guard.

(B), the spindle assembly.

(A), the feed-up dial and mechanism.

(D), the wheel slide.

(E), the wheel slide base.

The grinding wheel mount has an internal taper on the spindle. When mounting or removing grinding wheels, extreme care MUST be used to prevent damage to the taper on the spindle or in the mount.

A complete stock of grinding wheels is carried at the factory, available for immediate shipment.

The grinding wheel guard cover is released by removing three nuts (J, Fig. 5). The grinding wheel splash guard (H, Fig. 5) is fully adjustable for any width or diameter grinding wheel and should be kept as close as possible to the grinding wheel to prevent excessive splashing of the coolant.

The grinding wheel guard can be moved back or forth after the two screws (one in front and one in rear) (E, Fig. 5) have been loosened. The guard is mounted in a dovetail groove for this purpose.

Two locking screws and one expanding screw are provided on the coolant pipe clamp bracket as shown in Figure 6, permitting the coolant nozzle to be adjusted to any convenient position. To adjust, loosen the two screws (B, Fig. 6), and tighten the center screw (A, Fig. 6). Position the coolant pipe and loosen the center screw. Then tighten the two lock screws.

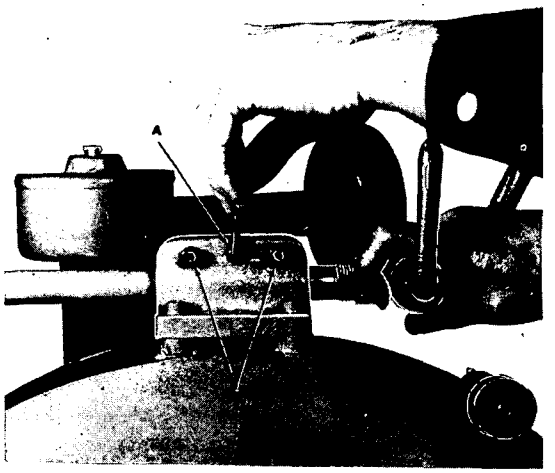


Figure 6—Adjusting Coolant Pipe

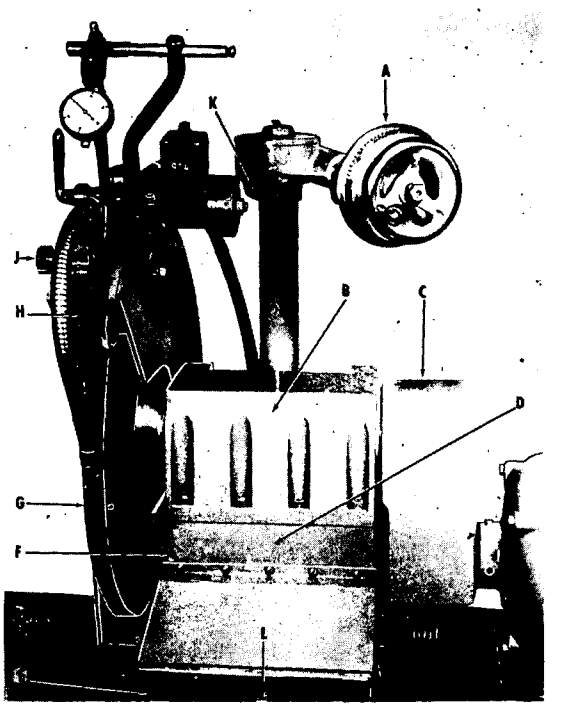


Figure 5—Wheelhead

The spindle is mounted on two pairs of super-precision spindle bearings inside the housing (B, Fig. 5).

These bearings have been preloaded to insure absolute rigidity. No further attention to the spindle or bearings is necessary so long as care is exercised with its use. The entire assembly also has been permanently lubricated for the life of the bearings. It is recommended that the factory be contacted whenever spindle trouble occurs.

Unless the operator is thoroughly familiar with this type bearing, he should never attempt to disassemble the spindle.

The factory maintains a complete spindle replacement service at a moderate price. When this service is used, please write the factory for full details.

The feed-up dial (A, Fig. 5) is calibrated in .001". This dial is direct reading, that is, when the dial is turned .020", the grinding wheel will remove .020" stock from the diameter of the work.

The dial pointer plate may be moved to any desired position that is convenient to the operator by loosening the cap screw behind it. The entire horizontal part of the feed-up mechanism may also be moved to any desired position by loosening the Allen cap screw (J, Fig. 5) located at bottom of worm-gear housing.

MOUNTING THE GRINDING WHEEL

The grinding wheel is mounted on a sleeve-type mount. This mount consists of two parts, the sleeve and the flange. The sides of the sleeve and flange grip the sides of the grinding wheel by the gripping effect of the eight screws that hold them together. Always use new clean blotters between the mount and the wheel. Always be sure that all dirt and small particles are removed from sides and hole of the wheel and also from the mount. Always be sure that the screws and their threaded holes are clean and oiled before assembly of the flange and sleeve.

NOTE: Special instructions are necessary for the tightening of the eight screws that hold the flange and sleeve together. Notice the numbers from one through eight stamped on the flange beside the screw holes. The numbers represent the tightening order that must be followed. The tightening order is 1-2-3-4-5-6-7-8. Notice that this forms a criss-cross pattern. This tightening order must be followed to prevent damage to the grinding wheel which would endanger the operator.

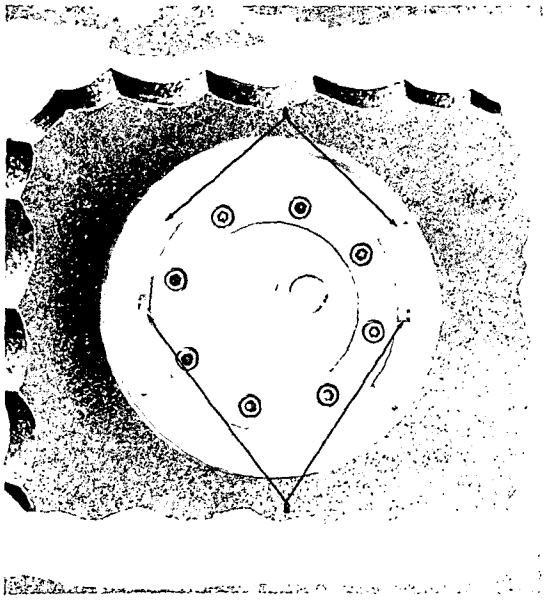


Figure 7—Balancing Grinding Wheel

When mounting a grinding wheel, proceed as follows: Clean the parts as stated above. Place a new clean blotter on both sides of the wheel and place it on the sleeve. Then place the flange on and screw the eight screws in place with the fingers. With the hexagon wrench furnished, tighten No. 1 screw **lightly.** Then tighten the remaining seven screws in proper order lightly. Then go back and tighten each screw in proper order a little more. Then (using a torque wrench if available) tighten each screw in proper order to 15 foot pounds torque.

CAUTION: When inserting screws, never tighten one screw up to the full 15 foot pounds and then go to the next screw and tighten it up to 15 foot pounds. This procedure is likely to damage the wheel because the flange will not be drawn down evenly against the wheel. Excessive tightening pressure must also be avoided, as this will distort and warp the flange and sleeve.

After a period of 8-16 hours' grinding, the screws should be checked for looseness caused by the compression of the blotters. The screws will probably have to be retightened to maintain the 15 foot pounds torque. Be sure to follow the proper tightening order.

Use extreme care when mounting or removing the wheel from the spindle. If the taper in the wheel mount or on the spindle is damaged, the wheel will not run true. If the wheel is dropped on the spindle, the precision ball bearings will be damaged. When removing the wheel, turn the spindle nut two turns, then tap the wheel with the hand to break the mount loose from the spindle taper. Then remove the nut and the wheel. DO NOT hit the wheel or the spindle with a hammer.

BALANCING THE GRINDING WHEEL (Figure 7)

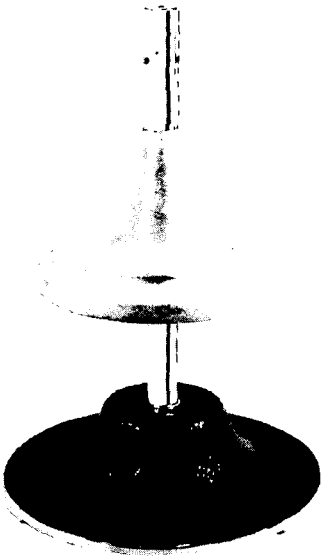
Notice that two bronze counterweights (A, Fig. 7) are mounted in a groove in the wheel mount flange.

These counterweights are locked in position by means of a screw (B, Fig. 7) located in the middle of them. These counterweights may be moved in their groove to compensate for the unbalance in grinding wheels. New grinding wheels should be balanced before and after trueing them on the machine with the diamond wheel dresser.

A balanced grinding wheel is essential to good grinding. Much patience and care must be used when balancing in order to insure the highest quality grinding.

Two types of balancers are available—a balancing arbor and a spirit level horizontal balancer.

SPIRIT LEVEL BALANCER



Spirit Level

Spirit Level: When using the spirit level horizontal balancer, obtain a clean table and place the balancer base on it. Then place the balancing head gently onto its base. Check the air bubble to be sure that it is exactly centered about the black circle on the glass. If not, adjust by loosening or tightening the small screws in the side of the chrome-plated head. Then place the mounted wheel onto the balancing head. Loosen the counterweights and note direction of unbalance by the position of the air bubble. Move the counterweights until the bubble is exactly centered about the black circle. Then lock the counterweights in position.

504—RAPID RETRACTION MECHANISM

The rapid retraction mechanism enables the operator to move the entire grinding wheel and spindle assembly away from the crankshaft without moving the feed-up dial. Fig. 2 shows this retraction mechanism.

505—TABLE TRAVERSE AND TAPER ADJUSTMENT

The front table and the back table move in opposite directions when the traverse hand wheel is rotated. The front table, however, moves 3½" before the back table begins to move. This allows the crankshaft journal to be moved across the face of the grinding wheel while the grinding wheel is stationary. The front table is built in two sections. The top section (CC, Fig. 1) is pivoted at center for taper adjustment. The taper adjustment knob (V, Fig. 1) moves the top table. If any taper is encountered during grinding, loosen the two capscrews underneath and at the ends of the sub table (BB, Fig. 1) and turn the taper adjustment knob a slight amount to eliminate this taper. Example: If large end of taper is towards right end of machine, taper adjustment knob should be turned to the right, or clockwise.

506—COOLANT

There are two coolant tanks located inside the cabinet which are accessible through the front door (Y, Fig. 1). The left tank has the coolant pump mounted in it. After the coolant leaves the flexible coolant hose, it flows down the trough in the center of the cabinet and returns to the right tank. The dirt will settle to the bottom of this tank and only the clean coolant will flow over to the left tank and be pumped back.

Using the Economy Lubricant paste furnished, mix the coolant as follows: Place three pounds of paste in a large container and add approximately 16 gallons of warm water and thoroughly mix together. Place this mixture in the coolant tanks. Follow proportions if smaller container is used.

The coolant tanks must be cleaned every two or three weeks and new grinding lubricant added. A small, inexpensive pump is furnished as extra equipment for quick removal of the old coolant. This pump has a sealed motor so that the entire pump may be immersed in the coolant tank. The electric cord is then attached to a 110-volt plug and the coolant will be pumped through the hose attached to the pump. Remember that the grinding lubricant is very important to grinding and, therefore, must be kept clean and fresh. The grinding lubricant paste may be purchased from STORM-VULCAN, INC., at Dallas or direct from the producer.

NOTE: If the grinding lubricant paste furnished does not mix properly with the water in your locality, a water softening agent should be used.

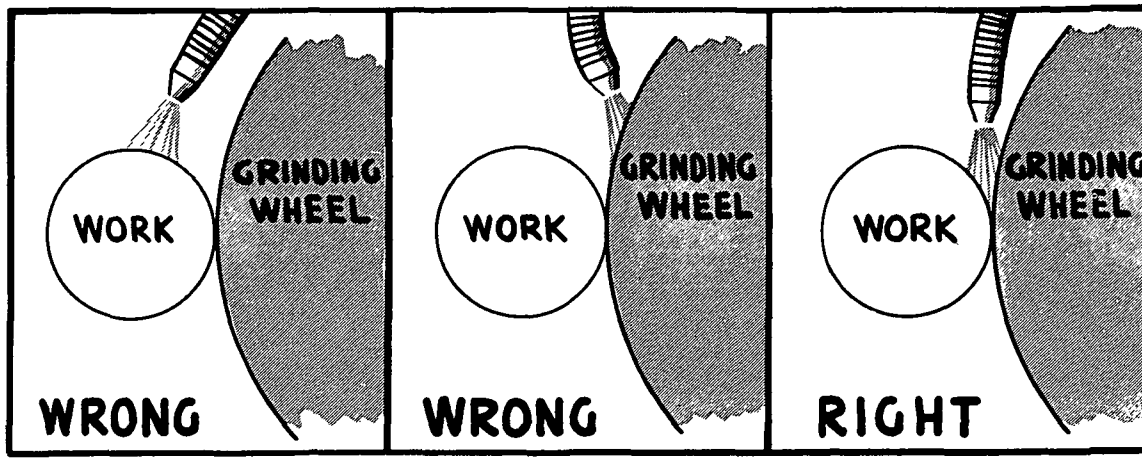


Figure 8—Coolant Application

Use of Coolant: Good grinding is almost impossible without a good coolant and the proper use of it. Be sure to have the proper coolant and keep it clean by filtering or changing as it becomes dirty. Use plenty of coolant when grinding and while dressing the grinding wheel. One of the most common causes of poor grinding is due to the improper use or the wrong type of coolant. The coolant MUST flow BETWEEN the work and the grinding wheel, not on top of the work or on the face of the wheel. (Fig. 8.)

507—STEADY REST (Figure 9)

The purpose of the steady rest is to hold the crankshaft steady and to eliminate whipping and vibration while grinding. The steady rest is clamped to the front table with lever (D, Fig. 9). If the lever fails to clamp the steady rest securely, adjust the screw underneath the lever block. To engage lower jaw (A), push knob (C) fully in and turn to the right one-fourth turn. The screw knobs (B) are used to adjust the steady rest jaws.

When using the steady rest, be sure that the jaws are always in contact with the journal when grinding . . . **never** put an excessive amount of pressure on the jaws. Any excessive pressure of the jaws against the crankshaft journal may tend to distort the crankshaft which will result in the journal being ground tapered or out-of-round.

The steady rest shoes are removable. These shoes are made of a good grade babbitt metal. The upper shoe is attached with a capscrew and the lower shoe has two bronze screws cast into it. These screws fit two holes in the lower jaw. Two bronze nuts are used to secure this shoe in place. These shoes are always available from stock for immediate shipment. It is recommended that a supply of these shoes be kept on hand.

The steady rest shoes should be filed flat, straight and smooth at regular intervals. Never allow the shoe tips to have burrs or marks on them.

The three screws (E, Fig. 9) are used to adjust the upper jaw gib. This gib should be kept snug against the upper jaw so that excessive play is eliminated. The screw lock nuts are used to lock the screws in position after adjusting.

Always keep the screw threads and clamping mechanism slightly covered with oil to prevent rust and corrosion and to provide smooth operation.

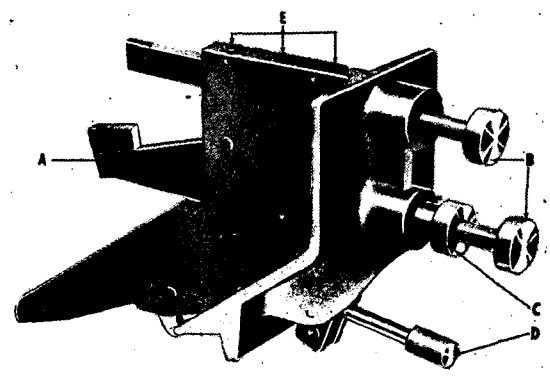


Figure 9—Steady Rest

508—TRUEING FIXTURE (Fig. 10)

The indicator (C, Fig. 10) is shipped in a separate box to prevent damage. Assemble as follows: Remove the tape from the trueing fixture shank and remove the small brass plug from the tape. Place the indicator into the hole at the knurled end of the shank. Remove the small set screw at the knurled diameter and place the brass plug in the tapped hole. Replace the set-screw and position the indicator so that its needle moves only a few marks and tighten the set-screw. The trueing fixture is now ready for use.

The trueing fixture is used for trueing the crankshaft journals with the centerline of the headstock and tailstock spindles before grinding.

The shank (A, Fig. 10) is adjustable to any position when the thumb screw (B) is loosened. The trueing fixture base is machined to fit the contour of the front table and is so balanced that it requires no clamping. Always be sure that the fixture fits securely against the front table for accurate readings. Protect the indicator from damage.

The plunger assembly should be removed and cleaned every two weeks. To remove, loosen the thumb screw and pull the entire shank and plunger assembly from the fixture base. Be sure not to lose the small brass plug that is under the thumb screw and protects the shank from damage. Loosen the small set-screw at the knurled diameter of the shank and remove the indicator. This set-screw also has a small brass plug under it that should be replaced when reassembling. Screw the knurled brass nut at the end of the shank out and the plunger may be pulled out. Clean all parts and apply a light coat of oil and reassemble. The indicator should be positioned in the shank so that its plunger just contacts the shank plunger so that the maximum travel of the indicator can be had for trueing.

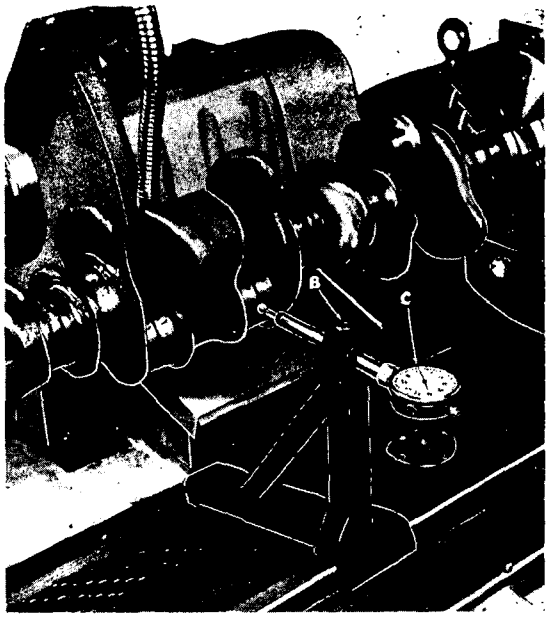


Figure 10—Trueing Fixture

NOTE: Never oil the indicator as this will damage it. Excessive oil on the plunger and mating parts should be avoided so that the oil does not work into the indicator.

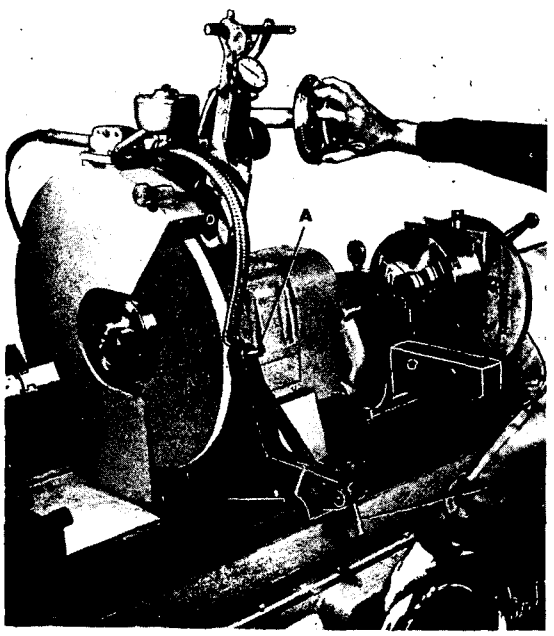


Figure 11—Wheel Dressing Fixture

509—WHEEL DRESSING FIXTURE (Fig. 11)

The wheel dressing fixture is clamped to the front table in the same manner as the steady rest. The clamp adjustment is also the same. The diamond shank (A) is held securely with a set-screw. Always be sure that the diamond is securely anchored to the fixture and that the fixture is securely anchored to the table with the locking lever (B). Failure to do this will result in an untrue surface and patterns on the

face of the grinding wheel which will cause imperfect grinding. Never allow the point of the diamond to protrude more than 5/8" past the fixture. Revolve the diamond shank slightly every few dressings to maintain a good cutting edge on the diamond.

510—DRESSING GRINDING WHEEL FACE (Fig. 11)

First, clamp the dressing fixture to the front table. Then, proceed as follows: Turn both switches on. Turn the coolant on. Bring the grinding wheel very lightly into contact with the diamond. Move the front table from side to side very slowly while feeding the grinding wheel forward no more than .001" each pass. Make four or five passes and "finish" with a .0005" cut.

CAUTION: Never dress the grinding wheel without using coolant on diamond. Never allow the back table to move while dressing the grinding wheel.

New operators will find it best to dress the grinding wheel before regrinding each crankshaft. After gaining experience, it will be necessary only when the wheel has become glazed or rough.

511—WHEEL SIDE DRESSING FIXTURE

The wheel side dressing fixture is furnished as extra equipment and is used for trueing the sides of the grinding wheel with the face and sizing the width. The same diamond that is used in the wheel dressing fixture may be used in this fixture, however, an extra diamond should be kept on hand for this purpose. The nose, (B, Fig. 12), is held to the frame of the fixture with the set-screw (A, Fig. 12). Two flat surfaces on the pilot diameter of the nose are provided so that the diamond will point slightly downward when the set-screw is tightened.

512—DRESSING GRINDING WHEEL SIDES

Clamp the wheel side dressing fixture in the chucks as shown in Fig. 12. Release work head lock shafts. Move coolant hose into position at the side of the grinding wheel and turn coolant on. Turn both motor switches on. Bring the diamond slightly into contact with the grinding wheel at the bottom and move the diamond up toward the center of the grinding wheel. Move diamond back down to the bottom of grinding wheel. Move the top table very slightly and take another cut.

IMPORTANT: Always use coolant on diamond when dressing grinding wheel. Always be sure that the diamond is locked tightly in position so that the diamond points slightly downward. Always bring the diamond from the bottom upward into the grinding wheel. Always dress both sides of grinding wheel.

513—ARNOLD GAUGE

All necessary information concerning mounting, use and maintenance of the Arnold Gauge is furnished in the carton in which it came.

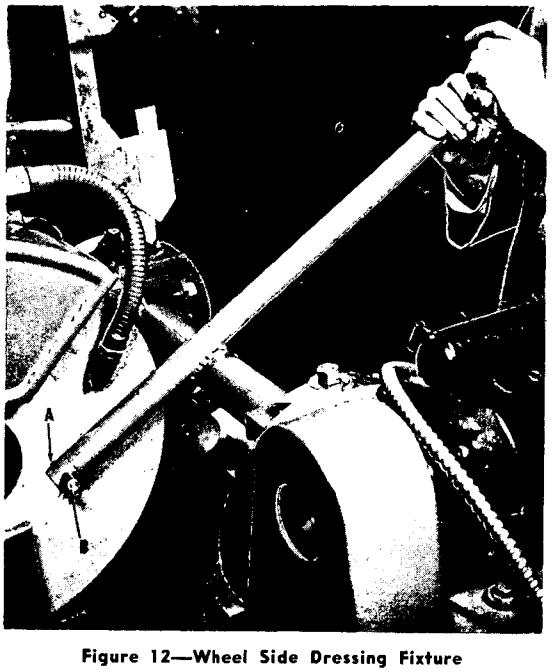


Figure 12—Wheel Side Dressing Fixture

600 - OPERATING INSTRUCTION

601—PREPARING CRANKSHAFT FOR GRINDING

First, clean the crankshaft thoroughly to remove all oil, sludge, carbon or other dirt and wipe dry. Be sure to clean all oil holes thoroughly.

Next, check the crankshaft for cracks, excessive bends or warpage . . . straighten if necessary.

602—PLACING CRANKSHAFT IN MACHINE

Find the "stroke" of the crankshaft to be ground (listed in most bearing catalogs). Engage the lockshafts into the work heads. Move the work head vertical slides to the proper setting according to the "stroke" of the crankshaft. Be sure that the cross slides are in the neutral position. Open the chuck jaws at the headstock (E, Fig. 3) slightly larger than the size of the flywheel flange. Open the chuck jaws (H, Fig. 4) at the tailstock slightly larger than the size of the timing gear end of the crankshaft.

Note: Always remove all keys, timing gears, studs, dowel pins and bushings from the crankshaft that would interfere with the chuck jaws. Never chuck on a timing gear.

Loosen the tailstock hold down nut (G, Fig. 4) and position the tailstock for the length of the crankshaft. Place the flywheel flange of the crankshaft at the headstock, and the timing gear end at the tailstock. Tighten the chuck jaws at both ends. Use only light pressure. Then tighten the tailstock hold down nut. The crankshaft is now ready for trueing.

Another method for loading the crankshaft is as follows: Position the tailstock housing so that the distance between the headstock and tailstock chuck faces is slightly less than the length of the crankshaft. Be sure that the tailstock spindle is retracted into the tailstock housing. Lock the tailstock to the table by tightening the hold down nut. Open the tailstock chuck jaws 2 to 3 times larger than the size of the timing gear end of the crankshaft. Place the timing gear end into the tailstock chuck jaws far enough so that the flywheel flange clears the headstock chuck. Then move the flywheel flange into the headstock chuck jaws, now tighten the chuck jaws lightly.

Note: To prevent twisting or binding of the crankshaft, be sure that the flywheel flange does not touch the face of the chuck jaws. Allow only the jaws to touch and grip the outside diameter of the flywheel flange. Never allow the jaws to touch the back of the flywheel flange.

Four studs (F, Fig. 3) are furnished for holding the counterweights (G, Fig. 3) to the headstock and tailstock heads, two for each head. Place these studs into their holes located at the bottom of each head. These studs are removed when grinding main bearing journals.

Various sizes of counterweights are furnished as standard equipment, some made of cast iron and some of lead. The large weights must be used at the headstock as they will not clear the grinding spindle housing when used at the tailstock. Always use at least twice as much weight at the headstock as is used at the tailstock. Only enough weight at the tailstock to offset the weight of the chuck is recommended. Two lengths of spacers are furnished for placing on the counterweight studs when only a few counterweights are used.

603—TRUEING CRANKSHAFTS WITH MATING JOURNALS

Loosen the chuck jaws slightly and revolve the crankshaft so that the two end mating journals, are approximately centered, that is, when they are at bottom dead center with respect to the chucks or centered about the headstock and tailstock spindles. Tighten the chuck jaws and place enough counterweights on their studs to balance the shaft when it is revolved.

Place the trueing fixture on the front table at one end of the end journals. Loosen the screw (A, Fig. 13) and move the indicator shank until the plunger ball touches the journal and moves the indicator pointer approximately .050".

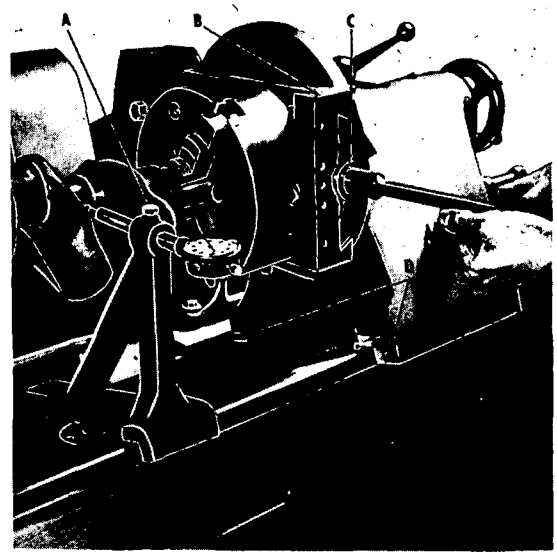


Figure 13—Adjusting Elevating Head for Stroke Run-out

Then tighten the screw. Disengage the head lock shafts and revolve the crankshaft by hand. The indicator will indicate the amount of run-out. If the indicator indicates run-out of the "stroke," the elevating screw nut (A, Fig. 3 and A, Fig. 4) nearest the indicator needs adjusting as shown in Fig. 13. Revolve the micrometer dial one-half the indicated run-out. If the indicator shows side run-out, loosen both chucks and tap the crankshaft with a soft mallet or the palm of the hand into position. Re-tighten the chucks, and move the indicator to the opposing mating journal at the opposite end. True this journal the same as instructed above. When both mating journals run true they are ready for grinding.

After these mating journals are ground, the chucks are loosened and the crankshaft is revolved to bring the next pair of mating journals into position. These journals are then trued and ground as described above.

604—TRUEING CRANKSHAFT WITHOUT MATING JOURNALS.

Some crankshafts for V-8, 4 cylinder and some 6 cylinder engines do not have mating journals. The following special instructions should be followed in trueing these crankshafts:

Place the crankshaft in the machine and set the "stroke" as described in section 603. Be sure that both the headstock and the tailstock elevating heads (B, Fig. 13) are at the same relative position when reading the micrometer dials; (C, Fig. 13). This is important to be sure that the main bearing journals are exactly parallel to the head and tailstock spindle.

Revolve the crankshaft so that one end journal is in grinding position and lock both chucks. Place the trueing fixture at this journal, release the head lock shafts and revolve the crankshaft. If the indicator shows "stroke" run-out, adjust the elevating screw nuts of BOTH heads half the amount of run-out. If side run-out is indicated loosen the chucks and revolve crankshaft as previously instructed in Section 603.

Remember that when "stroke" adjustment is made on crankshafts that do not have mating journals, both elevating heads MUST be moved exactly the same amount to maintain parallelness of the main and rod journals.

605—MACHINE SET-UP FOR GRINDING MAIN BEARING JOURNALS

Engage the head stock shafts (E, Fig. 4) and set both elevating heads at "O" (zero) after removing the counterweights and their studs. Place the crankshaft in the machine with the flywheel flange at the headstock. Lock the chuck jaws and place the trueing fixture at one of the end journals. Release the head lock shafts and revolve the crankshaft by hand while reading the indicator. Adjust for run-out by adjusting either the elevating head screw (A, Fig. 14) or cross slide screw (B, Fig. 14) or both as required. Release the chuck jaws and tighten again after the crankshaft has been trued. This will prevent the crankshaft from being in a strained condition when it is ground.

Note: Maximum rut-out of the end main bearing journals, flywheel flange and timing gear location should never exceed .002".

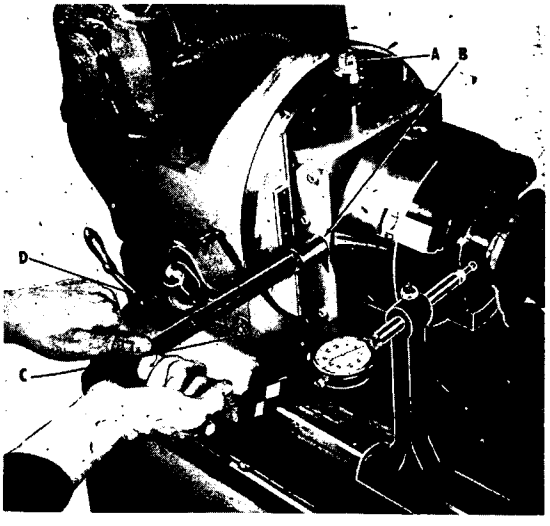


Figure 14—Set-up for Grinding Main Journals

606—USE OF STEADY REST WHEN GRINDING MAIN BEARING JOURNALS

Place the steady rest at one of the center journals (preferably the one nearest the tailstock) and grind this journal to size. Leave the steady rest at this journal and grind the other main journals.

Note: Sometimes it may be necessary to use 2 steady rests, one at each center main. Only one steady rest is furnished as standard equipment with the grinder, however, these assemblies are carried in stock at the factory for immediate shipment for those who desire them.

607—GRINDING THE CRANKSHAFT

After the crankshaft has been trued, all of the rod journals should be measured with a micrometer to determine the worst journal. If the worst journal requires .020" stock removal from its diameter to clean up, then all of the other journals should be ground .020" undersize so that all journals are alike.

Repeat the above procedure for determining the correct undersize to grind main bearing journals.

Note: After the crankshaft has been ground, it should be cleaned all over and have applied to it a good grade rust inhibitor.

700 - REPAIR AND MAINTENANCE

701—LUBRICATION

Bed and Table Ways: With table traverse handwheel, move the tables their maximum distance. This will uncover the oil wells in the bed ways. Keep these wells filled with APG 90 Lubriplate or equivalent.

These wells must be filled at least once a week. They should be thoroughly cleaned out and refilled with fresh oil at least once every two weeks to prevent grinding dust and coolant from wearing and corroding the ways.

Headstock: Check the headstock gear grease once every week by lifting the cover of the fitting at the left side of the headstock housing (*DD*, Fig. 1). Keep the grease filled to level. Use Texaco Meropa No. 3 or equivalent.

The work head spindle bearings are permanently lubricated and should require no further attention. If, however, the work head and spindle is disassembled, pack the bearing chamber one-half full with Texaco Regal Starfak No. 2 or equivalent.

Tailstock: Fill the oil cups on top of tailstock housing with Texaco Regal A (R&O) or equivalent once every week. The tailstock work head spindle bearings are permanently lubricated and should require no further attention. If, however, the work head and spindle are disassembled, pack the bearing chamber one-half full with Texaco Regal Starfak No. 2 or equivalent.

Wheel Head: The grinding wheel spindle is permanently lubricated and should require no further attention. If, however, the spindle should be disassembled, pack the bearing chambers one-half full with Texaco Regal Starfak No. 2 or equivalent.

When the slide is full forward, fill oil wells back of spindle housing with APG 90 Lubriplate. Fill at least once a week.

Add a small amount of Texaco Regal PE (R&O) or equivalent to the feed-up worm gears through the oil cup or by removing the cover once every week. Also add a small amount of this oil to the oil cup once every week.

Rapid Retraction and Table Traverse Gears: There are five oil cups at the rear of the cabinet with one oil cup at the front of the cabinet. Add Texaco Regal PE (R&O) or equivalent to these oil cups every week. Also put a small amount of this oil on the gear shaft and gears at the rear of the cabinet once every week.

Miscellaneous Lubrication: Always keep an oil can filled with Texaco Regal PE (R&O) handy for miscellaneous lubrication.

Before sliding the headstock housing or the tailstock housing to a different position on the front table, be sure to wipe the table clean and apply a small amount of oil from the oil can to the table. This is very important to prevent excessive wearing of the mating surfaces which would prevent the spindle center-lines from lining up.

Always keep all screws and moving parts clean and oiled to prevent gumming and corrosion.

One Shot Oiling: The "One Shot Oiling System" is a supplementary system for daily use. However the aforementioned lubrication procedures should be adhered to weekly.

Be ever mindful that a grinding machine is constantly subjected to a cloud of grinding dust and coolant that will, in time, wear the moving parts. A little thoughtfulness on the part of the operator concerning lubrication and cleaning will greatly increase the life of the machine.

702—ADJUSTING RAPID RETRACTION—ADJUSTING LOCK

Two adjustments are provided for the rapid retraction lock. The tension adjusting screw located at the bottom front of the wheel head base just below the hinged splash guard (K, Fig. 5) determines the amount of pressure necessary to lock the rapid retraction. This screw should be kept in a position that will require a slight amount of pressure when turning the retraction handle to lock the rapid retraction.

The stop adjusting screw at the rear (E, Fig. 2) stops the retraction lever. This screw should be in a position that will allow the retraction lever to pass a slight amount past center when the rapid retraction is locked. Be sure to hold the screws in position while locking the nuts.

703—HEADSTOCK AND TAILSTOCK SPINDLE BEARINGS

The headstock and tailstock spindles are equipped with sealed ball bearings. These bearings are adjusted with the nuts at the end of the spindles. These nuts are accessible when the work head vertical slides are removed. The headstock nut has left hand threads and the tailstock has right hand threads. These bearings should be adjusted until only a slight amount of drag is noticed when the driving heads are revolved by hand.

DO NOT adjust too tight as this will damage the bearings and impair the accuracy of the machine.

704—ELEVATING HEAD AND CROSS SLIDE RULE

The vertical slides and the cross slides have gibs that are adjustable to hold the proper tension on the dovetails. Each gib has four screws for adjustment. These gibs must always be kept as tight as possible, yet still have face movement. Never allow the gibs to have any slack.

705—REPLACING HEADSTOCK DRIVING HEAD BELTS

The headstock work head is driven by two matched "V" belts. To replace these belts, remove the sheet metal guard located back of the work head. This guard is bolted to the housing with five machine screws.

Next, remove the motor and loosen the two set screws holding the spindle. Remove the idler pulley assembly by removing the small Allen head capscrew (C, Fig. 14) and turning the adjusting screw (D, Fig. 14) counter-clockwise until the assembly is free to be removed. Then, loosen the set screw in the small pulley on the drive shaft. Pull the entire work head and spindle assembly away from the housing while also at the same time pulling the smaller pulley off the drive shaft. Replace the belts and reassemble.

Always be sure to purchase matched belts for this replacement.

706—ADJUSTING HEADSTOCK MOTOR PULLEY TENSION

This belt is adjusted by loosening the motor mounting screws and shifting the motor until the proper belt tension is reached. Tighten the motor mounting screws.

707—ADJUSTING HEADSTOCK DRIVING HEAD BELT TENSION

The headstock head is driven by two concealed vee belts located just back of the head and inside the bell section of the headstock housing. The belts are adjusted for tension with the screw (D, Fig. 14). This screw moves an idler pulley which applies the belt tension. To adjust, remove the small Allen head capscrew (C, Fig. 14) and turn the adjusting screw clockwise to apply tension or counter-clockwise to remove tension. After the adjustment has been completed, reinstall the Allen head capscrew. This capscrew keeps the adjusting from moving and relieving the belt tension. Care should be used in adjusting these belts, as excessive tension will wear the belts rapidly.

708—ADJUSTING WHEEL HEAD BELT TENSION

The grinding spindle is driven by six vee belts that are located inside the belt guard (C, Fig. 5). Tension is constantly applied to these belts by the torsion spring (B, Fig. 15). If the belts require adjustment, proceed as follows: Bring the wheel head to the forward grinding position and remove the belt guard. This guard is removed by lifting up at the back and out at the bottom and then upward. Hold the pulley idler arm in toward the spindle and slip the belts from the idler pulley. Rest the idler arm against the top of the back table and loosen the set-screw (A, Fig. 15) at the outer edge of the spring collar. Revolve the spring collar toward the rear of the machine and tighten the set-screw. Lift the idler arm up close to the spindle and reinstall the belts. Then, place the belt guard back into position.

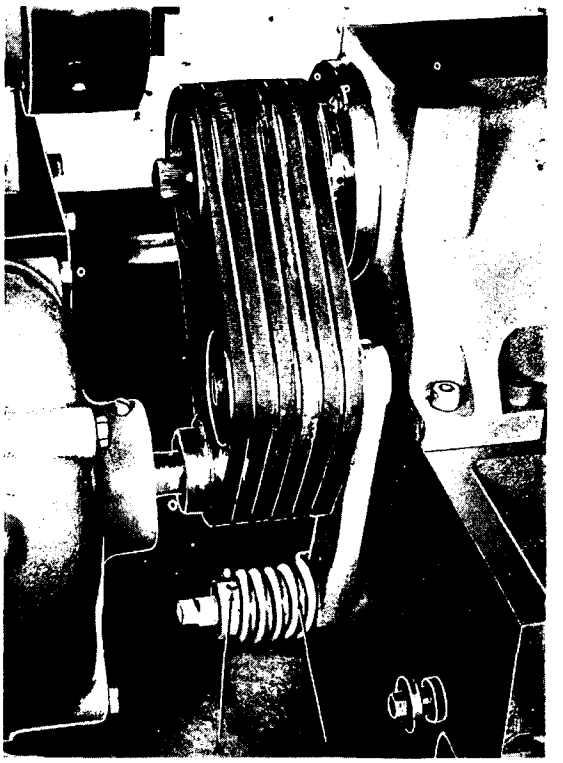


Figure 15—Adjustment for Wheelhead Belt Tension

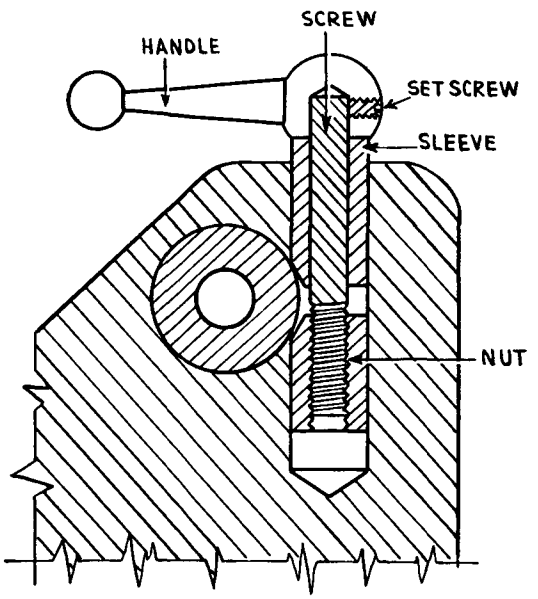


Figure 16—Tailstock Spindle Lock

709—ADJUSTING TAILSTOCK SPINDLE LOCK (Fig. 16)

The tailstock spindle lock consists of the handle, screw, sleeve and nut. When the handle is turned, the screw pulls the nut up and this action forces the sleeve down. This causes a wedging action which locks the spindle. Should the handle be out of position when the spindle is locked, it may be adjusted by loosening the set-screw on the side of the handle and placing the handle where desired and then retightening the set-screw. Be sure that the lock is tight against the spindle before adjusting.

TROUBLE	CAUSE	CORRECTION
Chatter Marks		
Regularly spaced marks.	General vibration.	Tighten motor mounting bolts. Check motor bearings and balance of motor.
	Loose spindle pulley.	Tighten pulley.
Regularly but widely spaced marks.	Bad driving belts.	Replace belts.
	Worn out idler pulley bearings.	Replace bearings.
Long, regularly spaced chatter marks that form a checkerboard pattern.	Wheel out of balance.	Balance wheel on wheel mount, repeat after truing. If trouble persists, run wheel without coolant to throw off excess water and store on side to prevent water from settling at lower edge of wheel.
	Wheel out of round.	True before and after balancing. True sides to face.
Chatter marks have same frequency with building vibration.	Building vibration.	Install mounting pads or move machine to different location in building.
Chatter marks fairly long, wide and evenly spaced at wide intervals and discolored; wheel glazed or loaded.	Wheel too hard.	Use softer grade or coarser grit wheel (also see Wheel Glazing).
Irregular chatter marks when using dead centers.	Work centers not true.	Check fit of centers and lubricate point with white lead.
Chatter marks that form checkerboard pattern.	Faulty dresser.	Replace worn-out diamond. Tighten set-screw holding diamond.
	Diamond cracked or loose	Replace or reseat diamond.
	Dresser not rigidly clamped to table.	Adjust cam clamp.
General	Dressing	Use sharp diamond rigidly held close to wheel.

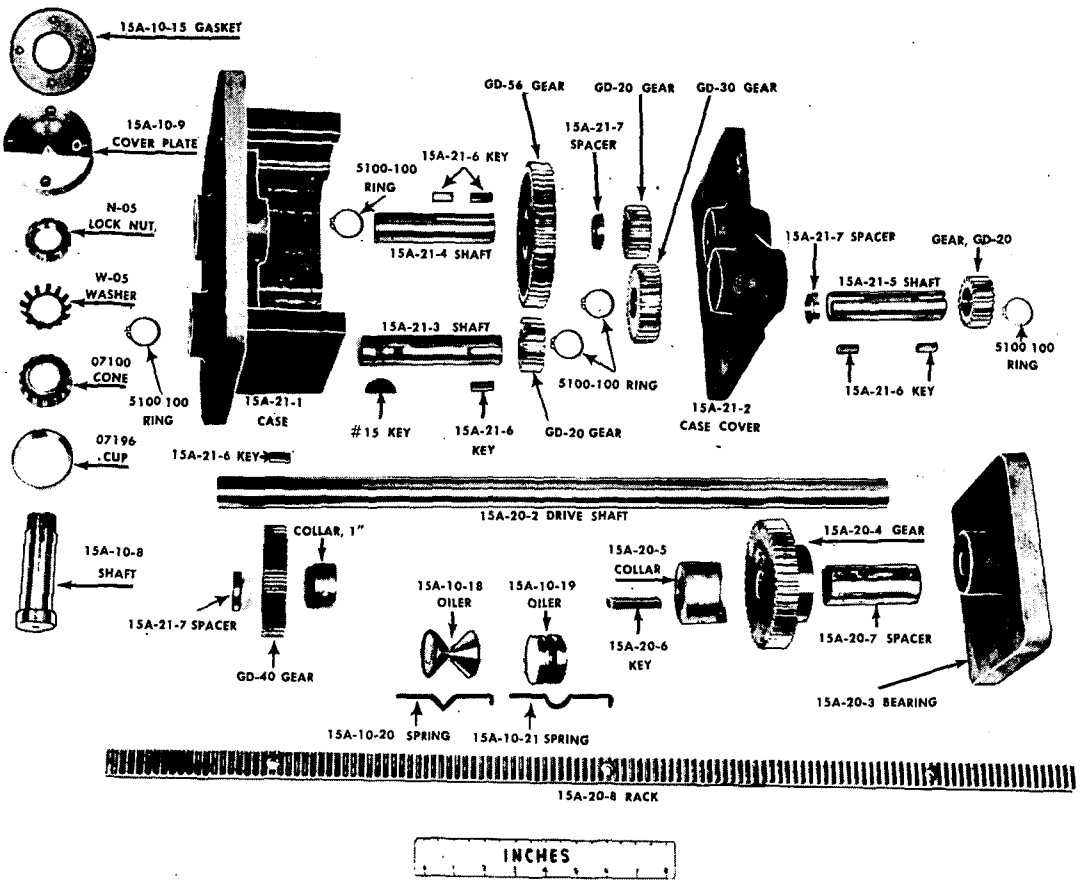
NOTE: Out-of-balance wheels can cause different patterns of chatter depending upon the amount of out-of-balance. Wheels should be balanced as accurately as possible.

TROUBLE	CAUSE	CORRECTION
Scratching of Work		
Narrow and deep regular marks.	Wheel too coarse.	Use finer grit wheel.
Wide irregular marks of varying depth.	Wheel too soft.	Use harder grade wheel.
Widely spaced spots on work.	Oil spots or glazed areas on wheel face.	Balance and true wheel. Avoid getting oil on face of wheel.
Uneven marks on work.	Bad vee belts.	Replace spindle belts. Purchase set of six matched belts.
Fine spiral or thread on work.	Faulty wheel dresser.	Replace cracked diamond; reseat diamond; use slower traverse speed; revolve diamond slightly every fifth dressing; tighten set screw on diamond. Dress with less in-feed; do not allow diamond to stop while in contact with wheel; do not start dressing on wheel face. Move diamond evenly across face of wheel; round off edges of wheel.

TROUBLE SHOOTING SUGGESTIONS - Continued

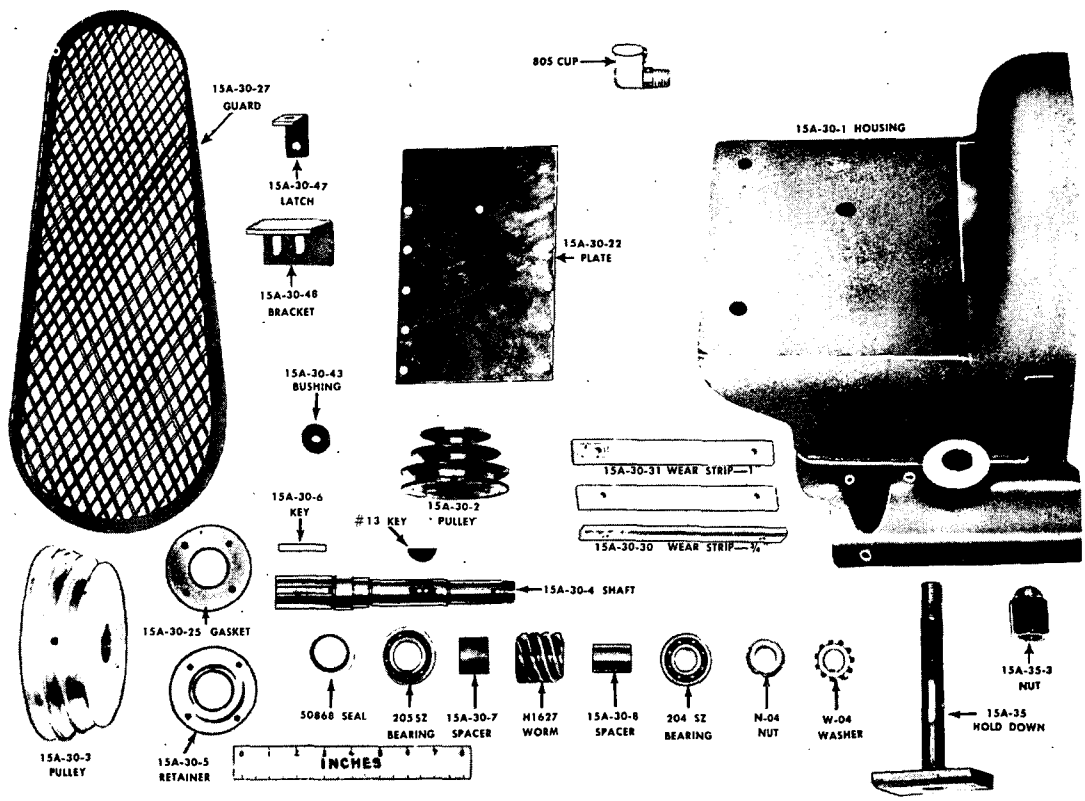
TROUBLE	CAUSE	CORRECTION
	Sagging work.	Provide additional steady rests.
Wavy traverse lines.	Ragged wheel edges.	Round off wheel edges.
Occasional deep marks.	Faulty wheel dressing.	Replace worn out diamond; revolve diamond slightly; flush wheel with coolant after dressing.
	Coarse grits or foreign matter in face of wheel.	Dress wheel.
	Bond disintegrates, grit pulls out.	Coolant too alkaline for wheel bonding material; decrease soda content or change coolant.
Irregular marks.	Loose dirt settling on machine.	Keep air and shop clean. Clean machine daily.
Irregular marks of various lengths and widths; scratches usually fish-tail.	Dirty coolant.	Change coolant; clean coolant tanks, hose and wheel guard.
Deep irregular marks.	Loose wheel flanges.	Tighten flanges; use blotters between mount and wheel.
Grit marks.	Wheel too soft or too coarse.	Change Wheel.
	Dressing too coarse.	Finer in-feed and slower traverse while dressing.
	Improper procedure.	Allow wheel to "spark-out" when finishing.
Grinding Grade of Wheel		
Lack of cut; glazing, loading, burning of work; chatter.	Wheel acts too hard.	Open up wheel grit by sharper dressing; increase in-feed wheel pressure; discard gummy coolant; use coarser grit or softer grade wheel. Increase work speed.
Wheel marks on work; short wheel life; wheel not cutting properly.	Wheel acts too soft.	Decrease work speed and in-feed wheel pressure; dress wheel with slow traverse and less cut; change coolant.
Wheel Loading		
Metal particles lodged on abrasive grains or in wheel pores.	Incorrect wheel.	Use coarser grit or more open structure to provide chip clearance; use more coolant.
	Faulty dressing.	Replace worn-out diamond.
	Faulty coolant.	Coolant too thick or heavy; change dirty coolant.
Wheel Glazing		
Shiny appearance and slick feel.	Improper wheel.	Use coarser grit or softer grade wheel or manipulate wheel to get softer grinding effect.
	Improper dressing.	Use sharp diamond; turn diamond ¼ turn every fifth dressing; use faster traverse and deeper penetration.
	Faulty operation.	Use more in-feed.

TROUBLE	CAUSE	CORRECTION
	Faulty coolant.	Use less oily coolant; use more coolant; increase soda content if water is hard; don't use soluble oils in hard water. NEVER use straight oil coolants.
Inaccurate Work		
Work out of round.	Expansion of work.	Keep temperature of work down by using more coolant and lighter cuts.
	Work out-of-balance in machine.	Correct with counterweights.
	Faulty operation.	Use less steady rest pressure.
Tapered journals.	Faulty grinding machine.	Correct worn ways and alignment of tailstock and headstock; tighten headstock and tailstock spindle bearings; replace worn-out bearings; level machine.
	Improper dressing.	Check dressing fixture for rigidity; check diamond; move point of diamond closer to fixture.
	Improper operation.	Use harder wheel.
NOTE: Machine MUST be level in all directions to insure accurate work.		
Checking of Work		
Work has check marks.	Improper grinding.	Prevent wheel from acting too hard. Don't force wheel into work; use more even flow of coolant; adjust idler to prevent belt slippage.
Burning of Work		
Work shows discoloration.	Improper wheel.	Use softer wheel; manipulate wheel to get softer effect; prevent glazing and loading; use more coolant; prevent chatter.
	Faulty operation.	Use less in-feed; eliminate belt and wheel slippage; prevent slippage of work.
Wheel Breakage		
Radial break, three or more pieces.	Improper mounting.	Use blotters between mount and wheel; correct uneven flange pressure; prevent dirt between mount and wheel.
	Faulty operation.	Prevent overheating due to lack of coolant or excessive wheel pressure on work.
	Faulty grinding wheel.	Sound wheel before mounting by tapping lightly to be sure that it was not damaged in transit or in handling.
Radial break, two pieces.	Flange too tight.	Avoid excessive strains on sides of wheel. Tighten flange as explained under Wheel Mounting.



15A—Parts Illustration No. 1

15A-10 BED ASSEMBLY	
15A-10-1	Bed
15A-10-2	Table, sub
15A-10-3	Table, top
15A-10-4	Table, back
15A-10-5	Guard, sub table water
15A-10-6	Guard, top table water
15A-10-7	Guard, back table water
15A-10-8	Shaft, table pivot
15A-10-9	Cover, plate, table pivot shaft
15A-10-10	Knob, taper adjustment
15A-10-11	Pin, taper adjustment
15A-10-12	Nut, taper adjustment
15A-10-13	Screw, taper adjustment
15A-10-14	Guard, back table way (2 required)
15A-10-15	Gasket, table pivot cover plate
15A-10-16	Guard, gear shaft splash—left
15A-10-17	Guard, gear shaft splash—right
15A-10-18	Oiler, "V" way (4 required)
15A-10-19	Oiler, flat way (4 required)
15A-10-20	Spring, "V" way oiler (4 required)
15A-10-21	Spring, flat way oiler (4 required)
15A-10-22	Door, rear
15A-10-24	Lock washer, sub table (2 required)
15A-10-25	Guard, steady rest side—6"
15A-10-26	Guard, steady rest side—10"
15A-10-27	Guard, steady rest top
15A-10-30	Guard, back table top splash

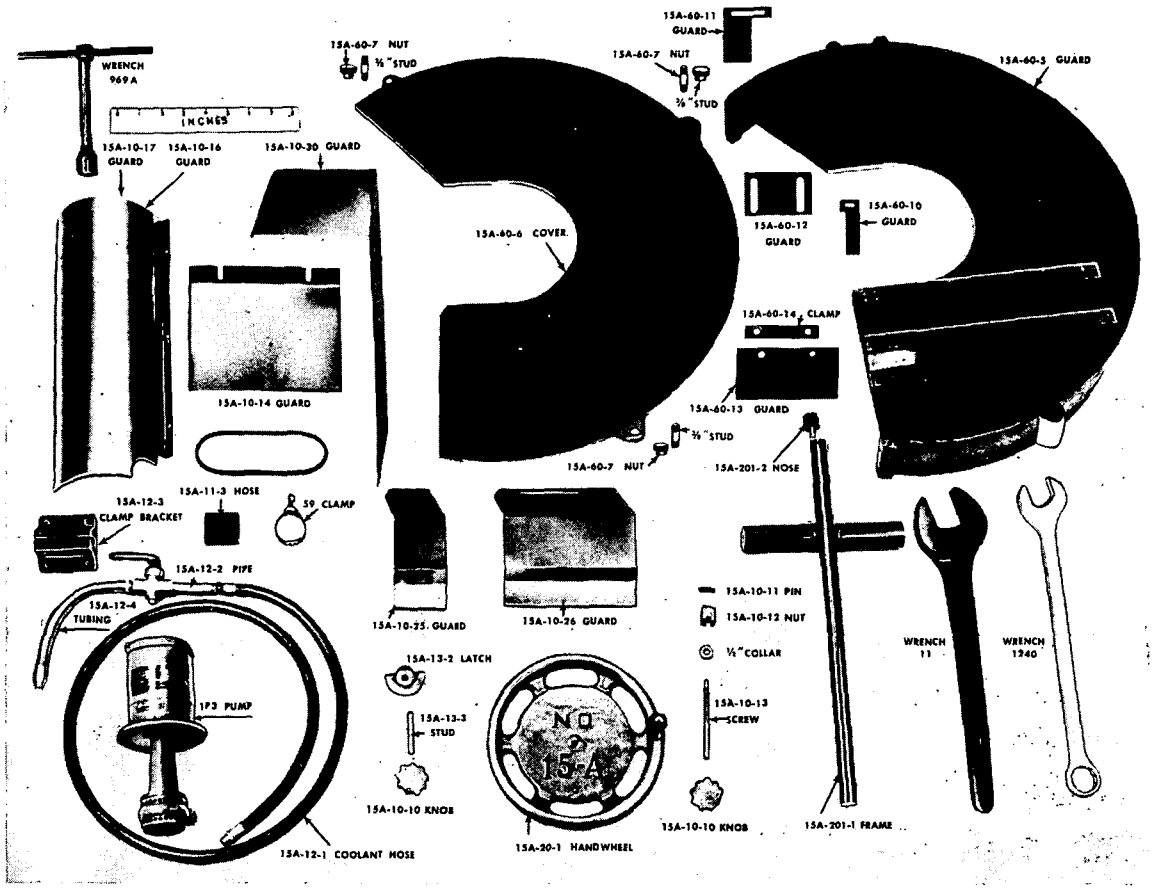


15A—Parts Illustration No. 2

½″	Collar, set
07100	Cone, Timken
07196	Cup, Timken
N-05	Lock nut, ball bearing
W-05	Lock washer, ball bearing
15A-11	Coolant pan assembly
15A-11-1	Coolant pan—left
15A-11-2	Coolant pan—right
15A-11-3	Hose, coolant pan connecting
1P3	Pump, Ruthman gusher
59	Clamp, hose (2 required)
15A-12	Coolant hose assembly
15A-12-1	Hose, Coolant
15A-12-2	Pipe, coolant
15A-12-3	Clamp bracket, coolant pipe
15A-12-4	Tubing, coolant (flexible)
½″	Water cock
15A-13	Front door assembly
15A-13-1	Door, front
15A-13-2	Latch, front door
15A-13-3	Stud, front door latch
15A-10-10	Knob, front door

15A-20 TABLE TRAVERSE GEAR ASSEMBLY

15A-20-1	Handwheel, table traverse
15A-20-2	Shaft, back table drive
15A-20-3	Bearing, back table drive shaft
15A-20-4	Gear, back table drive
15A-20-5	Collar, back table tarry drive
15A-20-6	Collar key, back table tarry drive
15A-20-7	Spacer, back table drive gear
15A-20-8	Rack, sub and back table (2 required)
15A-21-6	Key, table traverse gear
15A-21-7	Spacer, table traverse gear
GD-40	Gear, spur
	Collar, 1″ set
H-3308	Handle, Balcrank
414	Cup, oil
	Plug, 1″ expansion

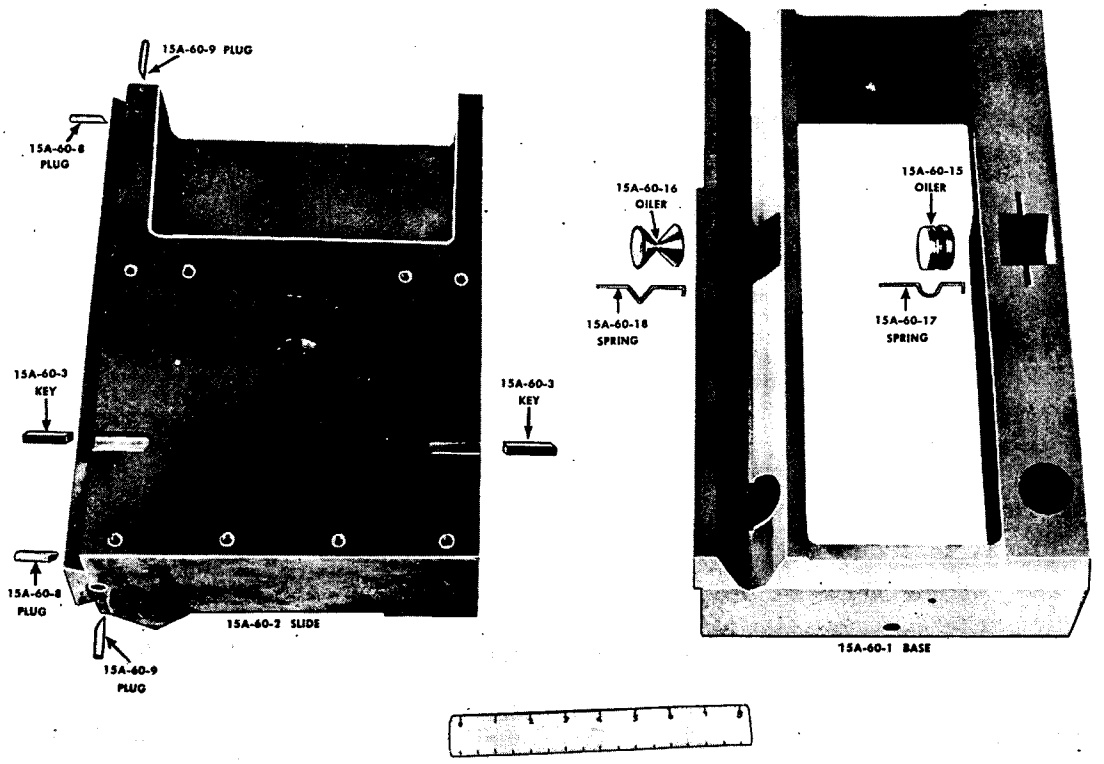


15A—Parts Illustration No. 3

15A-21	Table traverse gear case assembly
15A-21-1	Case, table traverse gear
15A-21-2	Case cover, table traverse gear
15A-21-3	Shaft, table traverse handwheel
15A-21-4	Shaft, table traverse idler
15A-21-5	Shaft, front table drive
15A-21-6	Key, table traverse gear (5 req'd.)
15A-21-7	Spacer, table traverse gear (2 required)
15A-21-8	Dust cover
5100-100	Ring, snap (6 required)
GD-20	Gear, spur (3 required)
GD-30	Gear, spur
GD-56	Gear, spur
	Pin, dowel ($\frac{5}{16}$ dia. x $1\frac{1}{4}$) (4 required)
	Key, #15 Woodruff

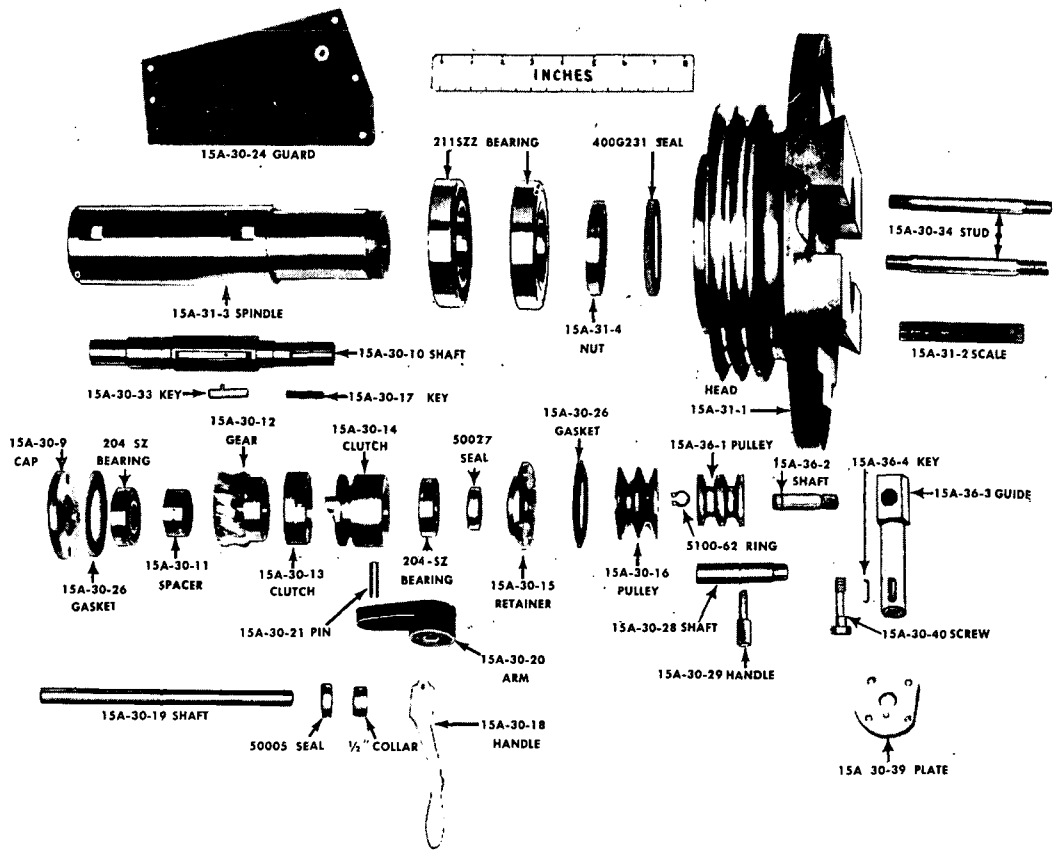
15A-30 HEADSTOCK ASSEMBLY

15A-30-1	Housing, headstock
15A-30-2	Pulley, headstock motor
15A-30-3	Pulley, headstock worm shaft
15A-30-4	Shaft, headstock worm
15A-30-5	Retainer, worm shaft oil seal
15A-30-6	Key, worm shaft pulley
15A-30-7	Spacer, worm shaft worm
15A-30-8	Spacer, worm shaft bearing
15A-30-9	Cap, worm gear shaft bearing
15A-30-10	Shaft, worm gear drive
15A-30-11	Spacer, worm gear drive shaft
15A-30-12	Gear, worm
15A-30-13	Clutch, female
15A-30-14	Clutch, male
15A-30-15	Retainer, worm gear shaft oil seal
15A-30-16	Pulley, worm gear shaft
15A-30-17	Key, worm gear shaft pulley



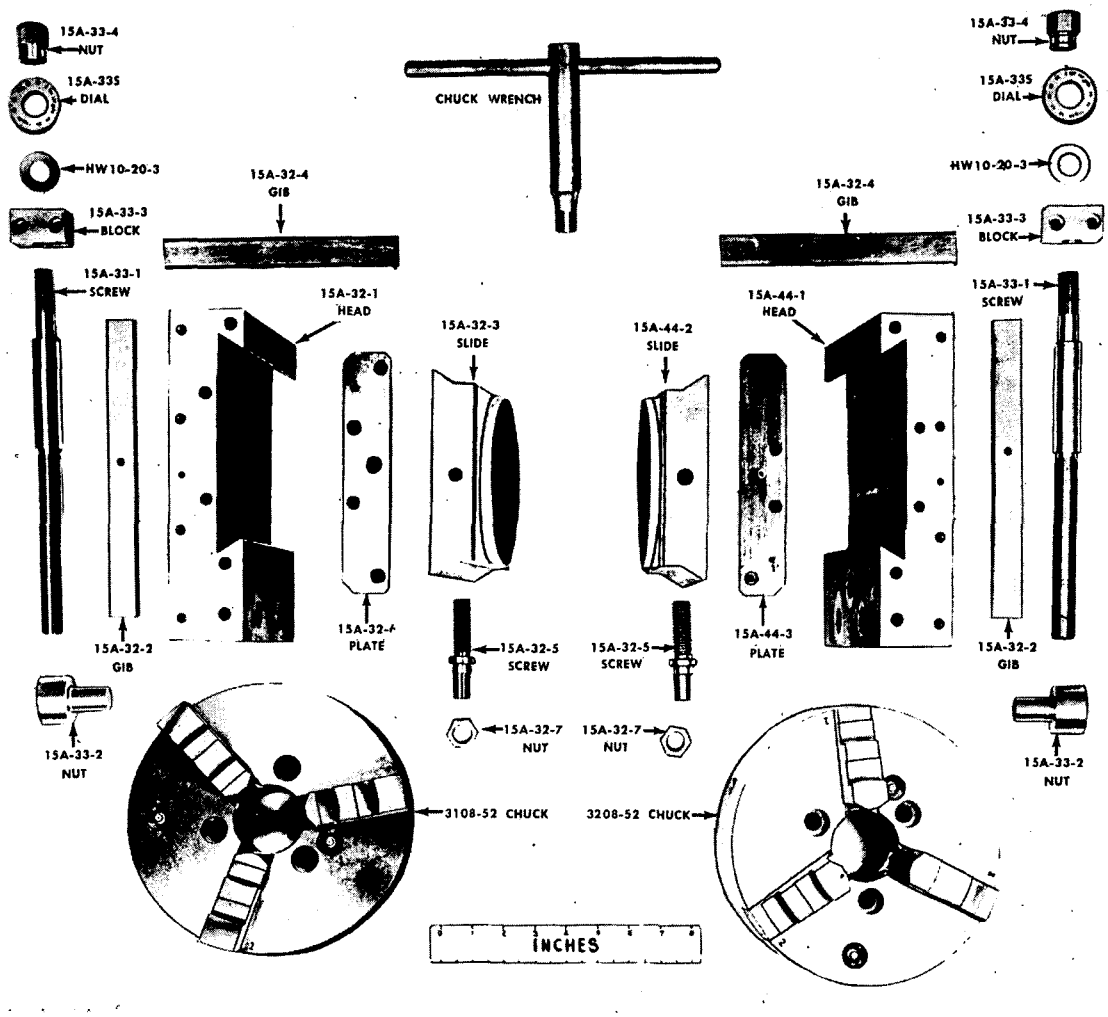
15A—Parts Illustration No. 4

15A-30-18	Handle, clutch shaft
15A-30-19	Shaft, clutch
15A-30-20	Arm, clutch
15A-30-21	Pin, clutch arm
15A-30-22	Plate, headstock oil
15A-30-23	Gasket, headstock oil plate
15A-30-24	Guard, headstock pulley splash
15A-30-25	Gasket, worm shaft oil seal retainer
15A-30-26	Gasket, worm gear shaft oil seal retainer
15A-30-27	Guard, headstock belt
15A-30-28	Shaft, head lock
15A-30-29	Handle, head lock shaft
15A-30-30	Wear strip—¾"
15A-30-31	Wear strip—1" (2 required)
15A-30-32	Shims, wear strip (.001, .002 and .005 thick)
15A-30-33	Key, male clutch
15A-30-34	Stud, counterweight (2 required)
15A-30-35	Counterweght, small (iron) (4 required)
15A-30-36	Counterweight, large 1" thick (iron)
15A-30-37	Counterweight, large 1½" thick (iron) (3 required)
15A-30-38	Counterweight, large (lead)
15A-30-39	Plate, idler screw
15A-30-40	Screw, idler adjusting
15A-30-41	Spacer, counterweight stud—1½" (4 required)
15A-30-42	Spacer, counterweight stud—2¼" (4 required)
15A-30-43	Bushing, motor mount (8 required)
15A-30-44	Guard, top table wiper
15A-30-47	Latch, belt guard
15A-30-48	Bracket, belt guard hinge
205SZ	Bearing, ball
204SZ	Bearing, ball (3 required)
N-04	Nut, ball bearing lock
W-04	Washer, ball bearing lock
	Motor, electric—½ h.p.—1750 r.p.m.
50027	Seal, oil
50868	Seal, oil
50005	Seal, oil
2"	Plug, expansion



15A—Parts Illustration No. 5

H1627	Worm
1M032	Belt, "V" (2 matched)
1M038	Belt, "V"
	Key, #13 Woodruff
½"	Collar, set
805	Cup, oil
15A-31	Headstock head assembly
15A-31-1	Head, headstock
15A-31-2	Scale, headstock throw
15A-31-3	Spindle, headstock
15A-31-4	Nut, headstock spindle bearing
211SZZ	Bearing, ball
400G231	Seal, oil
15A-32	Headstock elevating head assembly
15A-32-1	Head, headstock elevating
15A-32-2	Gib, headstock elevating head
15A-32-3	Slide, headstock cross
15A-32-4	Gib, headstock cross slide
15A-32-5	Screw, headstock cross slide
15A-32-6	Plate, cross slide screw
15A-32-7	Nut, cross slide screw
15A-33	Headstock elevating screw assembly
15A-33-1	Screw, headstock elevating
15A-33-2	Nut, headstock elevating screw
15A-33-3	Block, headstock elevating screw
15A-33-4	Nut, headstock elevating screw dial
HW10-20-3	Hardened washer
15A-33S	Headstock dial assembly
15A-33S-1	Dial, headstock
15A-33S-2	Holder, headstock dial
15A-35	Headstock hold down assembly

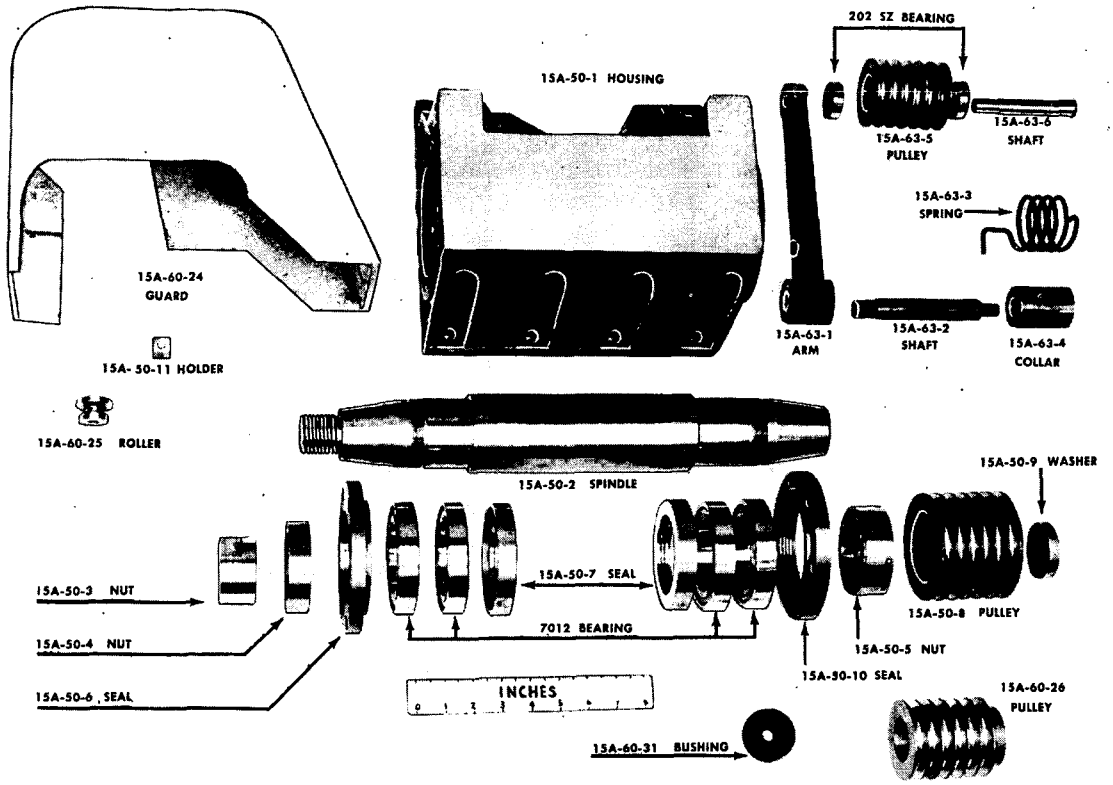


15A—Parts Illustration No. 6

15A-35-1	Foot, headstock hold down
15A-35-2	Stud, headstock hold down
15A-35-3	Nut, headstock hold down
15A-36	Headstock idler assembly
15A-36-1	Pulley, headstock idler
15A-36-2	Shaft, headstock idler pulley
15A-36-3	Guide, headstock idler
15A-36-4	Key, headstock idler
B-1012-10	Bearing, bushing type
5100-62	Ring, snap

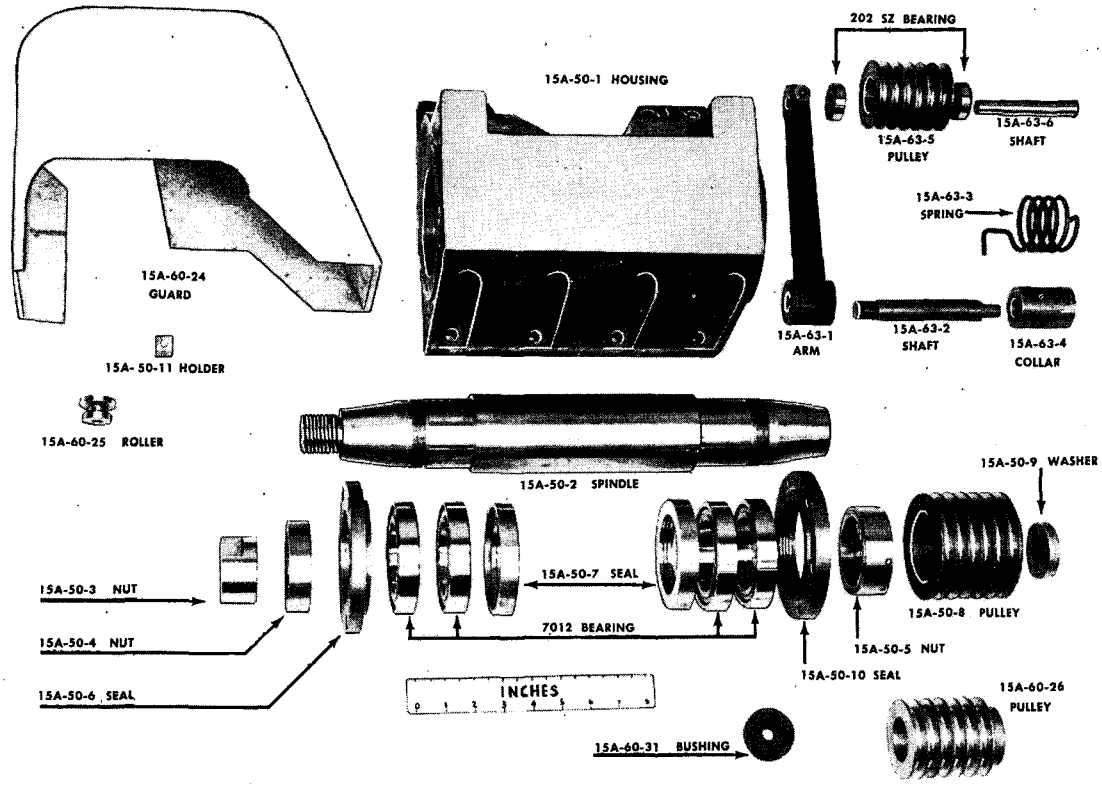
15A-40 TAILSTOCK ASSEMBLY

15A-40-1	Housing, tailstock
15A-40-2	Shaft, tailstock head lock
15A-40-3	Sleeve, spindle clamp
15A-40-4	Nut, spindle clamp
15A-40-5	Stud, spindle clamp
15A-40-6	Lever, spindle clamp
15A-40-7	Key, spindle
15A-30-30	Wear strip—¾"
15A-30-31	Wear strip—1" (2 required)
15A-30-32	Shims, wear strip (.001, .002 and .005 thick)
¾"	Collar, set (2 required)
302	Cup, oil
304	Cup, oil
15A-30-34	Stud, counterweight (2 required)
15A-30-44	Guard, top table wiper



15A—Parts Illustration No. 8

15A-50-10	Seal, grinding spindle rear
15A-50-11	Holder, belt guard
7012	Bearing, precision ball (4 required)
15A-51	Wheel mount assembly
15A-51-1	Sleeve, wheel mount
15A-51-2	Flange, wheel mount
15A-51-3	Counterweight, wheel mount (2 required)
15A-51-4	Screw, counterweight lock (2 required)
15A-60 WHEEL HEAD ASSEMBLY	
15A-60-1	Base, wheel head slide
15A-60-2	Slide, wheel head
15A-60-3	Key, wheel head slide (2 required)
15A-60-5	Guard, grinding wheel
15A-60-6	Cover, grinding wheel guard
15A-60-7	Nut, grinding wheel guard cover (3 required)
15A-60-8	Plug, grinding wheel guard lock—short (2 required)
15A-60-9	Plug, grinding wheel guard lock—long (2 required)
15A-60-10	Guard, splash—right
15A-60-11	Guard, splash—left
15A-60-12	Guard, splash—top
15A-60-13	Guard, splash—bottom
15A-60-14	Clamp, bottom splash guard
15A-60-15	Oiler, flat type
15A-60-16	Oiler, "V" type
15A-60-17	Spring, flat type oiler
15A-60-18	Spring, "V" type oiler
15A-60-19	Plate, feed up slide
15A-60-20	Rack, feed up
15A-60-22	Spring, compensating
15A-60-23	Screw, compensating spring eye (2 required)
15A-60-24	Guard, belt
15A-60-25	Roller, belt guard
15A-60-26	Pulley, motor
15A-60-27	Guard, front splash
15A-60-28	Apron, front splash guard
15A-60-29	Guard, rear splash
15A-60-31	Bushing, motor mount (4 required)

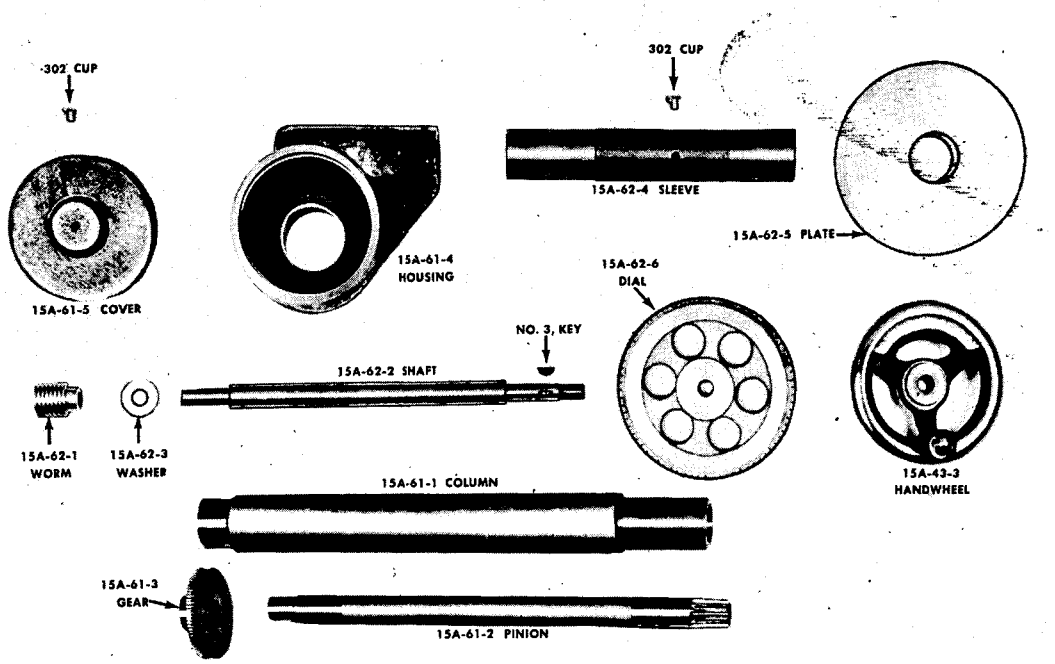


15A—Parts Illustration No. 8

15A-50-10	Seal, grinding spindle rear
15A-50-11	Holder, belt guard
7012	Bearing, precision ball (4 required)
15A-51	Wheel mount assembly
15A-51-1	Sleeve, wheel mount
15A-51-2	Flange, wheel mount
15A-51-3	Counterweight, wheel mount (2 required)
15A-51-4	Screw, counterweight lock (2 required)

15A-60 WHEEL HEAD ASSEMBLY

15A-60-1	Base, wheel head slide
15A-60-2	Slide, wheel head
15A-60-3	Key, wheel head slide (2 required)
15A-60-5	Guard, grinding wheel
15A-60-6	Cover, grinding wheel guard
15A-60-7	Nut, grinding wheel guard cover (3 required)
15A-60-8	Plug, grinding wheel guard lock—short (2 required)
15A-60-9	Plug, grinding wheel guard lock—long (2 required)
15A-60-10	Guard, splash—right
15A-60-11	Guard, splash—left
15A-60-12	Guard, splash—top
15A-60-13	Guard, splash—bottom
15A-60-14	Clamp, bottom splash guard
15A-60-15	Oiler, flat type
15A-60-16	Oiler, "V" type
15A-60-17	Spring, flat type oiler
15A-60-18	Spring, "V" type oiler
15A-60-19	Plate, feed up slide
15A-60-20	Rack, feed up
15A-60-22	Spring, compensating
15A-60-23	Screw, compensating spring eye (2 required)
15A-60-24	Guard, belt
15A-60-25	Roller, belt guard
15A-60-26	Pulley, motor
15A-60-27	Guard, front splash
15A-60-28	Apron, front splash guard
15A-60-29	Guard, rear splash
15A-60-31	Bushing, motor mount (4 required)

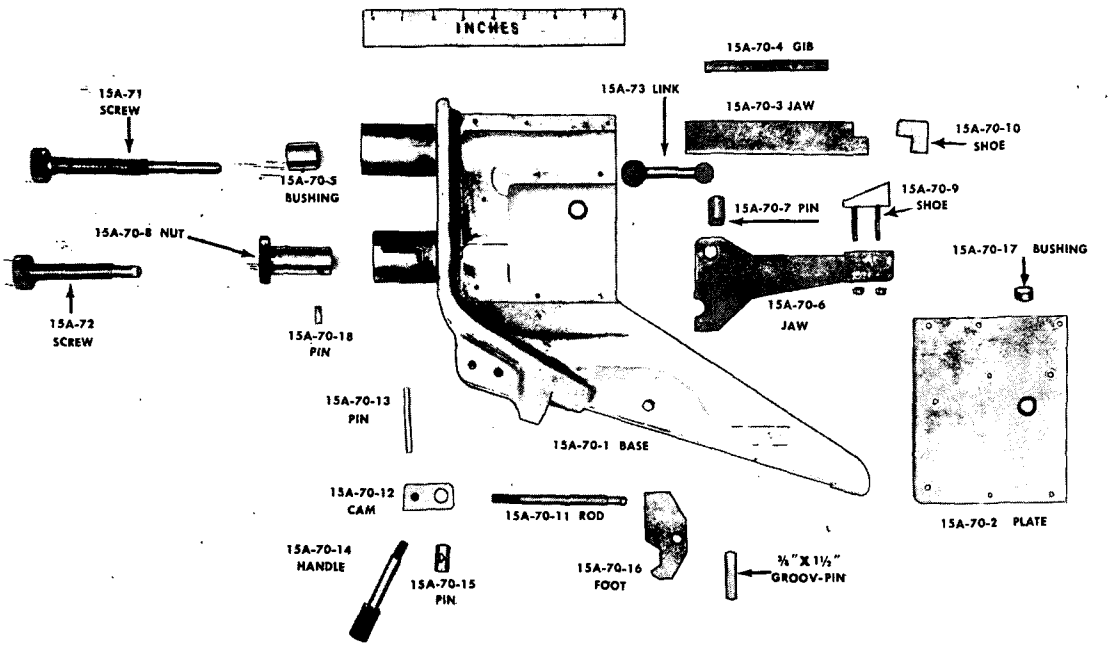


15A—Parts Illustration No. 9

15A-60-32	Spring, front splash guard
15A-30-43	Bushing, motor mount (4 required)
0M026	Belt, "V" (6 matched)
	Motor, electric, 3 h.p., 1750 rpm.
	⅜" x 1½" stud (3 required)
304	Cup, oil
15A-61	Feed up column assembly
15A-61-1	Column, feed up
15A-61-2	Pinion, feed up
15A-61-3	Gear, feed up worm
15A-61-4	Housing, worm gear
15A-61-5	Cover, worm gear housing
A-1324	Bearing, bushing type (2 required)
302	Cup, oil
15A-62	Worm shaft sleeve assembly
15A-62-1	Worm, feed up
15A-62-2	Shaft, feed up worm
15A-62-3	Washer, worm shaft thrust
15A-62-4	Sleeve, worm shaft
15A-62-5	Plate, pointer
15A-62-6	Dial
15A-43-3	Handwheel
	Key, #3 Woodruff
302	Cup, oil (2 required)
B-1220-8	Bearing, bushing type
B-1220-12	Bearing, bushing type
15A-63	Idler arm assembly
15A-63-1	Arm, idler
15A-63-2	Shaft, idler arm
15A-63-3	Spring, idler arm
15A-63-4	Collar, spring tightener
15A-63-5	Pulley, idler
15A-63-6	Shaft, idler pulley
202SZ	Bearing, ball (2 required)

15A-70 STEADY REST ASSEMBLY

15A-70-1	Base, steady rest
15A-70-2	Plate, steady rest cover
15A-70-3	Jaw, steady rest upper
15A-70-4	Gib, steady rest upper jaw
15A-70-5	Bushing, steady rest threaded
15A-70-6	Jaw, steady rest lower
15A-70-7	Pin, lower jaw pivot



15A—Parts Illustration No. 10

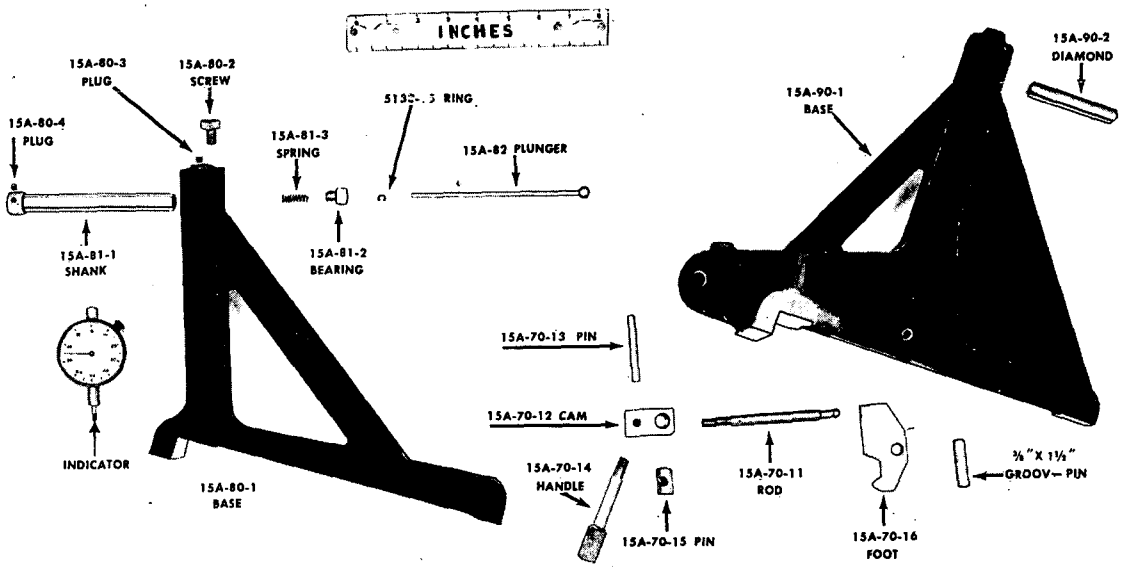
15A-70-8	Nut, lower jaw rapid release
15A-70-9	Shoe, lower jaw
15A-70-10	Shoe, upper jaw
15A-70-11	Rod, cam
15A-70-12	Cam, lock
15A-70-13	Pin, cam
15A-70-14	Handle, cam
15A-70-15	Pin, cam rod
15A-70-16	Foot, clamp
15A-70-17	Bushing, lower jaw (2 required)
15A-70-18	Pin, rapid release nut
⅜" x 1½"	Groov-Pin
15A-71	Upper jaw screw assembly
15A-71-1	Screw, upper jaw
15A-71-2	Knob, steady rest screw
15A-72	Lower jaw screw assembly
15A-73	Link, lower jaw

15A-80 TRUEING INDICATOR ASSEMBLY

15A-80-1	Base, trueing indicator
15A-80-2	Screw, thumb
15A-80-3	Plug, thumb screw
15A-80-4	Plug, shank screw
15A-81	Trueing indicator shank assembly
15A-81-1	Shank, trueing indicator
15A-81-2	Bearing, plunger front
15A-81-3	Spring, plunger
B-35-3	Bearing, bushing type
5133-15	Ring, snap
25C	Indicator
15A-82	Trueing indicator plunger assembly
15A-82-1	Plunger, trueing indicator
15A-82-2	Ball, trueing indicator plunger

15A-90 WHEEL DRESSER ASSEMBLY

15A-90-1	Base, wheel dresser
15A-90-2	Diamond
15A-70-11	Rod, cam
15A-70-12	Cam, lock
15A-70-13	Pin, cam
15A-70-14	Handle, cam
15A-70-15	Pin, cam rod
15A-70-16	Foot, clamp
⅜" x 1½"	Groov-Pin



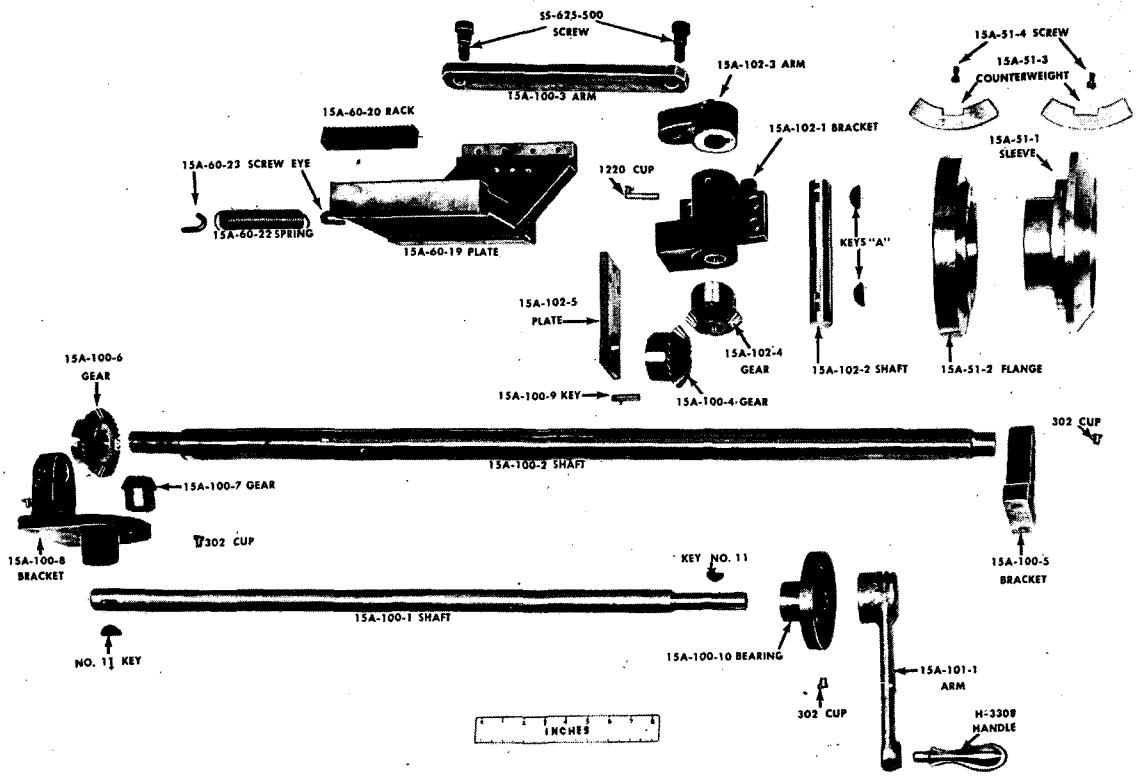
15A—Parts Illustration No. 11

15A-100 RAPID RETRACTION ASSEMBLY

15A100-1	Shaft, handle
15A-100-2	Shaft, sliding gear
15A-100-3	Arm, connecting
15A-100-4	Gear, sliding
15A-100-5	Bracket, gear shaft support
15A-100-6	Gear, gear shaft stationary
15A-100-7	Gear, handle shaft
15A-100-8	Bearing & bracket, handle shaft
15A-100-9	Key, sliding gear
15A-100-10	Bearing, handle shaft
SS-625-500	Screw, shoulder (2 required)
	Key, #11 Woodruff (3 required)
302	Cup, oil (4 required)
15A-101	Rapid retraction lever assembly
15A-101-1	Arm, rapid retraction handle
H-3308	Handle, Balcrank
15A-102	Retraction table bracket assembly
15A-102-1	Bracket, retraction table
15A-102-2	Shaft, retraction table bracket
15A-102-3	Arm, retraction
15A-102-4	Gear, table bracket shaft
15A-102-5	Plate, sliding gear back
	Key, "A" Woodruff (2 required)
1220	Cup, oil

ELECTRICAL 15A-190

15A-190-1	Electric control compartment
15A-190-2	Electric control compartment
15A-190-3	Captive screw (2 required)
15A-190-4	#8-32 special nut (4 required)
15A-190-5	#8-32 special nut (3 required)
15A-190-6	Grinding motor grounding strap
15A-190-7	Headstock motor grounding strap
15A-190-8	Conduit, ½" x 27" (2 required)
15A-190-9	Conduit, ¾" x 43"
15A-190-10	Conduit, flexible—½" x 52"
15A-190-11	Conduit, flexible—⅜" x 80"
15A-190-12	Wiring diagram
	#104 BEPCO terminal block
	9586 H 1760 magnetic starter C-H
	H1369B heater coil (3HP)
	10250 H. 56 push button station C-H



15A—Parts Illustration No. 12

9115 H 89 manual starter C-H
10172 H 2 overload relay
(2 required) C-H
H148 heater coil (½ HP)
H1468A heater coil (1/10 HP)

#72171 junction box (¾ outlet)
#72-C-1 junction box cover
#802 Connector (2 required)
#240 connector
#241 connector (2 required)
#8221 connector (2 required)
#266 90° connector
#123 conduit bushing (2 required)
#122 conduit bushing (9 required)
R2 reducing washer
R3 reducing washer
½" 45° elbow
½" close nipple

15A-200 EXTRA EQUIPMENT

15A-200-1	Balancing arbor
15A-201	Wheel side dresser assembly
15A-201-1	Frame, side dresser
15A-201-2	Nose, side dresser
3108-52	Chuck, Skinner
3208-52	Chuck, Skinner
25 lb.	Lubricant, Economy grinding
969A	Wrench, ⅞ "T" handle
11	Wrench, $1\frac{3}{16}$ open end
No. 00	Wrench, $\frac{5}{16}$ open end
1240	Wrench, 1¼ open end
	Gauge, Arnold (with 3" to 5" caliper)
	15A Grinding wheel 22" (specify width, grit and grade)

APPENDIX

BASIC ISSUE ITEMS LIST

Section I. INTRODUCTION

1. General

This appendix is a list of basic issue items. It is composed of those items which make up the major end item of equipment and the operator's tools and equipment that are issued with the equipment and are required for storage.

2. Requisition Notes

a. Repair Part Identified by Federal Stock Number.

(1) If the exact item requisitioned is not furnished, or if other action is necessary, the exact nature of the action taken by the commodity command will be indicated by standard symbols on prescribed forms.

(2) When requisitioning an item, the requesting agency will order the *listed* item. However, the commodity command will take necessary action to issue the exhaust stock item until stock is exhausted, whether it be an individual item, kit, set, or assembly.

(3) Requisition for replacement of items that are the responsibility of the commodity commands will be submitted to the commodity command indicated in column 1a, Materiel Code Number.

b. Part to Which FSN Has Not Been Assigned. When requisitioning a C source (local procurement) item identified only by a manufacturer's part number, it is mandatory that the following information be furnished the supply officer:

(1) Manufacturer's code number (5 digit no. preceding the colon in the descriptive col).

(2) Manufacturer's part number (the number, and sometimes letters, following the colon, (1) above). Dashes, commas, or other marks must be included exactly as listed.

(3) Nomenclature exactly as listed herein, including dimensions if necessary.

(4) Name of manufacturer of end item (from cover of TM or manufacturer's nameplate).

(5) Federal stock number of end item (from TM).

(6) Manufacturer's model number (from TM or name/data plate, preferably name/data plate).

(7) Manufacturer's serial number (from name/data plate).

(8) Any other information such as type, frame number, and electrical characteristics, if applicable.

(9) If DD Form 1348 is used, fill in all blocks except 4, 5, 6, and Remarks field, in accordance with AR 725–50. Complete form as follows:

(*a*) In blocks 4, 5, and 6, list manufacturer's code, and manufacturer's part number (as listed in description column).

(*b*) In Remarks field, list noun name (repair part), end item application (FSN of end item), manufacturer, model number (end item), serial number (end item), and any other pertinent information such as frame number, type, etc.

3. Explanation of Columns

a. Source, Maintenance, and Recoverability Code (col 1).

(1) *Material numerical codes* (col 1*a*). This column indicates the responsible

commodity command for the materiel. The commodity commands responsible for supply of items in this list are—

Code	Explanation
9	Ordnance materiel
10	Quartermaster materiel
5	Engineer materiel

(2) *Source* (col 1*b*). This column indicates the selection status and source for the listed item. Source code used in this list is—

Code	Explanation
C	Obtain through local procurement. If not obtainable from local procurement, requisition through normal supply channels with a supporting statement of nonavailability from local procurement.

(3) *Maintenance level* (col 1*c*). This column indicates the category of maintenance authorized to install the listed item. Maintenance level code used in this list is—

Code	Explanation
O/C	Operator or crew maintenance.

(4) *Recoverability* (col 1*d*). This column indicates whether unserviceable items should be returned for recovery or salvage. If no code is indicated, the item will be considered expendable. Recoverability code used in this list is—

Code	Explanation
R	Items which are economically repairable at direct and general support maintenance activities and are normally furnished by supply on an exchange basis.

b. Federal Stock Number (col 2). This column indicates the Federal stock number which has been assigned by the Cataloging Division, Defense Logistics Services Center.

c. Description (col 3). This column indicates the Federal item name (shown in capital letters) and any additional description required for supply operations. The manufacturer's code and part number are also included for reference—

Code	Explanation
10646	Carborundum Co.
21938	Federal Products Corp.
55130	Skinner Chuck Co.
83658	Storm Vulcan, Inc.

d. Unit of Issue (col 4). This column indicates the quantity to be requisitioned.

e. Quantity Authorized (col 5). This column indicates the quantity of the listed item authorized for stockage to constitute the prescribed load.

f. Illustration (col 6). This column indicates the figure number of the illustration that depicts the listed item. When more than one item appears on an illustration, the item number is also indicated.

4. Abbreviations

Abbreviations	Type materiel
adj	adjustable
al-oxide	aluminum oxide
assy	assembly(ies)
brg	bearing(s)
bx	box(es)
deg	degree(s)
exter	external
gr	grade, grain
grad	graduation
hd	head
hdl	handle(d)(s)
hyd	hydraulic
int	internal
mtg	mounting
o/a	overall
pt	point(s)
S	steel
std	standard
stght	straight
w	wide
w/	with

5. Suggestions and Recommendations

The direct reporting by the individual user, of errors, omissions, and recommendations for improving this manual, is authorized and encouraged. DA Form 2028 (Recommended Changes to DA Publications) will be used for reporting these improvements. This form will be completed in triplicate using pencil, pen, or typewriter. The original and one copy will be forwarded direct to Commanding General, Headquarters, U. S. Army Weapons Command, ATTN: AMSWE–SMM–P, Rock Island Arsenal, Rock Island, Ill. 61202. One information copy will be provided to the individual's immediate supervisor (e.g., officer, noncommissioned officer, supervisor, etc.).

Section II. BASIC ISSUE ITEMS

(1) Source Maintenance, and Recoverability Code				(2)	(3)	(4)	(5)	(6) Illustration	
(a) Material Code	(b) Source	(c) Maintenance Level	(d) Recoverability	Federal Stock No.	Description	Unit of issue	Quantity Authorized	(a) Figure No.	(b) Item No.
					MAJOR COMBINATION				
					The following item is to be requisitioned for initial issue only.				
9			R	4910-540-6103	GRINDING MACHINE, CRANKSHAFT: (83658:15A)	ea		1	
					COMPONENTS OF MAJOR COMBINATION				
					None Authorized				
					REPAIR PARTS				
					None Authorized				
					TOOLS AND EQUIPMENT FOR GRINDING MACHINE, CRANKSHAFT: (83658:15A)				
9	C	O/C		3460-373-1059	ARBOR, GRINDING WHEEL: balancing (83658:15A-200-1).	ea	1		
9	C	O/C			BLUNT CENTER: (83658:146-2D)	ea	1		
9	C	O/C			BLUNT CENTER (83658:146-2F)	ea	1		
9	C	O/C			CENTERING FIXTURE ASSEMBLY (83658:15M)	ea	1		
9	C	O/C		3460-373-1153	CHUCK, UNIVERSAL JAW: S body, 8 in. dia., 3 jaw, nonreversible, ext, 2 in. center hole 4.750 in. deep mtg recess, w/wrench (55130:3108-52).	ea	1	15A, No. 6.	
9	C	O/C		3460-373-1154	CHUCK, UNIVERSAL JAW: S body, 8 in. dia, 3 jaw nonreversible, int, 2 in. center hole, 4.750 in. deep mtg recess, w/wrench (55130:3208-52).	ea	1	15A, No. 6.	
9	C	O/C			COUNTERWEIGHT, IRON: large, 1 in. thk (83658:15A-30-36).	ea	1	3	
9	C	O/C		4910-373-1204	COUNTERWEIGHT, IRON: large 1½ in. thk (83658:15A-30-37).	ea	2	3	
9	C	O/C		4910-373-1206	COUNTERWEIGHT, IRON: small (83658:15A-30-35)	ea	5	3	
9	C	O/C		4910-373-1205	COUNTERWEIGHT, LEAD: large (83658:15A-30-38)	ea	5	3	
9	C	O/C			DRIVER DOG ASSEMBLY: long (83658:15A-113M1) (used w/indicator assembly (5210-373-1386)).	ea	1		
9	C	O/C			DRIVER DOG ASSEMBLY: short (83658:15A-112M1) (used w/indicator assembly (5210-373-1386)).	ea	1		
9	C	O/C			EL GRINDING COMPOUND: (83658:1420-6A)	lb	5		
9	C	O/C		4910-373-1263	FIXTURE, DRESSING, ABRASIVE: grinding wheel face, assy (83658:15A-90).	ea	1	11	
9	C	O/C		4910-373-1264	FIXTURE, DRESSING, ABRASIVE: grinding wheel side, assy (83658:15A-201).	ea	1	12	
9	C	O/C			FLOOR LEVELING PADS: (83658:1420-3)	ea	4		
10	C	O/C		5210-473-6230	Gage, Sizing Crankshaft: Continuous measurement, w/indicator graduated in 0.0005 in., 2 calipers, 1 to 3 and 3 to 5 in. range, hyd mtg, w/support arms (21938:Arnold Model LR).	ea	11		
9	C	O/C		3415-373-1326	GUARD, BACK TABLE WAY: (83658-15A-10-14)	ea	2		
9	C	O/C			GUARD, WHEEL, GRINDER-GRINDING MACHINE: side, steady rest, 6 in. (83658:15A-10-25).	ea	2		
9	C	O/C		3415-373-1333	GUARD, WHEEL, GRINDER-GRINDING MACHINE: side, steady rest, 10 in. (83658:15A-10-26).	ea	1		

(1) Source Maintenance, and Recoverability Code				(2)	(3)	(4)	(5)	(6) Illustration	
(a) Material Code	(b) Source	(c) Maintenance Level	(d) Recoverability	Federal Stock No.	Description	Unit of issue	Quantity Authorized	(a) Figure No.	(b) Item No.
					TOOLS AND EQUIPMENT FOR—Continued				
					GRINDING MACHINE, CRANKSHAFT—Continued				
9	C	O/C	____	3415-373-1336	GUARD, WHEEL, GRINDER-GUIDING MACHINE: splash, rear, wheel hd (83658:15A-60-29).	ea	1		
9	C	O/C	____	3415-373-1337	GUARD, WHEEL, GRINDER-GRINDING MACHINE: top, splash, back table (83658:15A-10-30).	ea	1		
9	C	O/C	____	3415-373-1338	GUARD, WHEEL, GRINDER-GRINDING MACHINE: top, steady rest (83658:15A-10-27).	ea	1		
10	C	O/C	____	5210-373-1386	INDICATOR ASSEMBLY: trueing, crankshaft journal (83658:15A-80).	ea	1	13	
10	C	O/C	____	5210-449-7015	INDICATOR, DIAL: 0.075 in. range, 0.0005 in. dial grad, 0-15-0 dial markings, 2¼ in. dia o/a adj dial setting, contact pt on rim, w/base upright post and clamp attachment, w/hdl plunger contact pt action, w/jeweled brg (21938:35-B-40).	ea	1	15A, No. 11	
5	C	O/C	____	5120-242-7410	KEY, SOCKET HEAD SCREW: hex type, L-type hdl, 3/32 in. w across flats, 2 in. lg arm.	ea	1		
5	C	O/C	____	5120-240-5292	KEY, SOCKET HEAD SCREW: hex type, L-type hdl, ⅛ in. w across flats, 2¼ in. lg arm.	ea	1		
5	C	O/C	____	5120-198-5292	KEY, SOCKET HEAD SCREW: hex type, L-type hdl, 5/32 in. w across flats, 2½ in. lg arm.	ea	1		
5	C	O/C	____	5120-240-5300	KEY, SOCKET HEAD SCREW: hex type, L-type hdl, 3/16 in. w across flats, 2¾ in. lg arm.	ea	1		
5	C	O/C	____	5120-242-7411	KEY, SOCKET HEAD SCREW: hex type, L-type hdl, 7/32 in. w across flats, 3 in. arm.	ea	1		
5	C	O/C	____	5120-198-5409	KEY, SOCKET HEAD SCREW: hex type, L-type hdl, 5/16 in. w across flats, 2¾ in. lg arm.	ea	1		
5	C	O/C	____	5120-240-5268	KEY, SOCKET HEAD SCREW: hex type, L-type hdl, 9/16 in. w across flats, 5¾ in. lg arm.	ea	1		
9	C	O/C	____	4910-373-1396	MOUNT, SLEEVE TYPE, GRINDING WHEEL: assy (83658:15A-51).	ea	2		
9	C	O/C	____	----------	MOUNTING PLATE: (83658:1420-4) ----------	ea	4		
9	C	O/C	____	3460-373-1239	NIB, DIAMOND, WHEEL DRESSING: 1¼ carat (83658:15A-90-2).	ea	1	15A, No. 11	
9	C	O/C	____	----------	POINTER CENTER: (83658:147-20) ----------	ea	1		
9	C	O/C	____	4910-373-1484	REST, STEADY, ASSEMBLY: (83658:15A-70) ------	ea	1	9	
9	C	O/C	____	4910-373-1543	SHOE, LOWER JAW, STEADY REST: (83658:15A-70-9) (see note 1).	ea	10	15A, No. 10.	
9	C	O/C	____	4910-373-1544	SHOE, UPPER JAW, STEAD REST: (83658:15A-70-10) (see note 1).	ea	10	15A, No. 10.	
9	C	O/C	____	4910-373-1559	SPACER, COUNTERWEIGHT STUD: 1½ in. (83658:15A-30-41) (see note 1).	ea	4		
9	C	O/C	____	4910-373-1560	SPACER: COUNTERWEIGHT STUD: 2¼ in. (83658:15A-30-42). (see note 1)	ea	4		
9	C	O/C	____	----------	STUD, COUNTERWEIGHT: (83658:15A-30-34) ------	ea	4	15A, No. 5.	
9	C	O/C	____	----------	STUD NUT, COUNTERWEIGHT: (83658:15A-30-74)	ea	4	3	
9	C	O/C	____	----------	STUD NUT, COUNTERWEIGHT: (83658:15A-30-75)	ea	4	3	

(1) Source Maintenance, and Recoverability Code				(2)	(3)	(4)	(5)	(6) Illustration	
(a) Material Code	(b) Source	(c) Maintenance Level	(d) Recoverability	Federal Stock No.	Description	Unit of issue	Quantity Authorized	(a) Figure No.	(b) Item No.
					TOOLS AND EQUIPMENT FOR—Continued				
					GRINDING MACHINE, CRANKSHAFT—Continued				
9	C	O/C			STUD NUT, COUNTERWEIGHT: (83658:15A–30–76)	ea	4	3	
9	C	O/C			V-WAY BACK GUARD: (83658:15A–10–45)	ea	2		
9	C	O/C			WHEEL, ABRASIVE: std wheel, stght, al-oxide, 545 gr size, med gr spacing No. 5, vitrified bond, gr L, 24 in. dia, 1 in. thk, 5 in. arbor hole dia (10646:A545–L5–VG).	ea	1		
9	C	O/C			WHEEL, ABRASIVE: std wheel, stght, al-oxide, 545 gr size, med gr spacing No. 5, vitrified bond, gr L, 24 in. dia, 1½ in. thk, 5 in. arbor hole dia (10646:A545–L5–VG).	ea	1		
5	C	O/C		5120–228–9517	WRENCH, BOX AND OPEN END, COMBINATION: offset type, 12 pt bx end, 15 deg angle of open end, 1¼ in. opng, 16 in. lg o/a.	ea	1	15A, No. 3.	
5	C	O/C		5120–287–5192	WRENCH, OPEN END, FIXED: sgle-hd type, 15 deg angle, 5/16 in. opng, ¼ in. thk hd, 4 in. lg o/a.	ea	1		
5	C	O/C		5120–277–1242	WRENCH, OPEN END, FIXED: sgle-hd type, 15 deg angle, 1 13/16 in. opng, 15/16 in. thk hd, 16⅜ in. lg o/a.	ea	1	15A, No. 3.	
5	C	O/C		5120–293–2231	WRENCH, SOCKET: sgle socket, T-type, hex socket, fixed hdl, ⅞ in. socket, 7¼ in. lg o/a.	ea	1	15A, No. 3.	
9	C	O/C			Y-DRIVE ASSEMBLY: left (83658:15A–111L) (used in lieu of chucks when grinding crankshafts on centers).	ea	1		
9	C	O/C			Y-DRIVER ASSEMBLY: right (83658:15A111R) (used in lieu of chucks when grinding crankshafts on centers).	ea	1		
9	C	O/C			Y-DRIVER BAR: (83658:15A–111–7A) (used w/Y-DRIVER ASSEMBLIES (83658:15A–1112 and 83658:15A–111R).	ea	1		
					Note 1. Not supplied on certain contracts; however, quantities indicated should be on hand or on order at all times.				