

SER # 5619

OPERATORS MANUAL

AND

PARTS CATALOG

No. 18

BLANCHARD SURFACE GRINDER



THE BLANCHARD MACHINE CO.
CAMBRIDGE, MASS., U. S. A.

BUDEL MACHINERY CO., INC.
C. S. BRIGGS DIVISION
SYRACUSE, N. Y.

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OPERATORS HANDBOOK AND MAINTENANCE MANUAL # 18

BLANCHARD VERTICAL SURFACE GRINDER

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THE BLANCHARD MACHINE COMPANY

64 STATE STREET

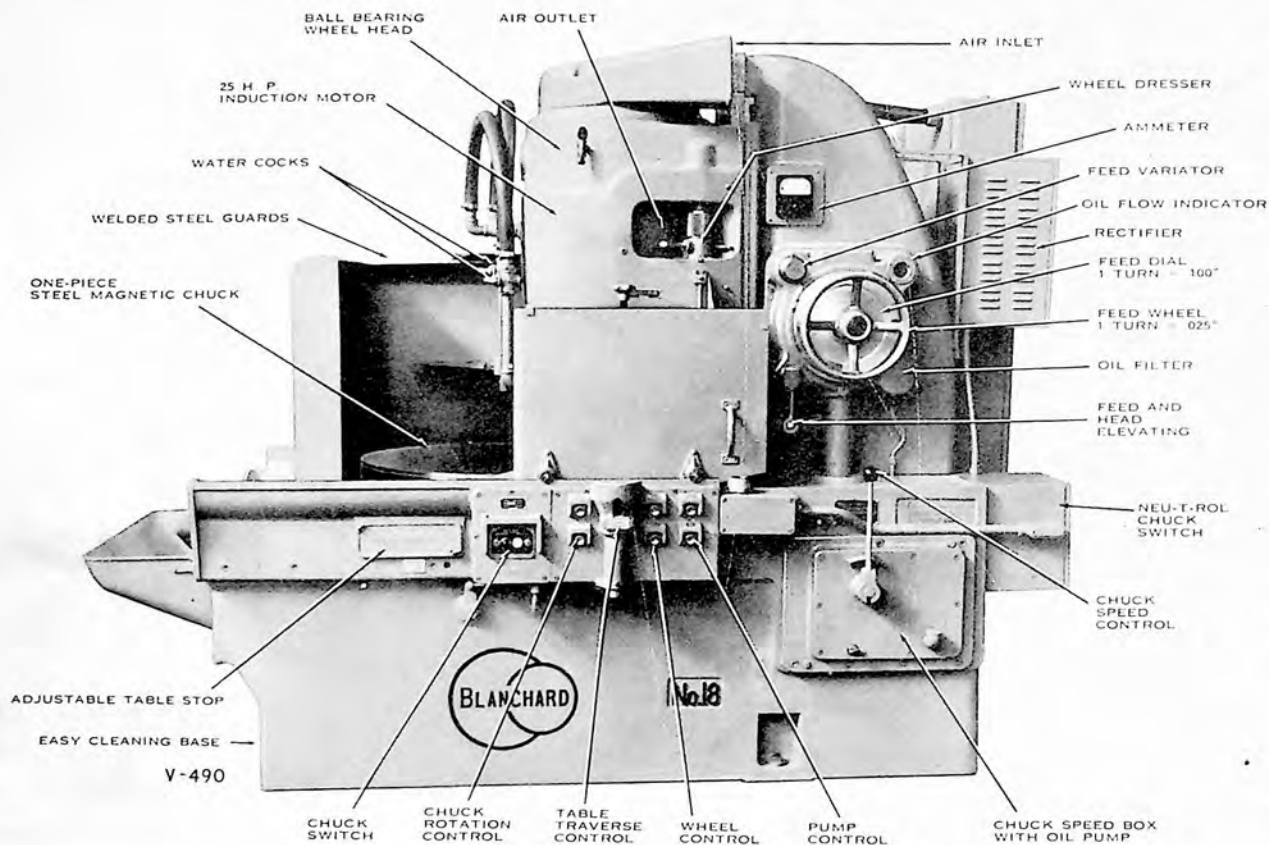
Mail and Express Address: CAMBRIDGE, MASS., U. S. A.

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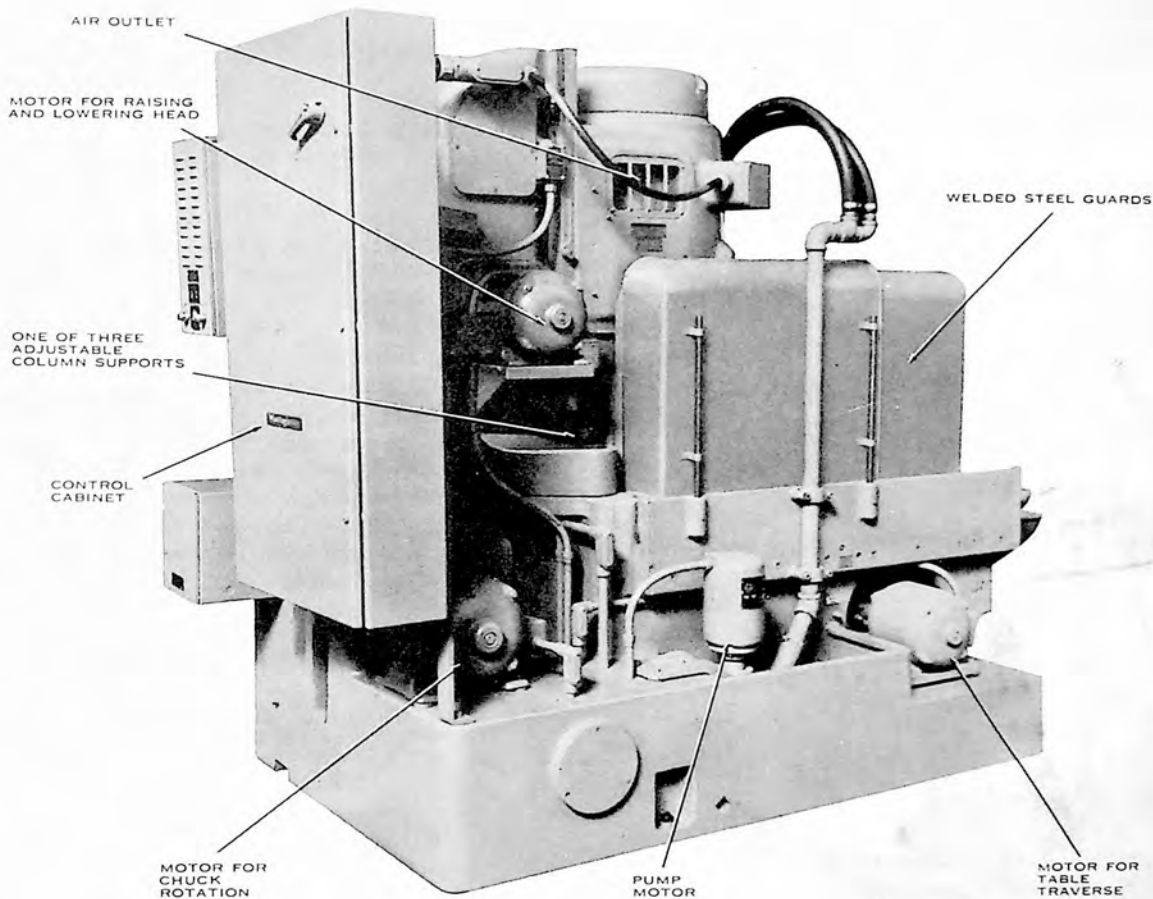
BLANCHARD NO. 18 GRINDER



Front View

This is the operator's side of the grinder with the guards open and the chuck in the loading position.

BLANCHARD NO. 18 GRINDER



Rear View

This is the rear side, showing the four small motors and the piping for the coolant.

BLANCHARD NO. 18 GRINDER

Specifications

RANGE: 36" diameter x 12" high over 30" chuck with new cylinder wheel—11" high with Blanchard segment wheel. 36" diameter x 12" high over 36" chuck with new cylinder wheel—11" high with Blanchard segment wheel.

WORKTABLE: BLANCHARD ONE-PIECE STEEL MAGNETIC CHUCK, 30" or 36" diameter with $\frac{5}{8}$ " pole spacing. Each chuck has 2" center hole and $\frac{3}{8}$ " - 16 tapped holes, 16 holes in 30" chuck and 19 holes in 36" chuck. For chuck current see page 13. Maximum weight of work load 3,000 lbs.

Size Chuck	Volts	Ampers	Watts
30"	110	5.2	572
	220	2.6	
36"	110	7.2	792
	220	3.5	

WHEEL: 18" x 5" x 15" cylinder or 18" x 5" x 14" Sected (both wire banded) or 18" Blanchard segment wheel. Wheel head for 20" wheel can be furnished on special order (recommended for grinding to center of work over 32" diameter).

SPEEDS: WHEEL: 720 R. P. M. on 60 cycle; 750 R. P. M. on 50 cycle.

CHUCK: 6, 9, 12, 18, 25 and 33 R. P. M.

(On 50 cycles chuck speeds are $\frac{5}{6}$ of these.)

FEED: Vertical down feed of wheel by hand or power.

Power feed: On 60 cycles approx. .004" to .080", and on 50 cycles approx. .003" to .066" per minute with accurate automatic stop. Maximum distance of down feed before stop operates is one turn of dial, .100". Wheel head has rapid power raising and lowering, interlocked with feed.

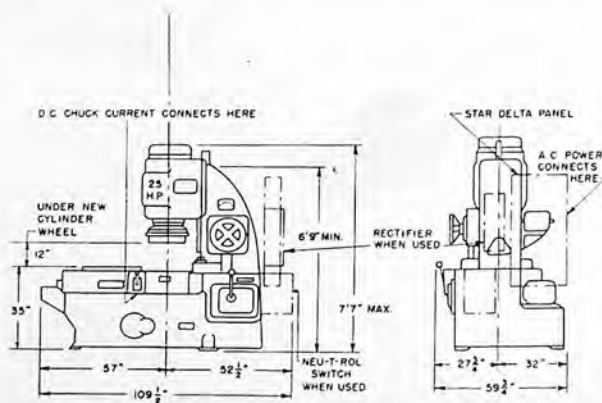
WATER SUPPLY: Easy cleaning tank in base, capacity 150 gallons. Motor-driven centrifugal pump submerged in tank, $1\frac{1}{2}$ " discharge pipe, 60 gallons per minute, supplying water inside the wheel and to outside nozzle through 1" pipes.

FLOOR SPACE and HEIGHT: Length 9' 3", width 4' 11", including control cabinet. Maximum height 7' 7", minimum 6' 9". Height of chuck from floor 35" See next page for other dimensions.

WEIGHT: GRINDER WITH 30" CHUCK AND STANDARD EQUIPMENT NET 11,400 lbs.
 Add for 36" chuck 400 lbs.
 Add for Caliper Attachment 50 lbs.
 Packing material domestic shipment, approximately 350 lbs.
 Packing material export shipment, approximately 2,000 lbs.
 Export shipment in one case, approximately, 9' 5" x 5' 9" x 7' 6"; 425 cubic feet.

STANDARD EQUIPMENT: 30" or 36" BLANCHARD ONE-PIECE STEEL MAGNETIC CHUCK; water guards; pump, piping; 2 grinding wheels mounted in rings, 4 extra rings for mounting wheels; or 2 grinding wheels and 1 cylinder wheel holder; 2 chuck rings, 1 outside, 1 inside to hold small work; set of wrenches; wheel dresser, built into head; hoe for cleaning tank; operator's handbook. 1 - 25 H.P. motor in head and 4 small motors with 110 volt push button controls completely wired to steel cabinet on back of machine containing starters and protective relays for all motors, disconnect switch interlocked with door of cabinet, transformer for 110 volt push button circuits; ammeter wired in wheel motor circuit; demagnetizing switch and pilot lamp for chuck.

The right is reserved to make such changes and improvements as in our opinion may be desirable.



BLANCHARD NO. 18-42 SURFACE GRINDER

Specifications

No. 18-42 Blanchard High Power Vertical Surface Grinder

RANGE: 48" diameter x 9" high under new cylinder wheel.
15" high with 6" extended column — 21" high with 12" extended column.

WORKTABLE: BLANCHARD ONE-PIECE STEEL MAGNETIC CHUCK, 42" diameter with .567" pole spacing except .850" spacing over three concentric main poles. Chuck has 4" center hole and twelve 3/8" tapped holes and three 5/8" tapped holes. Maximum weight of work load — 2,000 lbs.

WHEEL: 20" x 5" x 16 1/2" cylinder wheel, wire wound, is standard equipment. 18" wheels can be used. Usable depth cylinder wheels 4".

SPEEDS: WHEEL: 720 R. P. M. on 60 cycle current; chuck — 6, 9, 12, 18, 25, 33 R. P. M.

AUXILIARY MOTORS: Chuck Rotation — 1200 R. P. M.; head raise and lower and table traverse — 900 R. P. M.; Water Pump — 1800 R. P. M. (60 cycle speeds).

FEED: Vertical down feed by hand or power. Power feed variable from .004" to .080" per minute with accurate automatic stop. Maximum down feed before stop operates is .098". Wheel head has rapid raise and lower by power interlocked with feed.

WATER SUPPLY: Easy cleaning tank in base, capacity 120 gallons. Motor driven pump submerged in tank supplying 60 gallons per minute to inside wheel and outside nozzle through 1" pipes.

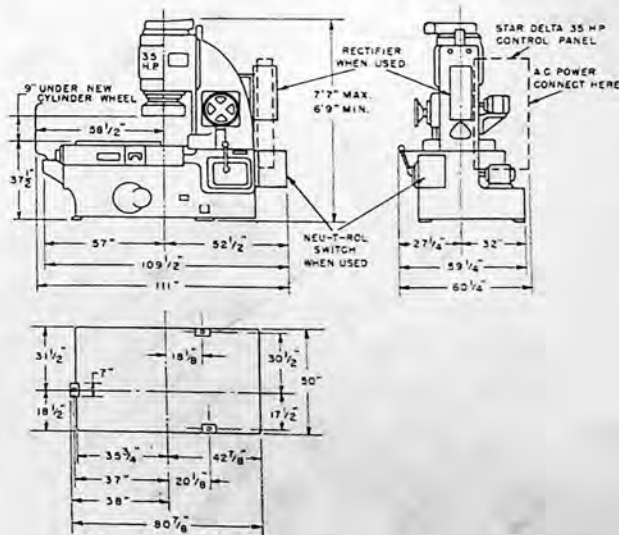
STANDARD EQUIPMENT: 42" BLANCHARD ONE-PIECE STEEL MAGNETIC CHUCK; 48" waterguards; pump; piping; two 20" x 5" x 16 1/2" cylinder wheels; 20" Blanchard cylinder wheel holder; 2 chuck rings, one outside, one inside; set of wrenches; wheel dresser, built into head; hoe for cleaning tank; operator's handbook. One 35 H.P. motor in head; one 3 H.P. chuck rotation motor; two 20 ft. lb. torque motors for table traverse and head raise and lower; one 1/2 H.P. motor driven pump; with 110 volt push button controls completely wired to steel cabinet on back of machine containing (for 3 phase, 60

cycle machines) reduced voltage (Star) starting and plugging and full voltage (Delta) running starters for main spindle motor; line starters for small motors with thermal overload protection for all motors; ammeter in wheel motor circuit; polarity reversing switch and pilot lamp for magnetic chuck.

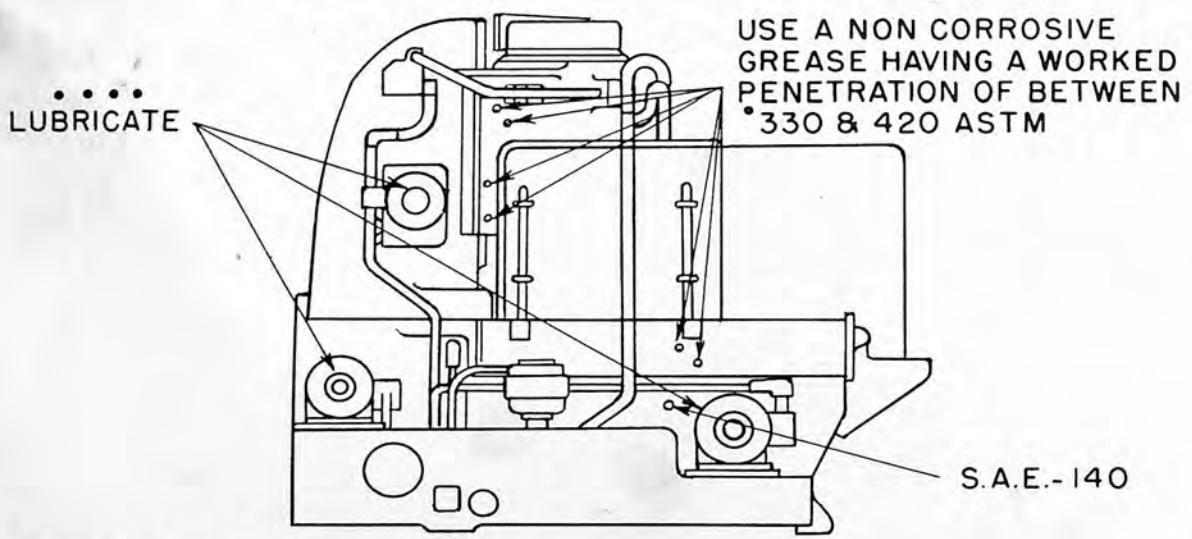
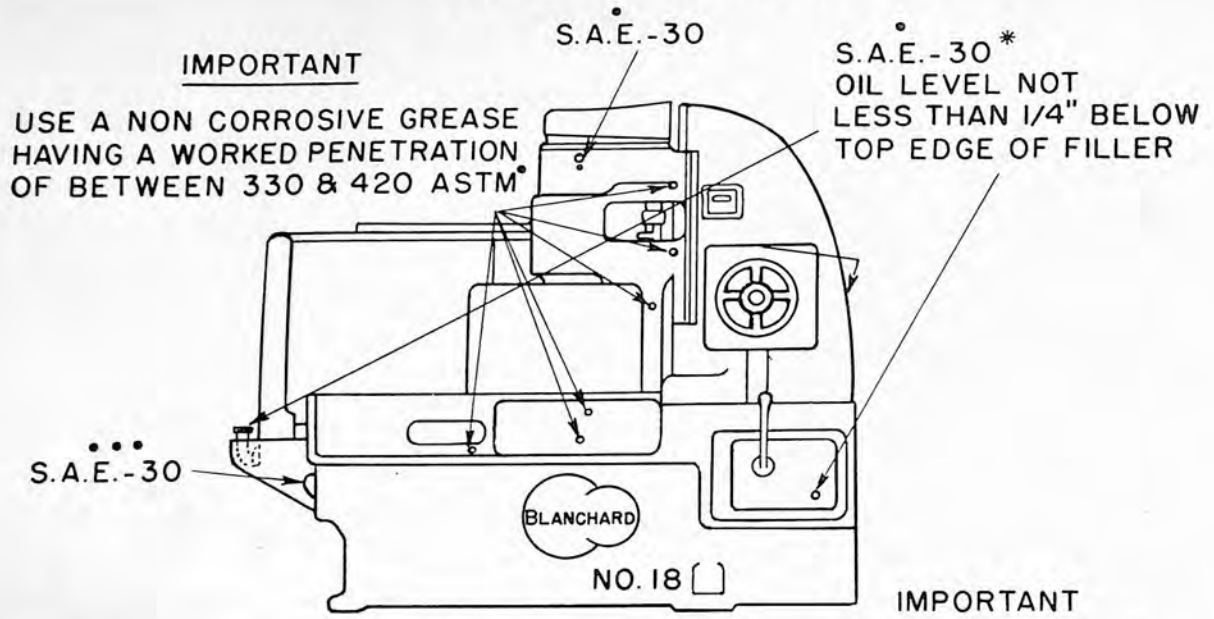
FLOOR SPACE: Length 9'9", width 5'5", including control panel.

HEIGHT: Maximum height 7'7"; minimum height 6'9"; chuck is 37 1/2" above floor.

WEIGHT: GRINDER WITH STANDARD EQUIPMENT	NET 13,300 lbs.
Add for Caliper Attachment	65 lbs.
Add for Rectifier	160 lbs.
Add for Neu-t-rol	50 lbs.
Add for Domestic Packing	500 lbs.
Export shipment in one case approximately 10' x 6' x 8' high — 480 cubic feet	14,800 lbs.
Current for Magnetic Chuck:	
42" diameter, 110 volts D. C.	5.7 amps. 630 watts
220 volts D. C.	2.9 amps. 630 watts



CAUTION: BEFORE STARTING THE MACHINE BE SURE IT IS PROPERLY LUBRICATED AS OUTLINED



- * CHANGE OIL EVERY 3 MONTHS
 - DAILY •• MONTHLY ••• 1/2 PINT WHEN STARTING NEW MACHINE
 - LUBRICATE ACCORDING TO MOTOR MFG'S. DIRECTIONS
- SUN TABLEWAY LUBRICANT (SUN OIL CO.) IS ALSO RECOMMENDED FOR HEAD AND TABLE SLIDES



LUBRICATION

For lubrication use good clean machine oil and clean neutral grease. Acid, alkali, or dirt in the oil or grease will RUIN the bearings.

- WHEEL HEAD: Keep the upper filler tube full of S. A. E. 30 oil. Check oil level daily, and drain and re-fill with clean oil every week. Grease lower bearing daily, using a non-corrosive grease having a worked penetration of between 330 and 420 ASTM.
- FEED SCREW: Grease daily at the fittings provided, using a non-corrosive grease having a worked penetration of between 330 and 420 ASTM.
- WHEEL HEAD SLIDES: Grease daily at the fittings provided with Sun Table Way Lubricant, or a non-corrosive grease having a worked penetration of between 330 and 420 ASTM.
- CHUCK SPEED BOX: Lubricate daily with S. A. E. 30 oil. Drain and refill with clean oil every 3 months.
- CHUCK BEARING: Fill to not less than 1/4" below top edge of filler daily with S. A. E. 30 oil. Drain and re-fill with clean oil every 3 months.
- TABLE BEVEL GEAR BOX: Fill to overflow with S. A. E. 30 oil when new machine is installed.
- TABLE WAYS: Grease twice daily with Sun Table Way Lubricant or use a non-corrosive grease having a worked penetration of between 330 and 420 ASTM.
- TABLE TRAVERSE BOX: Previous to Serial #6820. Lubricate monthly with S. A. E. 90 oil. Change oil every 3 months.
- TABLE TRAVERSE BOX: After Serial #6820. Lubricate daily with S. A. E. 140 oil to overflowing.
- MOTORS: All motors are lubricated according to the manufacturer's specifications.

CUTTING LUBRICANT: A good cutting lubricant for general work is one pound of Soda Ash or Tri-sodium Phosphate for each 10 gallons of water. The addition of 2 or 3 quarts of cutting oil will help to improve the finish on steel work. The water level should be kept as high as possible without overflowing the base.

NOTE: S. A. E. 30 OIL compares with Government specification VVO-526 GRADE 30. The grease recommended can be Marfak No. 1, made by the Texas Company; #897, made by the Sun Oil Company; or Mobil-grease #2. These compare with Government Specifications VV-G-632, Type B, Grade 1.

PREPARATION FOR USE

UNPACKING AND ASSEMBLY: The machine is completely assembled when shipped and no special unpacking is necessary.

FOUNDATION REQUIREMENTS: When removed from its case, the machine can be set on any foundation (wood, concrete, etc.) that will substantially hold its weight as indicated in the table of specifications. The base should be shimmed under the three pads by which the grinder is bolted to the skids. It should not be fastened to foundation.

PLUMBING: There are no outside plumbing connections to make.

ELECTRICAL CONNECTIONS: The A. C. power lines should be brought to the control panel. The power requirement for alternating current is approximately double that necessary for the main spindle motor. The D. C. line is connected at the chuck switch if no motor generator or rectifier is supplied by the manufacturer. The D. C. requirements are as follows:

<u>Chuck Size</u>	<u>Volts</u>	<u>Ohms</u>	<u>Amperes</u>	<u>Watts</u>
30"	110 D. C.	21.1	5.2	572
30"	220 D. C.	84.7	2.6	572
36"	110 D. C.	15.7	7	792
36"	220 D. C.	63	3.5	792
42"	110 D. C.	19.3	5.7	630
42"	220 D. C.	77.2	2.9	630

OPERATING INSTRUCTIONS

STARTING & STOPPING THE MACHINE: The machine is controlled from a central station with push buttons and levers operating push buttons. The power feed and head raise and lower lever is on the upper gear box. The push buttons and levers are clearly marked for quick easy identification.

TYPICAL GRINDING CYCLE: Load work on chuck, close chuck switch, make sure work is secure. Then with wheel high enough to clear work, traverse table to grinding position. Start wheel spindle, start pump motor and select proper chuck speed. Close water guard door and start chuck rotating. If necessary to change chuck speed, stop rotating before shifting gears. Feed wheel down by hand until it touches the work; engage down feed. Set rate of feed by feed variator knob. Set feed dial to feed predetermined amount. Check power consumption by ammeter while grinding. If motor draws too much overload, reduce feed rate. Overload relays are set at approximately 150% of full load amperage.

If very accurate work is required, table should run a few revolutions after feed trips before raising head.

Raise head either by hand or power. Turn off water, stop chuck rotation, and traverse table to loading position. Open water guard door and reverse chuck switch then leave it in open position for removing work. The time the switch is left in reverse position is determined by the size of the work. The object of reversing the switch is to change the polarity in the magnetic chuck and neutralize the residual magnetism in the pieces. Remove the work from the chuck. Clean the chuck and load it again as above.

Much of the work takes several minutes grinding time during which the operator can wash work already ground and prepare pieces for loading.

It is advisable to allow the wheel spindle to run during loading time as on heavy grinding this idle running helps cool the motor.

USE OF THE MAGNETIC CHUCK: All of the steel in the chuckface between and close to the brass rings is magnetic when the switch is closed. Pieces of work should span at least one brass ring to be held securely. Narrow or thin pieces will hold best if placed in a radial direction, thus crossing as many brass rings as possible.

Stops of some sort must be used to prevent work from sliding. The magnetism holds pieces down but does not prevent them slid-

ing, except by friction between the piece and chuck face. Except for fairly large and heavy pieces the friction is not sufficient for safe holding and even on large pieces stops are a good safety factor.

The standard way of chucking small flat pieces is to place them close together between inner and outer rings laid on the chuck. These rings are usually of sheet steel any convenient thickness less than the work.

Two rings are furnished with each machine, one fitting on the outside diameter of the chuck and projecting 1/4" above its face, and the other a flat ring to be laid in the center. The diameter of this inner ring represents what experience has shown to be the best size of open space to leave in the center of the chuck. If this open space were filled with work it would increase the area of contact between the work and wheel much more than it would increase the number of pieces chucked; and the result would be not a gain but probably a loss in production.

In arranging pieces on chuck, best results will be obtained if the ground surfaces form a complete circle so the cut is continuous. The inner retaining ring should always be used except for very narrow surface work or work having only a small boss to grind, in which cases it is allowable to entirely fill the chuck.

Pieces having beveled edges must be blocked in such a way that they cannot ride up on each other or on the retaining rings. In some cases square bars of cold-rolled steel laid radially between the pieces may be necessary. Pieces with a single bevel and to be ground on both sides, should be ground on beveled side first, thus ensuring a good surface for holding when grinding the other side.

Pieces too small for every one to span one or more brass rings when placed close together may be securely held by using a perforated brass plate. The holes in the plate should be located directly over the brass rings in the chuck and should be only large enough to allow easy placing of the pieces in them. The holes should be smallest near the upper side of the plate thus giving a bearing as high up as possible on the pieces and reducing their tendency to tip when pushed sideways by the wheel. The thickness of the plate should be only a few thousandths of an inch less than the finished dimension of the work. The plate should be of brass or other non-magnetic material in order not to absorb any of the magnetism. It should be centered by a plug or stops screwed to the chuck but should be left loose so it can be lifted and cleaned with the work.

Pieces having bosses or projections on the side next to the chuck can often be held magnetically by the simple expedient of placing soft steel blocks under the thinner part to make the piece rest level, the bosses being in contact with the chuck. The success of this method depends on the area of the part in contact with the chuck, the height and area of the blocks required, and the location on the chuck. The pieces must be blocked to prevent any side movement.

Non-magnetic metals such as brass, aluminum, and magnesium, can be held for grinding if the parts are blocked to prevent side movement and shimmed if necessary. Sometimes blocking pieces having sharp pins or serrations acting like spurs will hold the pieces down and prevent them from spinning.

Irregular shaped pieces which do not lend themselves to magnetic holding or blocking require some sort of mechanical clamping fixture. These fixtures are usually fairly simple in design and need only light clamping pressure at fixed support points to hold the piece for grinding.

Some non-metallic pieces such as rubber, plastics, carbon, graphite, and molded articles are held the same as non-magnetic metals. Other pieces such as glass, ceramics, sapphire, etc. require different holding methods.

The holes in chuck face, plugged with brass screws to keep out dirt, are tapped into the solid steel of the chuck body and are intended to receive screws for securing fixtures and stops.

An adjustable stop is provided to limit the distance the chuck is moved under the wheel when in the grinding position. When grinding work with a center projection to be cleared, the stop can be set to stop the chuck short of the normal grinding position.

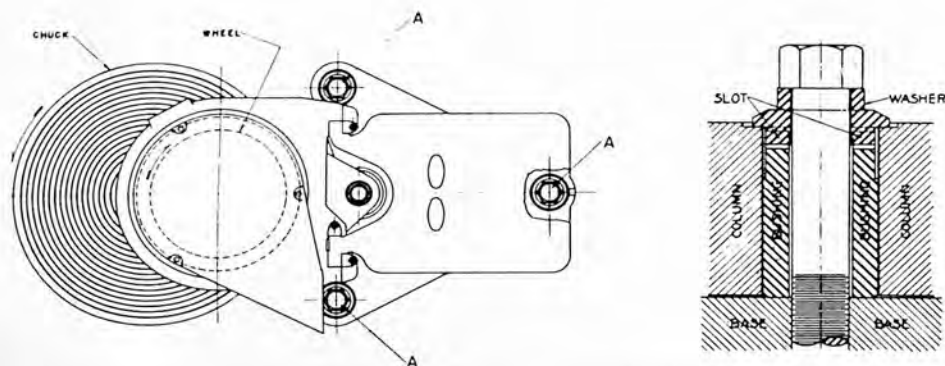
TRUING THE CHUCK: Whenever the chuck face becomes scratched and worn enough to affect the accuracy of the work it must be refinished. The closer the limits to which the work is held, the better must be the condition of the chuck face.

For truing the chuck, use a soft, free-cutting wheel, such as the 9A24HS Blanchard silicate. Dress its face to be sharp and keen, turn on plenty of water inside the wheel and bring it down gently onto the chuck face, with the chuck revolving at slow speed. It should not be necessary to grind off more than .001" or .002" to clean up the chuck face. The surface produced should be dull rather than polished, plainly show the wheel marks, and should be free from any burned, glazed or spotty appearance.

If much metal has to be removed, rough dress the face of the wheel, just before finishing, to ensure a good surface.

Burrs should be removed with an oil stone from chuck face before loading work to be ground accurately.

SPINDLE ALIGNMENT: To produce flat work of uniform thickness the wheel spindle must be exactly square with the chuck. All Blanchard spindles are set square at the factory. The 3-point column support provides for a slight adjustment of the spindle relative to the chuck, should this become necessary. The column is fastened to the bed at three points, A, shown in the plan view.



Plan of 3-point Column Support

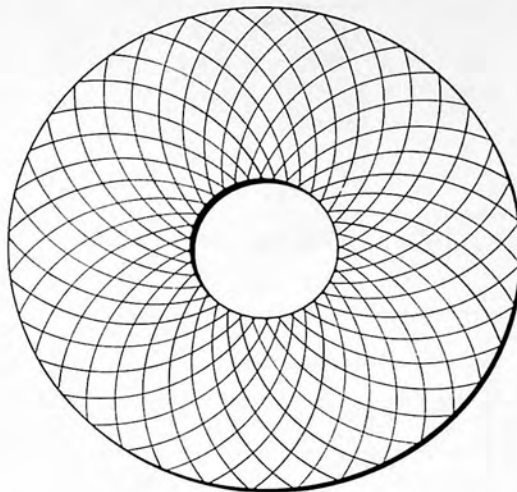
Section Through One Support Point

Bushings threaded into the column and bearing on the bed provide slight vertical adjustment at each of these three points. The base and column are separated by a clearance of about $1/16''$ so that the bearing comes entirely on the three bushings.

Hold-down bolts pass through the bushings and are threaded into the base. The heads of these bolts bear on large washers which rest in finished seats on the column and not on the bushings. These washers have a hexagonal portion and serve to turn the bushings by means of projections entering slots in the tops of the bushings.

By slightly raising or lowering at these points, the column and consequently the spindle can be tipped in any direction, an amount sufficient to restore the spindle to its correct position, perpendicular to the chuck face.

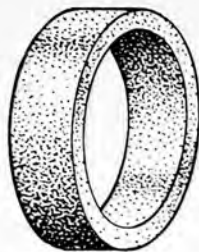
When the spindle is correctly set, the wheel will cut both where it moves toward and from the center of the chuck, giving a characteristic cross marking, thus:



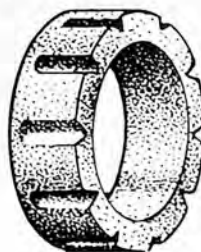
NOTE: In the diagram, for the sake of clearness, only a few lines are shown. The actual wheel marks on the work are of course much more numerous and closer together.

WHEELS

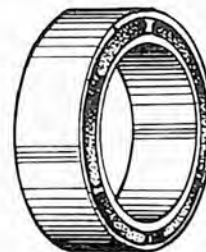
TYPE OF WHEELS: Three types of wheels are recommended for the Blanchard Grinder; cylinder, sectored, and segment.



CYLINDER



SECTORED



SEGMENT

CYLINDER WHEELS																																																																				
	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th rowspan="2" style="text-align: center;">BLANCHARD GRINDER</th> <th colspan="3" style="text-align: center;">Size in Inches</th> <th rowspan="2" style="text-align: center;">Wheel Area Sq. In.</th> </tr> <tr> <th style="text-align: center;">A</th> <th style="text-align: center;">B</th> <th style="text-align: center;">C</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">No. 10</td> <td style="text-align: center;">10</td> <td style="text-align: center;">4</td> <td style="text-align: center;">8</td> <td style="text-align: center;">28.3</td> </tr> <tr> <td style="text-align: center;">No. 11</td> <td style="text-align: center;">11</td> <td style="text-align: center;">5</td> <td style="text-align: center;">9</td> <td style="text-align: center;">31.4</td> </tr> <tr> <td style="text-align: center;">No. 16 (Belt Drive) *</td> <td style="text-align: center;">16</td> <td style="text-align: center;">5</td> <td style="text-align: center;">13</td> <td style="text-align: center;">68.3</td> </tr> <tr> <td style="text-align: center;">No. 16 and No. 18</td> <td style="text-align: center;">18</td> <td style="text-align: center;">5</td> <td style="text-align: center;">15</td> <td style="text-align: center;">77.7</td> </tr> <tr> <td style="text-align: center;">No. 18 with Extended Head</td> <td style="text-align: center;">20</td> <td style="text-align: center;">5</td> <td style="text-align: center;">16 ½</td> <td style="text-align: center;">100.5</td> </tr> <tr> <td style="text-align: center;">No. 16A and No. 16A2</td> <td style="text-align: center;">18</td> <td style="text-align: center;">5</td> <td style="text-align: center;">12</td> <td style="text-align: center;">141.3</td> </tr> <tr> <td style="text-align: center;">No. 16A and No. 16A2</td> <td style="text-align: center;">18</td> <td style="text-align: center;">5</td> <td style="text-align: center;">10</td> <td style="text-align: center;">176.0</td> </tr> </tbody> </table>	BLANCHARD GRINDER	Size in Inches			Wheel Area Sq. In.	A	B	C	No. 10	10	4	8	28.3	No. 11	11	5	9	31.4	No. 16 (Belt Drive) *	16	5	13	68.3	No. 16 and No. 18	18	5	15	77.7	No. 18 with Extended Head	20	5	16 ½	100.5	No. 16A and No. 16A2	18	5	12	141.3	No. 16A and No. 16A2	18	5	10	176.0																								
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* Silicate Bond only

		NORTON CHUCK SEGMENTS							
		BLANCHARD GRINDER	Set No.	Dia. of Chuck Inches	No. Per Set	Size in Inches			Wheel Area Sq. In.
						A	B	C	
No. 16 and No. 18	NO18	18	8	5	1 1/2	6	54.0		
No. 18	NO20	20	9	5	1 1/2	6	60.75		
No. 16 and No. 18	NO18A	18	8	5 5/8	2 1/4	6	91.3		
No. 22A-3, 4, 5	NO22A	22	10	5 5/8	2 1/4	6	114.1		

		CORTLAND CHUCK SEGMENTS							
		USED ON BLANCHARD GRINDER	Set No.	Dia. of Chuck Inches	No. Per Set	Size in Inches			Wheel Area Sq. In.
						A	B	C	
No. 16 and No. 18	CD18	18	4	11 1/4	2 1/4	5	73.6		
No. 18	CD22	22	5	11 1/4	2 1/4	5	92.0		

BLANCHARD WHEEL MARKINGS

91A 24 H 8 V 2

ABRASIVE		GRAIN SIZE			GRADE			STRUCTURE			BOND	MFR'S SYMBOL
BASIC	MIXTURE	COARSE	MEDIUM	FINE	SOFT	MEDIUM	HARD	CLOSE	MEDIUM	OPEN		
A	15A	14	30	80	E	H	K	4	7	10	V	1 2
5A	91A	16	36	100	F	I	L	5	8	11	B	W X
9A	59A	20	46	150	G	J	M	6	9	12	S	Y Z
C	CA	24	60	220				SOMETIMES OMITTED				SOMETIMES OMITTED

EXPLANATION

ABRASIVE—The letter "A" indicates an Aluminum Oxide Abrasive: A, the regular or tough; 5A, semi-friable; 9A, highly refined, friable. The letter "C" indicates Silicon Carbide Abrasive. 91A is a mixture of A and 9A, CA of C and A etc.

GRAIN SIZE—A number following grain size, 203 for example, indicates a combination of grain sizes.

STRUCTURE—Measure of grain spacing or density. Omitted in Blanchard Silicate and Resin bonded wheels.

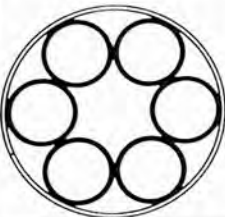
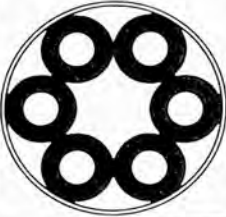
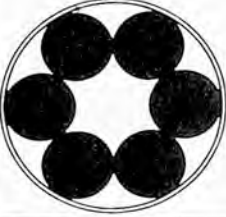
GRADE—The letters indicate relative bond strength. Two letters indicate a half grade. For example, HI is midway between H and I grades.

BOND—V indicates Vitrified; B, Resinoid; and S, Silicate Bond.

MANUFACTURER'S SYMBOL—The numbers 1 or 2 indicate that the actual grade is on the soft or hard side respectively of grade shown. The letters W, X, Y, and Z indicate variations from standard bonds.

BLANCHARD WHEEL RECOMMENDATIONS FOR

*18" X 5" X 15" WHEELS ON NO. 18 BLANCHARD GRINDERS — FERROUS METALS

We manufacture only wheels for Blanchard grinding, in all grits and grades and in Vitrified Silicate and Resinoid Bonds. For other materials ask for Blanchard Service.		AREA OR WIDTH OF SURFACE		
		NARROW	MEDIUM	BROAD
MATERIAL	FINISH RMS			
Cast Iron	90	C 30 I 8 V	C 20 H 8 V	C 20 GH 8 V
	90	C 30 J S	C 20 I S	C 20 H S
	15	C 80 H B	C 80 G B	C 80 FG B
Stainless Steel	60	CA 46 HI B	CA 46 H B	CA 46 GH B
	10	CA 100 I B	CA 100 HI B	CA 100 H B
1020 Mach. Steel & Boiler Plate	75	A24 I 8 V	5A 20 HI 8 V	5A 20 H 8 V
	75	A24 I S	5A 24 H S	5A 24 GH S
	16	C 150 J B	C 150 I B	C 150 H B
High Carbon Steel, Annealed	50	91A 30 I 8 V	91A 24 H 8 V	91A 24 GH 8 V
	50	5A 36 I S	9A 24 H S	9A 24 GH S
	8	9A 100 I B	9A 100 HI B	9A 100 H B
Tool Steel Hardened 55R ^c	25	9A 46 H 8 V	9A 30 GH 8 V	9A 20 G 8 V
	25	9A 46 H S	9A 30 G S	9A 24 G S
	6	9A 100 H B	9A 100 G B	9A 100 G B
High Speed Steel, Hardened 62R ^c	25	59A 60 GH 8 V	9A 46 G 8 V	9A 30 FG 8 V
	25	9A 46 G S	9A 46 G S	9A 30 F S
	6	9A 100 H B	9A 100 G B	9A 100 FG B
General Purpose Wheels: 9A 24 H 8 V — 91A 30 H 8 V — 9A 24 H S				

* For 11" x 5" x 9" wheels and all segments use one half to a full grade harder. For 20" x 5" x 16½" wheels use one half grade softer. On No. 16 Blanchards use one grade softer.

To cut fast and/or accurately a wheel must wear away, thus exposing new sharp grains. USE A SOFT WHEEL—USE ENOUGH FEED TO MAKE WHEEL CUT FAST—PROVIDE ENOUGH POWER TO CARRY THIS FEED. If wheel fails to cut freely, glazes or burns the work, the remedy is one or more of the following: (1) Dress wheel; (2) Use more feed and power; (3) Use softer or coarser wheel; (4) Reduce the area being ground.

GRINDING WHEELS FOR BLANCHARD GRINDING

Why Blanchard Makes Wheels

In the early days of Blanchard Grinding - back in the middle twenties - this Company had its own grinding wheel problems. The wheels we were able to purchase for Blanchard Grinders were often not uniform in grade, the available selection was limited, and delivery dates often extended into the distant future. Because of these wheel difficulties, Blanchard Grinders frequently were restricted to a work performance which was considerably lower than the maximum possible. In order to remedy this condition, and to assure our Blanchard Grinder customers the best performance resulting from an always available source of proper wheels, this Company decided to make its own grinding wheels. The policy - and still adhered to - was to specialize only on wheels for Blanchard Grinders. Our research and development work is continuous. Our objective is to produce wheels and segments of highest quality. The raw materials used are the best obtainable. Our manufacturing methods and inspection procedures assure a precision product.

THERE IS NO BETTER WHEEL FOR A BLANCHARD
THAN A BLANCHARD WHEEL

TYPES OF WHEELS

There are several types of wheels for Blanchard Grinding. Those most commonly used are the Cylinder, the Segment, and the Sectedored Wheels. The advantages and disadvantages of each are detailed below:

CYLINDER WHEEL

The cylinder wheel is the most popular and generally the most satisfactory type wheel for Blanchard Grinding. The proper Cylinder Wheel will stay sharp with little or no dressing. Wear will be just sufficient to maintain this sharpness and no more. The grain size will be so selected as to provide clearance for chips, depending upon the nature of the material and the total area of the surface being ground, and as to produce the desired finish. The contact with the work is continuous with the maximum area of abrasive surface in contact. The Cylinder Wheel should always be selected for fine finishes and where extreme flatness accuracy is required. Due to the broken contact surface, the Segment, and to a lesser extent the Sectedored Wheel, will often cause scratches on a fine finish and a rounding off of the edges of the surfaces being ground. It takes less time for a trained operator to change a Cylinder Wheel than to install a new set of Segments; and, as against resetting the Segments, there is only a wire band, in the case of the Cylinder Wheel, to be cut and removed.

SEGMENT WHEEL

The Segment Wheel is popular with many operators. It consists of several abrasive segments securely clamped into a segment chuck. There are several types of these chucks, and each type requires a special shape segment. Blanchard manufactures segment chucks for Segment Wheels of the following diameters: 18", 32", 36", and 42". The number of segments per set for each of these chucks, respectively, is: 6, 8, and 10. Safety, balance, and ease of clamping are necessary requirements for a satisfactory segment wheel, and these are provided in Blanchard Segment Wheels. Segments are set out to compensate for wear but should never project more than 2". The segments are gripped so securely that only one to two inches of the segment in the chuck is required for holding the last 2". Backing blocks or a ring is used to prevent any possibility of a segment cocking. The spaces between the segments facilitate the clearance of chips, which makes the segment wheel particularly suitable for grinding broad surfaces and rough castings. It is not suitable for grinding small pieces or narrow surfaces especially where a fine finish and flatness accuracy are required. The interrupted grinding surface has a tendency to catch and tip small pieces and throw them from the chuck.

SECTORED WHEEL

The Sected Wheel is essentially a cylinder wheel of increased rim thickness with V-shaped notches molded into the outer surface. The effect of these V-shaped notches is to give approximately the same number of linear inches of abrasive on any circumference. Thus each abrasive grain does the same amount of work. The Sected Wheel is cool-cutting, free from vibration, and uniform in grade. As in the case of the Segment Wheel, it is particularly suitable for grinding broad surfaces. Sected Wheels are available in the following dimensions: 10" x 4" x 7 1/2", 16" x 5" x 12 3/4", 18" x 5" x 14" and 18" x 5" x 10".

BONDS

The bond is the material used to cement together the abrasive grains and hold the individual grains in place while they are in contact with the material being ground. The bond must be strong enough to hold the grains firmly while they are acting as miniature cutting tools; it must also be soft enough so that when a grain has become dull the added resistance will break the grain or tear it loose, thus exposing fresh sharp cutting points. Because of the large area of contact with the work, the importance of the bond in wheels for Blanchard Grinding is apparent. In general a relatively soft wheel is required for Blanchard Grinding. Of the various bonds used in the manufacture of grinding wheels, the resinoid silicate and vitrified bonds are most generally used in making wheels for Blanchard Grinding.

ABRASIVES

The abrasive grain material in Blanchard Wheels is either silicon carbide or aluminum oxide. Three grain types of aluminum oxide are used: the tough, or regular; semi-friable; and the white, highly refined friable grain. Each of these abrasives has its advantages for certain kinds of work. Silicon carbide generally gives best results on materials of low tensile strength such as cast iron, chilled iron, brass, aluminum, bronze, fiber, ceramics, and similar materials.

Regular aluminum oxide is brown in color. It is a tough, strong grain, suitable for grinding tough, relatively soft metals, such as soft low carbon steels and malleable iron.

The semi-friable aluminum oxide is more highly refined than the regular, but less so than the white. It is intermediate in toughness between the two. It too is used for grinding steel in the soft state. In combination with the white it is particularly effective in meeting some grinding requirements.

The white highly refined aluminum oxide is the most useful abrasive for the general run of Blanchard grinding. It is used principally for hardened or soft high carbon steels, high speed steel, and hard alloys, and is the best general purpose abrasive for all materials.

The number used for designating the grain size or grit, corresponds to the number of meshes per linear inch in the sizing screen. The coarser grits will generally give a satisfactory finish for most purposes, and as they cut faster it is usually best to use them - except when grinding materials such as chilled iron and hardened steel, where the grain depth of cut is limited and grits larger than 24 are not recommended. In fact, wheel wear generally becomes excessive if grits coarser than 20 are used. The proper grit is generally dictated by the nature of the material and the area of the surface presented to the wheel: the narrower the surface, the finer the grit; and the broader the surface, the coarser the grit. Similarly, the harder the material, the finer the grit; the softer and more ductile the material, the coarser the grit. The action of an abrasive grain in grinding is similar to that of a cutting tool in machining a surface.

GRADE

The term "grade" as applied to grinding wheels is the measure of the hardness of the wheel. The harder the grade, the more securely the grains are held and the greater the force required to break them out of the wheel.

In selecting the proper wheel for a particular job, the following should be considered: the nature of the material, the dimensions of the

pieces and total area being ground, the amount of the material to be removed and the finish and accuracy desired. The effect of material is expressed best in tensile strength - the greater the tensile strength, the softer the grade required. Narrow pieces will take a harder wheel than broad surfaces. That is, the broader the surface, the softer the grade. For rapid cutting, a wheel must keep itself sharp by wear. Therefore, for rapid stock removal select a relatively soft grade.

FINE FINISHES

Grits from 60 to 220 are used for fine finishes. The harder the material and broader the surface, the softer the grade required.

HANDLING AND STORAGE OF WHEELS

The cylinder wheel because of its relatively thin section is more fragile than most other types of grinding wheels. Care must, therefore, be taken in shipping, packing and unpacking, handling, and storage, or breakage may be expected. Wheels should not be dropped or rolled along the floor. Racks should be provided for storage of wheels. It is usually more convenient to rack them vertically, that is with the axes horizontal. Proper labeling will facilitate finding a desired wheel if several different grits and grades are carried in stock. Wheels should not be stored in the open or in damp cellars. They must be kept dry and extreme temperature changes avoided.

GRINDING COSTS

It should be pointed out that wheel costs are only part of total grinding costs. Labor, overhead, and any burden charged to grinder and not included in overhead will usually be the greater part of grinding costs. The rate of stock removal is a primary factor in these costs, and it will often be found that a soft wheel, which may appear to wear away too fast, will grind the work at the lowest overall grinding cost.

The following equation may be used to obtain the wheel cost per piece ground:

$$c = \frac{Cd}{DN}$$

- c = Wheel cost per piece, dollars
- C = Cost of wheel, dollars
- d = Wheel wear, inches of depth, in grinding N pieces
- D = Usable wheel depth, inches
- N = Number of pieces ground

A convenient method of obtaining the amount of stock removed is to subtract the weight of the pieces after grinding from their weight before

grinding, thus obtaining the weight of the stock removed. If this weight is divided by the weight per cubic inch of the metal, we obtain the number of cubic inches of stock removed. While the weight of metal varies according to its composition, the following weights per cubic inch will usually give sufficiently accurate results:

Cast Iron	=	0.256 lbs.
Steel	=	0.283 lbs.
Aluminum	=	0.098 lbs.
Brass	=	0.305 lbs.
Bronze	=	0.316 lbs.

To obtain the amount of abrasive in cubic inches required to remove a given amount of stock, determine the wheel wear by subtracting the total depth of cut or thickness of material removed from the total down feed. Then divide this wheel wear by the wheel wear per cubic inch of abrasive for the particular wheels used.

TRUING AND DRESSING THE WHEEL: Many wheel troubles will be avoided by bearing in mind that there is a most distinct difference between dressing a wheel and truing a wheel. This difference is particularly marked in the case of the Blanchard Grinder Wheel.

To true a wheel is to remove material from the surface of the wheel so that at grinding speed the grinding face will "run true".

To dress a wheel is to remove the dull abrasive grains from the cutting face or to strip off a loaded or glazed face so that unused and sharp grain edges may cut upon the work.

The Blanchard Grinder Wheel does not need "truing" with a diamond or CARBORUNDUM stick and if it is done it will probably only complicate the trouble. Due to the change in area of contact, the pressure per square inch between the wheel and work increases enormously when a high spot in the wheel face comes in contact with the work; this great increase in pressure per square inch forces the grains of the high spot too far into the work and they are torn out of the wheel, thus dressing off the high spot and truing the wheel.

In the ideal grinding wheel the bonding substance is just strong enough to hold the grains until they become dull.

When the efficiency of a grain becomes too low, that is, when too much power is required to make it remove metal, the bonding

substance breaks down and the grain is released. However, it is difficult always to obtain the ideal wheel and when a hard wheel is being used (one that retains the grains after they become dull) or too fine a wheel (one that fills and prevents grains from entering work) it is necessary to supply artificial means of creating wear. This means takes the form of the wheel dresser and must be used at the discretion of the operator.

A work surface that is highly polished and appears to be divided into irregular patches means that the wheel needs dressing. A wheel making a highly polished surface is probably a little too hard (or too fine a grit) and should be watched carefully; if deep scratches appear in the polished surface the wheel should be dressed. When using coarse grit wheels on broad surfaces a wheel that is too hard will stall the motor repeatedly; if reducing the feed does not prevent stalling or creates a highly polished surface, a freer cutting or softer wheel should be used.

The Blanchard Wheel Dresser, however makes it possible to use a hard wheel economically and without loss of productive time. If used only when the wheel requires dressing, the Blanchard Wheel Dresser substitutes for the natural wear of the wheel; an artificial wear under the control of the operator. Do not use dresser except when necessary; first experiment by changing feed and speeds.

CYLINDER WHEEL HOLDER



INSTRUCTIONS FOR USING

1. - Changing Wheels: - If the holder is to be secured to or removed from the face plate, it is easier and faster to mount or remove the wheel on the bench. To change wheels with the holder in place on the grinder, proceed as follows:

- (a) Raise wheel guard as high as it will go.
- (b) With the table moved under the head, place the mounting board on the table under the wheel and lower the head until the wheel is about 1/8" above the board.
- (c) Loosen the clamp set screws, fully retracting the clamps. The wheel will drop to the board.
- (d) Raise the head until the wheel is free of the holder and remove the wheel.
- (e) Run hand around inside of holder and make certain that no clamp projects beyond its slot and check any sludge accumulation which should be removed.
- (f) Place the new wheel on the board and slide it under the holder, raising the head as necessary.
- (g) Lower the head, moving the wheel as necessary to guide it into the holder. Continue lowering until wheel is against the face of the holder and the board has been slightly depressed so that holder, wheel, and board turn together.

- (h) Tighten the set screws turning them in equally and hand tight. It is easy to tell when the center of the clamp comes against the wheel by the sharp increase in force required to turn the screw. The set screw should be turned only slightly beyond this point.
- (i) Raise the head and remove the board.
- (j) Adjust wheel guard.

2. - Parts and Accessories: -

- (a) Clamps and Set Screws - The spring clamps are attached to the set screws by means of dovetail slots. The top face of the clamp is narrower than the bottom face. It is essential to the proper operation of the holder that the broad face be down. The slot opening being in the broad face it must open down, or the closed end toward the face plate. It is not necessary to remove the clamps except for cleaning.
- (b) Wrench - Standard short arm hexagon keys must be used. The key for the 1/2" set screws has a 3 1/4" arm. The spring clamps are designed for the pressure obtainable with these keys. The use of longer arm wrenches or auxiliary means of gaining leverage, such as a pipe, will only result in broken wheels.
- (c) Mounting Board - This is a circular plywood board having the same diameter as the wheel and with a brass plug in the center of the bottom side. With this brass plug resting on the table, the use of the board assures that the wheel is held evenly against the face of the holder. It also provides a flexible support for the wheel. A cloth under the brass plug will avoid marring the table surface.
- (d) Wheel Guard - The wheel holders are greater in diameter than the corresponding wheel rings. Special wheel guards are available.

3. - Wheels: - Blanchard wheels purchased for use with the holder have the wire banding properly spaced and the Vellumoid strip cemented to the top of the wheel. The Vellumoid strip is .050" thick and 3/4" to 7/8" wide. This gasket material is pressed into the wheel by the clamps, the shape of the clamps resulting in an upward component against the face of the holder. It also acts as a cushion between the steel clamps and the abrasive and makes it possible for the clamps to firmly grip the wheel.

4. - Maintenance: - As is the case with every piece of machinery, the holder should be cleaned and lubricated occasionally, frequency depending on use. If difficulty is experienced retracting the clamps, it is an indication that the holder needs cleaning. The clamps should be removed from the holder and cleaned. The slots and the holder face should also be cleaned. Use a wire brush to clean the vertical tool cuts in the clamp faces and to remove any accumulated sludge between clamps. Put a small amount of Lubri-plate 130A lubricant on the set screws and the sliding surfaces of the clamps.

5. - Precautions: -

- (a) Use care in handling and storing wheels as they are brittle.
- (b) Use only recommended wrench. par. 2-(b)
- (c) Use care in getting wheel started into holder.
- (d) Always run hand around inside of holder to make sure that clamps are fully retracted into slots, and check sludge accumulations.
- (e) Clean and lubricate holder as required.

PREPARING CYLINDER AND SECTORED WHEELS FOR USE IN BLANCHARD CYLINDER WHEEL HOLDERS

Type 2 Cylinder and Sectored Wheels are prepared for use in the Blanchard Cylinder Wheel Holder by cementing a strip of Vellumoid (a gasket material) around the top of the wheel. These Vellumoid strips are .050" thick, 7/8" wide, and the circumference of the wheel in length. Blanchard Wheels purchased for use in the holder have this strip cemented in place for which there is no additional charge. When ordering place a "K" after wheel dimensions, such as 11" x 5" x 9" K. The following suggestions are for preparing other makes of wheels for use in the chuck.

The cement we use is 3M Adhesive EC847. We supply this in 1/2 pint cans and 5 oz. tubes, or it may be purchased directly from the Minnesota Mining and Manufacturing Company. This cement has a tendency to thicken when exposed to air. Use acetone as a thinner. Miracle cement is also quite satisfactory. This is available in hardware stores in tubes. A Vellumoid strip when cemented on will last for the life of the wheel no matter how many times the wheel is changed.

It is not essential that the strip be cemented to the wheel. If the wheel is to be mounted on the bench, that is before attaching the holder

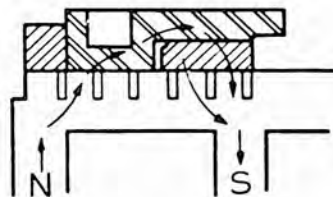
to the face plate, tuck the Vellumoid strip in between the wheel and the clamps. More specifically, with the clamps fully retracted place the wheel in the chuck twisting it slightly to assure a firm seat and centering it so as to provide room for the Vellumoid. Then tuck the strip in between the clamps and the wheel so that the ends do not come opposite a clamp and making sure that the strip is down against the face of the holder.

With the holder on the grinder the Vellumoid strip can be held in place, around the top of the wheel, with ordinary cellulose Scotch tape, one piece to hold the ends together and three or four pieces over the top of the wheel to hold the strip in place. Any other method of holding the strip in place until the wheel is clamped would be equally as satisfactory. While Vellumoid strips not cemented on may be reused if clean, it is better to use fresh strips.

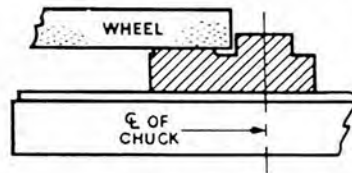
Vellumoid strips may be purchased from The Blanchard Machine Company.

SOLUTIONS TO CHUCKING DIFFICULTIES

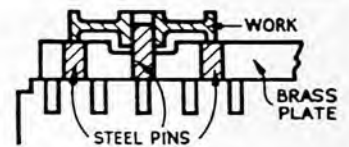
Odd shapes and unusual contours often cause chucking difficulties. In mass production, the solution is usually a special fixture, but ingenuity will do the job cheaper for toolrooms and job shops. Here, in pictures, are typical smart solutions.



Unbalanced Part — This part has parallel surfaces but requires additional support for the overhang and to resist wheel pressure. Blocking provides this support and increases the magnetized base surface. Downward wheel pressure adds to the holding force, but sideward wheel forces must always be counteracted by proper side blocking.



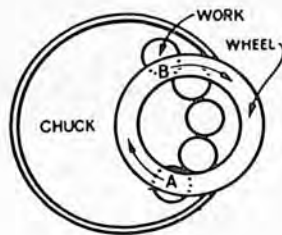
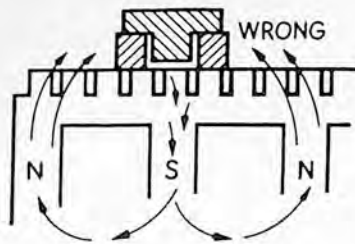
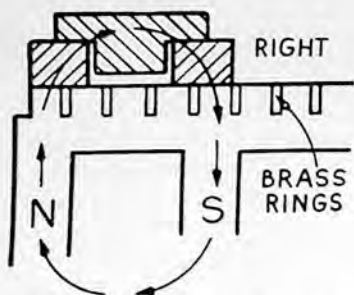
Projecting Element — By placing a projecting hub over the chuck center and feeding the wheel under the grinding wheel only far enough to grind the flat surface, a normally "impossible" job can be ground successfully. When the piece is turned over, blocking would be used to lift it high enough to clear the projecting hub above the chuck.



Many Projecting Parts — When a large quantity of parts with projecting hubs are to be ground, a non-magnetic metal body can be used as an auxiliary plate, with steel pins sweated in place to match the steel poles of the chuck. The plate top can then be profiled or provided with pockets to suit the parts. Note use of pin to center hub.



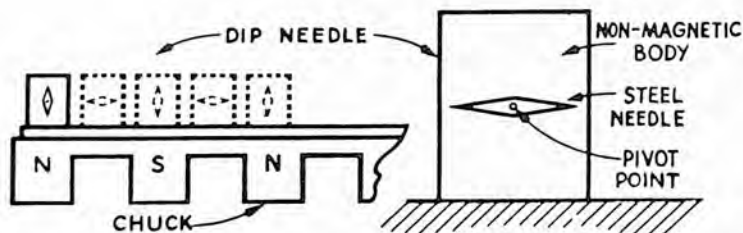
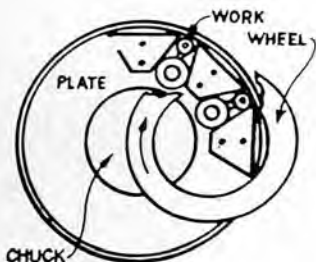
Rough Castings — Blocks supporting rough castings should have large contact areas, or a number of blocks should be used. Several like rough castings will usually vary enough so that blocking must be changed for each. Adjusting screws, as shown here at corners, will do the trick.



Right Location Helps — Full magnetic pull can be obtained only by locating work between opposite poles. Non-magnetic brass rings in the chuck act as dams between poles, to aid in causing magnetic force to travel through the workpiece. With work and blocking supports properly placed, the magnetism will grip the work with maximum pull.

Wrong Location — Placing the piece directly over one pole results in major loss in magnetic pull. Whether blocking is necessary or not, the piece should be spotted between two opposite poles rather than above one or the other. For effective holding, the operator must have some knowledge of magnetism and of chuck construction.

Thin Parts — Grinding action of the wheel may be enough to move thin parts—toward the chuck center at A, and off the chuck at B. If the wheelhead is tilted just enough to clear point A, no measurable error from a true flat surface will result and a single outside ring will be enough to block the work from sliding. If quantities are large, use a nest plate.



Bolted Work — Bolt pieces, if necessary, either through bolt holes provided in the chuck, or into separate steel or iron rings or plates held on the chuck by magnetism. Here, V-shaped blocks are bolted to a plate and work wedged into the openings — very effective for non-magnetic parts if the wheelhead is tilted to wedge the work as previously described.

Handy Aid — A simple "dip needle" — really a steel needle on a horizontal rather than a vertical pivot, will dip as shown at each north or south pole as it is pushed across the chuck with chuck current on. Thus the operator can find the poles and spot work between them to be certain of maximum gripping power for any specific job he may have to do.

Large Non-Magnetic Pieces — Non-magnetic parts require blocking to hold them against forces of wheel and chuck only, meaning generous blocking on ID and OD. Wheel pressure and its own weight will hold work down against the chuck.

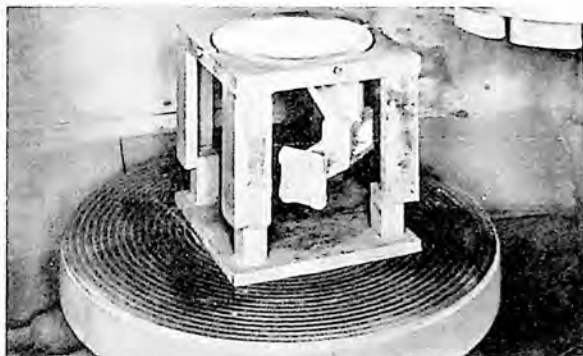




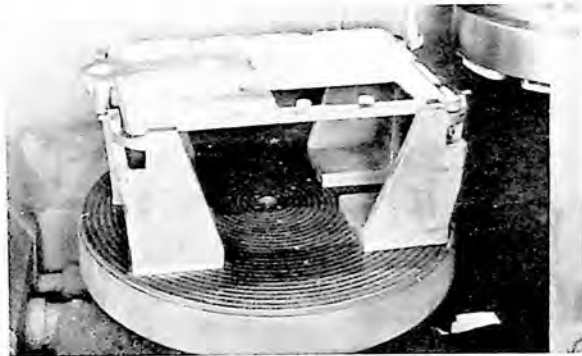
Blocking Small Pieces — To counteract the tendency of the grinding action of the wheel to move parts on the chuck, blocking rings may be used. Here two rings (supplied with the machine) block the small disks and hold them in contact with each other.



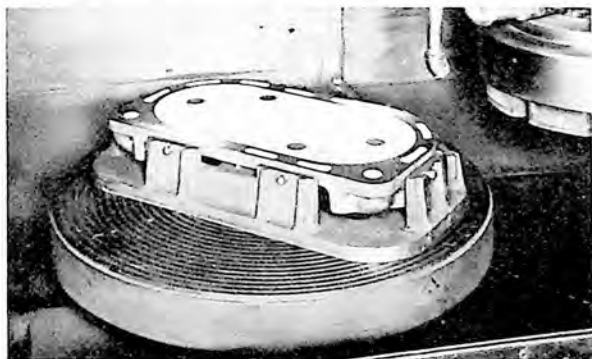
Difficult Shapes — Small pieces that do not block well can be nested in holes in a non-magnetic masking plate located to position workpieces over the strongest parts of the chuck. Here, small thin gears, like those strung on wires at the middle, are nested.



Odd-Shaped Pieces in Lots — For small lots, a fixture fabricated from scrap may work very well. Here a very complicated piece is supported on the flange under the ground surface and four screws grip the flange OD. The fixture is held in turn by magnetism.



Large Unequal Castings — Here a simple fixture provides locating pins at three corners and an adjusting screw at the fourth for leveling irregular castings, while two screws at each corner provide grip. The fixture is really four identical castings — to handle a variety of work.

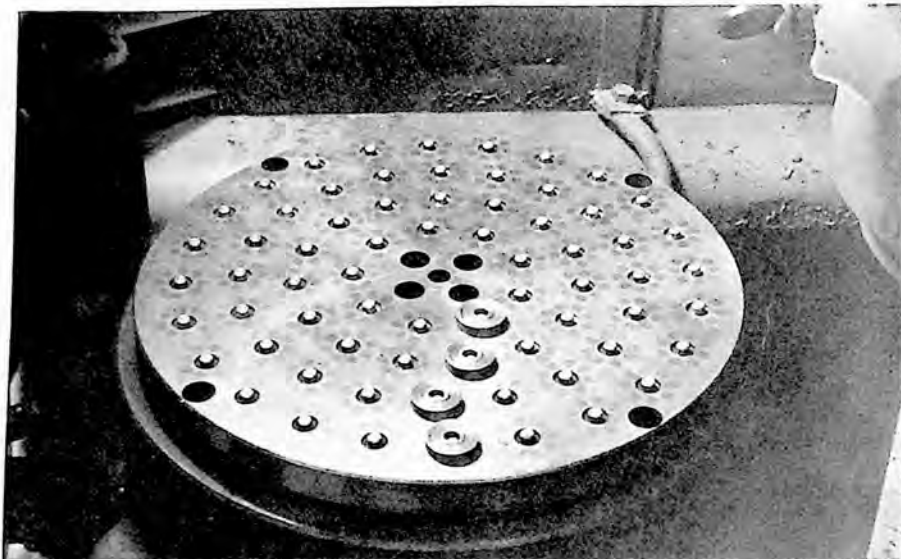


Heavy Unequal Castings — Here a fixture with ears has been cast to hold heavy and varying castings. Both positioning and clamping screws are provided, so non-magnetic pieces can be held securely, while the fixture is held by magnetism only.



Box Castings — By putting fixed locating plates and a few adjustable bolts for positioning the work atop a mounting plate, four castings can be ground at once. The plate covers the whole chuck surface. A little ingenuity will produce such a chuck for almost any part.

Small Pieces With Projections — If many small pieces have projections, a non-magnetic auxiliary plate can be made. This one has steel pins for locating in the piece bore and steel flush pins around it to aid in gripping pieces.



Interfering Projections — By hanging projections over the chuck edge, the pieces, in this instance, block each other and do not interfere with the chuck. No auxiliary blocking is required and pieces are held securely, although it may be necessary to adjust the column so that grinding pressure is against the chuck center.



REMEMBER

1. Magnetism adds weight to the work, thereby increasing friction between work and chuck.
2. Magnetic pull decreases with part volume.
3. Steel or cast-iron blocks or rings can frequently be substituted for expensive fixtures on a magnetic chuck. Such blocking must be ground all over to close limits for squareness and parallelism to assure good magnetic contact. Dimensions should be marked on blocking for ready reference.
4. A "grease-board transfer" will increase production of very small pieces. Mark a platen or flat bench to match the chuck and have the operator set up a second load in this area while the machine

is grinding the first. When the first load is removed, he simply places a greased board over the second load. Pieces will stick to the board, so can be carried to the chuck as a placed group. Pieces are placed, magnetism is turned on and board removed, then blocking rings are placed.

5. Parts with a projecting boss which interferes with normal chucking can be supported on two or more blocks or rings of equal height. If these are not available, they should be made before mounting pieces. This can be a tremendous time-saver when a group of like parts is to be ground.
6. Several like parts in a single chucking should touch each other so they supply their own side blocking, if it can be done without reducing magnetic efficiency too greatly.

GENERAL MAINTENANCE INSTRUCTIONS

CLEANING: In general keep the machine as clean as possible. Fifteen minutes intelligently spent each day in real cleaning will pay good dividends.

Especially keep all dirt cleared away from around the chuck as otherwise the accumulation of dirt will cause water to back up under the rim of the chuck in quantities too great for the guard groove to take care of, and some water will enter the chuck bearing chamber. If this condition occurs it can cause serious trouble.

Clean water ports in face plate daily and also whenever changing wheels. Remove from inside of wheel any heavy crust of dirt, taking care however not to remove or break the waterproof lining of paraffin or sulphur which is put on the inside of the wheel to keep water from escaping through the pores of the wheel.

Be sure cored holes in table are kept open.

The grinder is equipped with easy cleaning tank with inclined end, allowing mud to be hoed out into any convenient receptacle. No settling pan is used, the tank being adapted to settle out the dirt; and its entire bottom can be reached with the hoe provided. It is very easily cleaned. The pump chamber on the back of the machine is open on the top and quite accessible for cleaning.

The tank and pump chamber should be cleaned daily and when removing heavy stock, oftener.

The wheel head motor needs only to have the cover removed and the fan and upper end of coils cleaned occasionally.

The motor driven centrifugal pump should be kept clean and properly lubricated, to manufacturer's specifications.

All other motors are fully enclosed and need only to be kept clean and lubricated, to manufacturer's specifications.

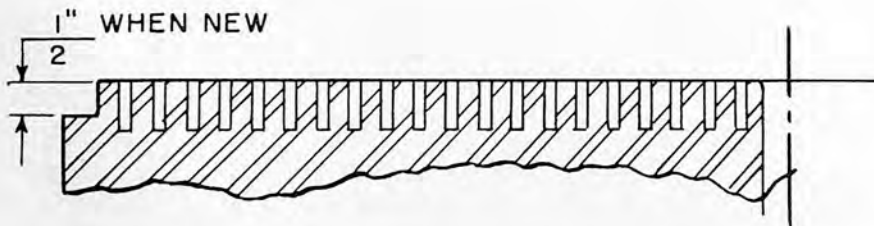
Blanchard Magnetic Chucks

Construction

All Blanchard Magnetic Chucks, regardless of size, are of the same essential construction. The chuck body is machined from a solid steel disc. The top of the chuck body is grooved and filled with brass to form concentric MAGNETIC POLES on the chuck face. On the opposite side, concentric coil pockets are machined in chuck body, leaving heavy walls between. These walls become the main poles of the chuck. The coils are sealed into the pockets and a cast iron or steel bottom plate completes the unit. Both the chuck body and bottom plate are ground flat to ensure a water tight joint. The one piece steel construction gives a body without joints and absolutely water tight.

Wearing Life of a Chuck.

On the outside circumference of Blanchard Magnetic Chucks is a shoulder, which holds the outer chuck blocking ring, and indicates the wearing life of the chuck.



When the chuck is new, this shoulder is $1/2$ ". As the chuck face is dressed from time to time the $1/2$ " dimension, of course, decreases. If this dimension is less than $1/8$ ", the complete chuck should be replaced.

Electrical Specifications

The 30", 36" and 42" Blanchard Magnetic Chucks may be used on either 110 or 220 Volts D. C. by making proper external connections. A variation of 10% high or low in voltage will not materially affect the operation of the chuck.

CAUTION: For work that is difficult to hold, a 10% lower voltage than standard will probably cause holding trouble.

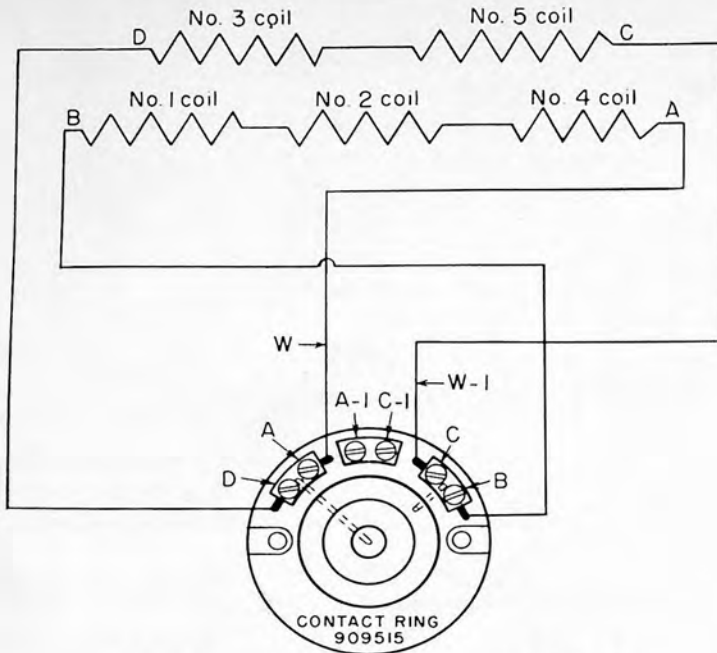
<u>Chuck Size</u>	<u>D.C. Voltage</u>	<u>Amperes</u>	<u>Ohms</u>	<u>Watts</u>
30"	110	5.2	21.1	572
	220	2.6	85.6	572
36"	110	7.2	15.3	792
	220	3.6	61.1	792
42"	110	5.7	19.3	626
	220	2.85	77.2	626

Chuck Connections

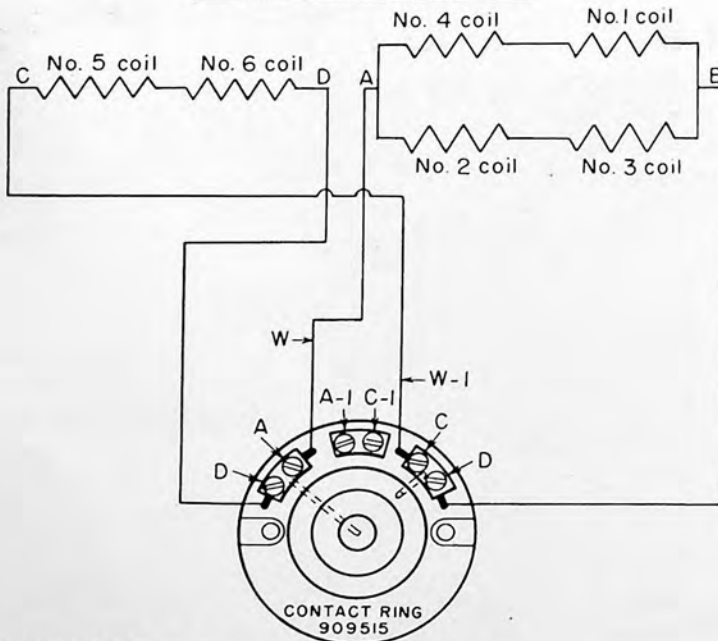
To check or change the connections for voltage lift the magnetic chuck straight up out of the table, turning slightly in each direction to free it from bearing. The weight to be lifted is as follows:

<u>Chuck Size</u>	<u>Approx. Weight</u>
30"	1, 100 lbs.
36"	1, 400 lbs.
42"	2, 195 lbs.

30" MAGNETIC CHUCK (5-COILS)
FOR NO. 18 GRINDERS

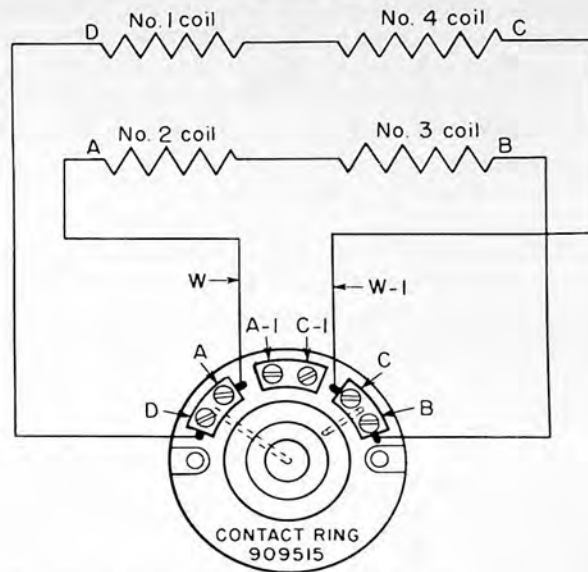


36" MAGNETIC CHUCK (6-COILS)
FOR NO. 18 GRINDERS



CONNECTIONS SHOWN FOR 110 VOLTS D.C.
FOR 220 VOLTS D.C. CONNECT "W" to "A-1" and "W-1" to "C-1"

42" MAGNETIC CHUCK (4-COILS)
FOR NO. 18 GRINDERS



CONNECTIONS SHOWN FOR 110 VOLTS D.C.

FOR 220 VOLTS D.C. CONNECT "W" to "A-1" and "W-1" to "C-1"

Failure of Chuck Magnetism

If the magnetic chuck does not become energized when the current is turned on, there are many things to check.

1. Failure of D.C. supply at source.
2. Fuses blown.
3. Low voltage.
4. Loose connections.
5. Broken or short circuited leads.
6. Worn out or dirty brushes.
7. Weak brush springs.
8. Dirty or grounded contact rings.
9. Defective magnetic chuck.

Locating Fault in Chuck Circuit

Usually there will be either a short circuit, causing the fuses to blow, or an open circuit so that no current flows when switch is closed.

Before starting to hunt for trouble in machine test outside circuit up to the switch as the fault may be entirely in the outside circuit. If certain that fault is inside the machine, locate by testing each part of the circuit separately.

Machines which have rectifiers and Neu-t-rol chuck switches must be checked thoroughly for trouble in these units.

If after thoroughly checking outside circuits trouble is not found, hoist out Magnetic Chuck and inspect brushes and contact rings. (For No. 18 Machines new brushes are 1/2" dia. by 1 1/4" long.) The springs should push the brushes up against the contact rings with light, but appreciable pressure when Chuck is in place. The contact rings should be smooth and free from pits or burned spots. If pitted or burned, it indicates poor contact caused by either brushes too short, weak springs, brushes sticking in holder, or oil or dirt on rings.

If rings and brushes look all right, test with lamp of same voltage as chuck circuit, or Volt Meter across brushes to see if current reaches this point. If lamp fails to light properly, or voltage reading is off, check chuck cable from switch to brush holder, and inspect brush holder.

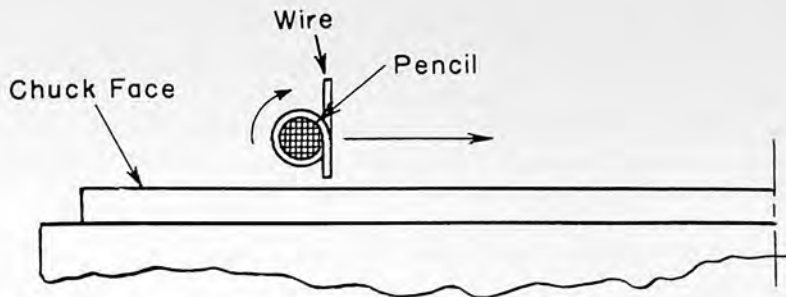
If tests show no fault in circuit up to brushes, then it may be at contact rings. Disconnect chuck wires from contact ring holder and test for ground between rings. If a ground shows, replace with a new contact ring holder. Also check for short circuit between rings.

If after testing complete circuit, trouble appears to be inside of chuck, we strongly recommend the Magnetic Chuck be returned to us for repairs.

Testing Chucks

When testing the chuck units themselves, there are several checks which should be made:

- (1) Be certain chuck is connected for same voltage as D.C. supply.
- (2) Check entire chuck and each group of coils for proper readings as shown in previous tables and sketches.
- (3) Check chuck for proper polarity. A quick test can be made by bending a piece of soft iron wire or a paper clip around a pencil so it is free to rotate. The wire should rotate in the same direction when passed over the chuck face, making 1/2 turn over each main pole. If wire turns first one way and then the other, reverse leads of one group of coils as shown in previous sketches.



CHANGING VOLTAGE OF MAGNETIC CHUCK: Remove chuck. Make connections for desired voltage as shown here.

MAGNETIC CHUCK CONNECTIONS



220 VOLTS

coils in series



110 VOLTS

coils in parallel

On grinders equipped with NEU-T-ROL switch, it is essential to return NEU-T-ROL to manufacturer for necessary changes.

ELECTRO-MATIC RECTIFIER

FOR MAXIMUM PERFORMANCE

The ELECTRO-MATIC RECTIFIER will deliver a steady flow of direct current to your equipment within its rated capacity with practically no voltage fluctuation within the unit itself. It is, therefore, suggested that this unit be connected to a circuit independent of one with excessive variable loads. This unit will give many years of satisfactory performance, providing it is connected and used within reasonable limits of its rated capacity. The A. C. voltage applied to this RECTIFIER should be within 10% of that indicated on the name-plate.

INSTALLATION

With the ELECTRO-MATIC RECTIFIER combination unit additional fusing or protective devices are not required.

The combination unit consists of the ELECTRO-MATIC RECTIFIER, wiring trough, switch, and fuse compartment. If you do not have the ELECTRO-MATIC RECTIFIER combination unit be sure a fuse disconnect switch is inserted in the A. C. supply line to protect the RECTIFIER against short circuits of excessive over-loads.

All wiring to and from this unit should be well insulated to minimize the possibility of grounds or short-circuits.

After connections are properly made to the A. C. and D. C. terminals of the RECTIFIER, the half-wave rectifying tubes should be secured firmly in their respective sockets. The anode clips should then be fastened to the terminal caps of the rectifying tubes or the anode leads to the anode terminal posts. Check RECTIFIER for proper operation and then replace cover and fasten securely.

ELECTRO-MATIC ELECTRONIC TIME DELAY SWITCH

This RECTIFIER is equipped with an automatic time-delay to ensure protection against tube failures due to the application of the D. C. load before the rectifying tubes have reached their proper operating temperature. The electronic time delay is factory adjusted and fully automatic. Once adjusted, further attention is not needed, as it derives its control medium from the D. C. output of the rectifying tubes, the ambient temperature and the applied voltage. A momentary voltage failure will not cause the time delay to recycle, it will act instantly within the operating temperature of the rectifying tubes. In the case of a sustained A. C. voltage cut-off, it will recycle only to the extent to which the rectifying tubes have cooled below their normal operating temperature.



The small variable control on the top of the chassis (as shown at lower left) is adjusted at the factory with the proper time allowance made for each model at the standard voltage and need not be readjusted except when tubes are changed or under certain voltage conditions. If the control must be readjusted, proceed as follows: Turn the adjustment completely to the left and then apply A. C. voltage to the RECTIFIER. The red pilot light (at right) indicates the applied A. C. voltage. When the emission starts at both tubes and full voltage is indicated on the voltmeter, wait 5 minutes and then turn the adjustment slowly to the right until the relay contacts close. At this point

the white pilot light (at left) will glow, indicating that the D.C. voltage has been applied to the output terminals. The purpose of this control is to obtain the proper time-delay on a cold start and yet provide for an instantaneous reclosure of the relay in case of a momentary A.C. voltage failure.

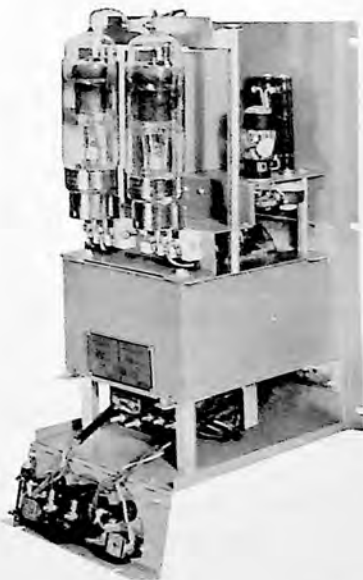
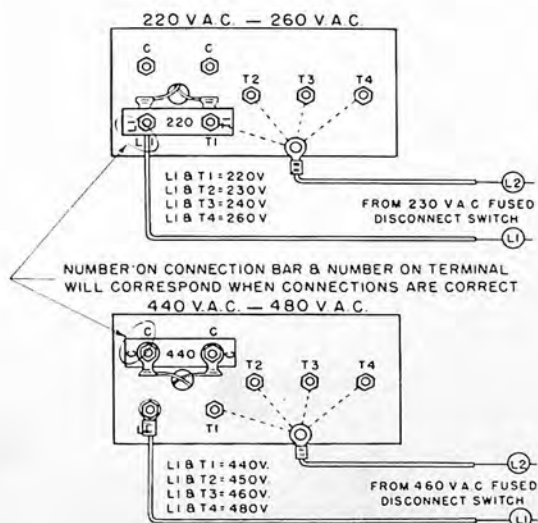
GUARANTEE

Each ELECTRO-MATIC RECTIFIER has been carefully inspected and tested under full operating conditions before shipment. The RECTIFIER is guaranteed for one year. If during that time repair or replacement is required due to defective workmanship or material they will be made without cost, provided the rectifier has not been subjected to physical damage beyond our control.

FOR PARTS & SERVICE CONSULT

Electro-Matic Products Co.
2235 N. Knox Avenue
Chicago 39, Illinois

DUAL A.C. VOLTAGE CONNECTIONS 230 - 460 V.A.C.



Service Hints on Electro-Matic Rectifiers

If the A. C. fuses blow, any of the following could be the cause: A defective tube, a leaking tube, a loose tube in the socket, or an excessive surge in the A. C. line voltage.

If the A. C. fuses continue to blow, look for the following: A loose tube, a worn out tube, or a leaking tube. If the tubes were found to be loose in their sockets, they must be removed and the contacts of the sockets thoroughly cleaned as well as the tube contact and replaced firmly into the socket.

Before replacing more than (2) fuses the condition of the tubes should be checked or the tubes replaced with new ones. Before replacing however, the contacts in the sockets should be thoroughly cleaned and tubes screwed up firmly into their sockets to assure good contact.

Loose tubes will have the following effect: The mercury will not properly vaporize with a loose tube because there is insufficient current to properly heat the filament.

When a tube is operated loose for a period of time, the contacts on the tube and the socket will become pitted and carbonized. In this case, the tube must be removed and the contacts of the tube and socket thoroughly cleaned, and the tubes again replaced tightly.

A loose tube because the mercury is not properly vaporized, will cause a flash-over, which is equivalent to a momentary short circuit through the secondary winding of the transformer at intervals of seconds, minutes or even several hours. Eventually it will blow the fuse, which to the operator would appear unreasonable. This condition cannot be remedied by merely tightening the tube because as explained above, once the contacts are pitted and carbonized, no amount of tightening of the tube would assure good contact.

If the transformer is damaged, the A. C. fuses will blow immediately upon closure of the A. C. Line Switch.

See that fuse terminals and fuse clips are clean, that good contact is made between the fuse terminals and clips, and that the clips are securely fastened to the base.

When renewing fuse, see that the links and contacts are clean, and that the links are securely fastened.

Properly designed fuses warn you when poor contact exists. Charring of the ends of fibre tubes or discoloring of metal ends always indicates poor contact on the fuse, or an overload. When only one end of fuse is charred or discolored, you have a positive indication as to the end the poor contact exists.

Washer or end plug on a ferrule contact fuse burned or partially melted indicates that the plug was not screwed down tight.

If Rectifier appears to be operating satisfactorily, but fuses blow when time delay comes in, which is indicated by the white pilot light, then check the following:

A short circuit in the D.C. wiring between the Rectifier and the Magnetic Chuck, or a ground, or a short circuit in the Magnetic Chuck, or associated equipment.

If Rectifier appears to be operating satisfactorily, but time delay does not come in:

Adjust screw driver slotted shaft mounted on the time delay chassis, turning shaft in clock-wise direction. If this does not pull time delay in, replace control tube, or check for an open circuit through relay coil.

Proper timing of the time delay is essential to tube life and should be adjusted according to data given on name plate. The timing will vary with the size of the Rectifier ranging from three to 10 minutes. To decrease the time cycle, turn shaft clockwise. To increase time cycle, turn counter clockwise. The timing adjustment should always be made when the Rectifier is started cold.

Recommended Fusing for Various Sizes of Electro-Matic Rectifiers.

<u>Model</u>	<u>A. C. Supply Voltage</u>	<u>D. C. Supply Voltage</u>	<u>Fuse Protection in A. C. Line to Rectifier</u>	<u>Fuse Protection in Anodes of Rectifier</u>
P5-21	220	110	15"	BAF 20 Amp.
P5-22	220	220	15"	
P5-41	440	110	10"	
P5-42	440	220	10"	

INSTALLATION AND OPERATING INSTRUCTIONS

NEU-T-ROL MAGNETIC CHUCK CONTROL



MODELS E-F-G-H-S

GUARANTEE

The NEU-T-ROL when operated according to instructions will perform indefinitely with practically no attention and is guaranteed for a period of one year against defective material and workmanship, during which time it will be repaired or replaced, providing it has not been subjected to physical damage beyond our control.

MAINTENANCE

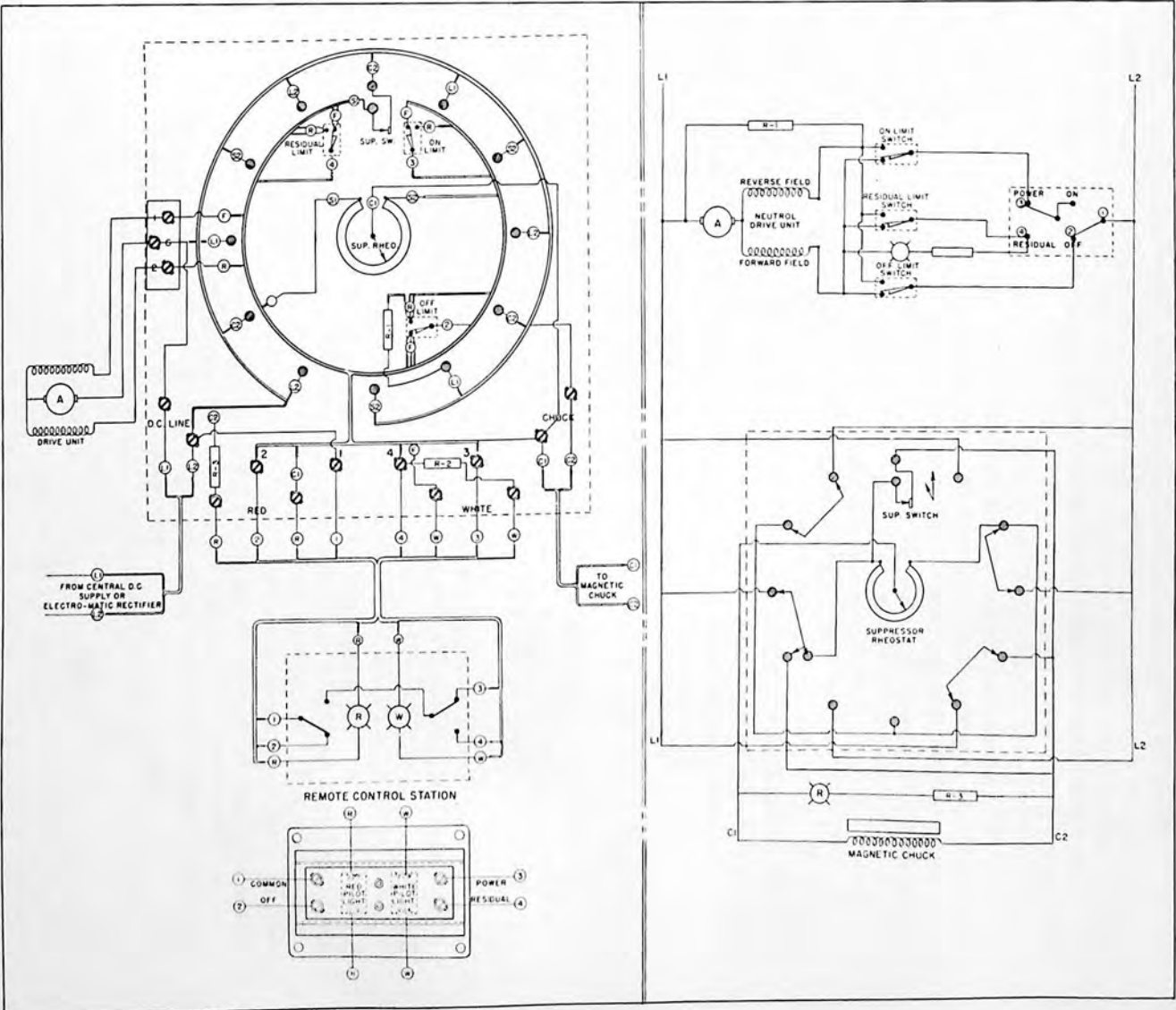
The NEU-T-ROL requires no maintenance or adjustments other than an occasional cleaning of the contact surface of the rotary switch. It is recommended that at periods of from three to six months, the contacts be cleaned and a slight amount of vaseline applied. This is not altogether essential. However, it will reduce wear and greatly prolong the life of the contacts.

PROTECTION

The suppressor rheostat and all other current-carrying members are sufficiently heavy to withstand considerable overloads. However, they cannot be subjected to short circuits. The D.C. supply should be properly fused to protect the NEU-T-ROL in the event a short circuit develops in the magnetic chuck or the wiring between it and the NEU-T-ROL. (It is not necessary to fuse the D.C. supply when the NEU-T-ROL is used in conjunction with the ELECTRO-MATIC RECTIFIER as the line fuses supplying the ELECTRO-MATIC RECTIFIER are of sufficient protection.)

For best performance, the D.C. voltage should not fluctuate more than 5% during the demagnetizing cycle.

MOTOR DRIVEN NEUTROL MAGNETIC CHUCK CONTROL



The NEU-T-ROL is arranged for a remote control. The main unit can be mounted on some out-of-the-way part of the machine and the remote control station mounted in a convenient position to the operator.

Remove cover and make line and chuck connections and connections between the main unit and the remote control station. A good grade of insulated wire should be used. Four wires are used for the control switches and two for each pilot light. Make all connections as shown on the wiring diagram.

The red pilot light is connected directly to the chuck terminals and definitely indicates whether the current is on or off to the chuck. The white pilot light is interconnected with the residual limit switch and indicates the residual position.

OPERATION

The NEU-T-ROL Magnetic Chuck Control is fully automatic in its operation and requires no attention or adjustment by the operator. The operator needs only to select one of the three desired positions, namely: "on", "residual", or "off".

HEAVY PRODUCTION GRINDING

Assuming that all connections are properly made and the proper D. C. voltage applied to the NEU-T-ROL and the magnetic chuck, operate the NEU-T-ROL as follows:

For heavy production grinding, it is only necessary to operate the on and off switch, leaving the power-residual switch in the "power" position. The on and off switch will fully energize the chuck, depending on the applied D. C. voltage and will completely demagnetize it when thrown to the "off" position. To load the magnetic chuck, the control switch should be in the "off" position. After the work is properly placed on the chuck for grinding, throw the control switch to the "on" position, noting that the power-residual switch is in the "power" position. The red pilot light will indicate power to the chuck. After the grinding operation is completed, throw the on and off switch to the "off" position, and the NEU-T-ROL will begin its demagnetizing cycle. After several seconds, the work can be easily removed. The work should not be moved during the demagnetizing cycle.

GRINDING OUT THE HIGH SPOTS FROM WORK THAT HAS BECOME WARPED

Where it is necessary to perform light grinding operations or grind out high spots from work that has become warped, set the NEU-T-ROL in the "on" and "residual" positions. In these positions, the work is not

held to the chuck with the full magnetizing power of the chuck, but rather with the residual magnetism retained in the chuck and the work-piece, which is sufficient under ordinary conditions for finish grinding. To demagnetize the chuck and the work-piece from this position, the on and off switch must be thrown to the "off" position.

GAUGING WORK BETWEEN GRINDING OPERATIONS

Where it is necessary to gauge work between grinding operations, as in cases where a large number of small pieces are loaded on the chuck, and it is necessary to remove one or more for gauging purposes between grinding operations, the power-residual switch should be thrown to the "residual" position. This will allow the operator to remove one or more pieces from the chuck without disturbing the entire lot. Upon replacing the work-pieces, the power-residual switch is again thrown to the "power" position and the grinding operation repeated. DO NOT ATTEMPT THIS PROCEDURE BY OPERATING THE ON AND OFF SWITCH, AS THE NEU - T - ROL WILL RELEASE THE WORK SO THOROUGHLY THAT WATER AND DIRT MIGHT SEEP UNDER THE WORK - PIECES AND THROW THEM OUT OF THEIR ORIGINAL POSITIONS.

The red pilot light indicates power to the chuck and the white light indicates the residual position.

FOR PARTS & SERVICE CONSULT

Electro-Matic Products Co.
2235 N. Knox Avenue
Chicago 39, Illinois

Service Hints on the Neu-t-rol Control and the D.C. Supply

If the Neu-t-rol fails to operate or energize Chuck:

What to look for:

Check the D.C. supply voltage, which should be within 10% of that indicated on the name plate.

Check the Neu-t-rol Control name plate and that of the Magnetic Chuck to be certain that they are of the same rating.

Blown fuses; extremely low voltage in cases of an ineffective generator, or a Rectifier operating on one tube supply half voltage at half wave.

Check the voltage fluctuation between "no load" and "full load". If there is more than 10% variation in the voltage, it will greatly effect the efficiency of the Neu-t-rol.

An inoperative drive motor on the Neu-t-rol Control caused by worn brushes, worn gears, or a loose coupling between the motor and the control.

If the Neu-t-rol unit operates but will not energize the Chuck:

Check to see if the red pilot light is burning on the remote control station, which is connected directly to the Chuck terminals of the main panel. If this pilot light is receiving current (be sure that it is not burned out), then a break in the wiring between the Neu-t-rol and Chuck or a bad brush at the Chuck, is causing the difficulty.

If the Neu-t-rol appears to operate satisfactorily and energizes the Chuck but does not demagnetize:

What to look for:

An open suppressor rheostat caused by a previous short circuit in the Chuck or the wiring between the Neu-t-rol and the Chuck, or if the Neu-t-rol continues to rotate and does not stop at the selected position, there is a possibility of ground or a short circuit in the wiring between the main Neu-t-rol panel and the remote control station; a ground or a short circuit in one of the control switches, or a sticking limit switch in the main Neu-t-rol panel.

Breaking the D.C. supply either ahead of the Neu-t-rol and the Magnetic Chuck, while the Neu-t-rol is in the full "on" position by other means than the Neu-t-rol is dangerous to the Magnetic Chuck and should never be attempted. This practice surges the Chuck with the possibility of puncturing the insulation and causing grounded Chucks, which can also break down the insulation on the Neu-t-rol drive motor and burn out an excessive amount of pilot lights.

The Neu-t-rol should never be left in the "on" position and the circuit broken by other means to effect holding the work in position on the Chuck at the end of the work day or during the changing of shift. The residual position is provided on the Neu-t-rol for just this purpose. Breaking the circuit by other means than the Neu-t-rol will cause surging of the Chuck as explained above, and where a Rectifier without a time delay is used to supply the D.C. current, it would be necessary to start the Rectifier under full load without giving the tubes a chance to warm up. This in turn could cause blown fuses or damaged tubes and the possibility of operating on one tube.

The work piece cannot be larger than the Magnetic surface area of the Chuck to obtain the maximum efficiency from the Neu-t-rol.

Recommended Fusing For Various Sizes of Neutrol Magnetic Chuck
Controls Where D.C. Supply is Furnished by Other Equipment Than
The Electro-Matic Rectifier

<u>Model</u>	<u>D.C. Supply Voltage</u>	<u>Fuse Protection in D.C. Line to Neutrol</u>
G750	115	15 Amp.
G750	230	8 "
G1000	115	20 "
G1000	230	10 "
H1500S	115	30 "
H1500S	230	15 "

INSTRUCTIONS FOR ORDERING PARTS

This catalog covers all standard #18 Blanchard Grinders from Serial #2545 up. The illustrations show the various units and the important changes that have been made in their design. Any part not shown is so designated in the text.

SERIAL NUMBERS: We number all our machines serially regardless of whether the machine is a #10, #11, #16, #16-A, #16-A2, #18 or larger grinders and within the range of serial numbers given in this catalog. There are other machines to which this catalog does not apply; therefore, it is **IMPORTANT THAT THE SERIAL NUMBER OF THE GRINDER BE GIVEN WHEN ORDERING PARTS.** The serial number is stamped on the front of the Base near the controls of the Chuck Speed Box.

IDENTIFYING PARTS: We do not stamp our parts, consequently identification should be made from this catalog. Any number found on gears is simply a lot number and cannot be used for identification. Pattern numbers are sometimes left on castings, and should agree with this catalog, but if not, they may be used if the number is plainly indicated. Parts in this catalog marked "X" before the number simply means that the part is not a casting, and if an order is telegraphed the "X" may be omitted if the customer prefers.

STYLE PARTS: We designate small parts such as Screws, Nuts, Washers, Studs, Dowel Pins, Keys, Threaded lengths of Pipe and Conduit, Grease Fittings, etc. as Style Parts; for example, "Style 66 - #9" means a #9 Woodruff Key. Style Parts need not be mentioned when ordering as they will be included with the part immediately preceding them in the catalog.

SUB-ASSEMBLIES: A number with six digits beginning with the number 9 signifies a Sub-Assembly or group of parts that can be ordered complete by using that number. For example, the number 910917 means a complete Traverse Pinion and Shaft with Gear Case Cover, Splash Guard, Guard Cover, Worm Gear and Bushings with necessary Screws and Keys on any #18 Grinder from Serial #2545 and up. As a rule, Sub-Assemblies are made up because the construction of the parts require that a group of parts be assembled in production. Individual parts can be supplied unless otherwise noted.

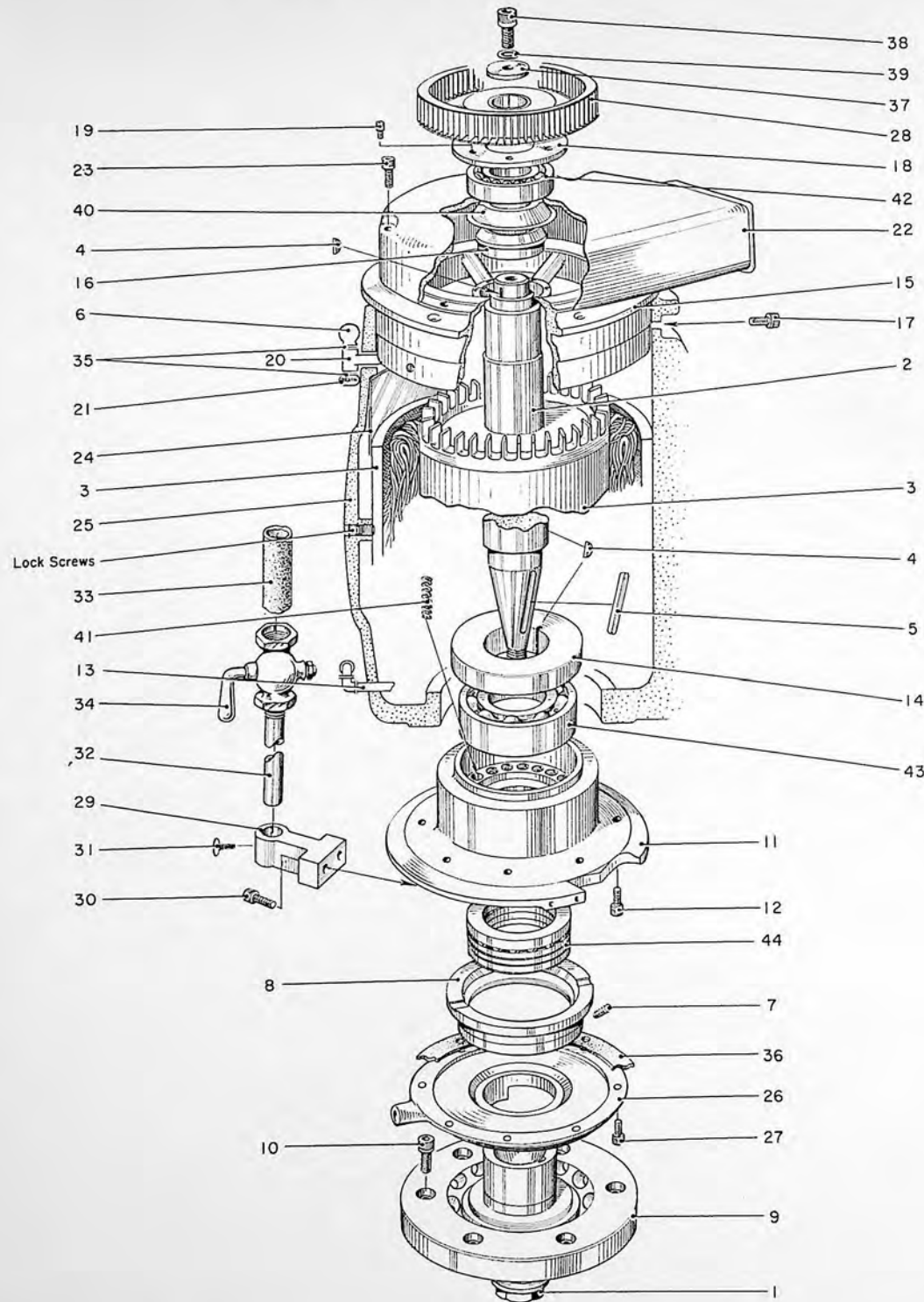
BEARINGS: All commercial Ball or Roller Bearings and Thrust Bearings are listed by the manufacturer's catalog number and may be ordered either direct from the manufacturer or from us.

ARRANGEMENT: We have tried to arrange the illustrations and list of parts in the order most likely to suit the customer's needs when ordering parts. Where there are two or more designs of the same unit, the older design is listed first according to the range of serial numbers which it includes. On some units where the changes affect only a few parts, we have shown the latest and also give the number of the older part in the description.

**Parts Plates, Parts Lists,
and Maintenance Instructions.**

PLATE 1

929816 Direct Motor Drive Wheel Head



IMPORTANT: Always give serial number of grinder when ordering repair parts.

KEY NO.	PART NO.	DESCRIPTION	QUANTITY
	929816	DIRECT MOTOR DRIVE WHEEL HEAD	
		Thrust Bearing Spindle from Serial 2545 and up. After Serial 2734 ventilation changed, altering Head.	
		This is the complete unit used on all #18 Direct Motor Drive Grinders with alternating current motors after serial 2545. It is not used on grinders with Direct Current Motors which require a special Head unit. When ordering give voltage, frequency, phase, and make of motor. The Feed Screw and its bevel gears and bearings are not part of this unit, but the Feed Screw should always be ordered with a new head. An 18" wheel is used on this head.	
	923897	ROTOR AND SPINDLE, includes	
1		X7302 Faceplate Nut	1
2		X23897 Spindle	1
3		25 HP, 0235 HP Rotor & Stator General Electric, Westinghouse or Woods (specify maker and current characteristics)	1
4		Style 66 - #9 Key	2
		Style 66 - #V Key (Not Shown)	2
5		Style 104 - 1/2" x 4" Key	1
	13632	18" Wheel Ring (Not Shown)	
	15013	20" Wheel Ring (Not Shown)	
6	24029	Upper Filler Plug	1
	17241	Lower Oil Slinger (up to Serial 3400)	1
7		Style 157 - 5/16" x 1/2"	1
8	23709	Grease Slinger Used After Serial 3400	1
9	17500	Faceplate	
		Allen Special Steel Washer 17/32" x 3/16" (permanently assembled in faceplate)	6
10		Style 52A - 1/2" x 1 1/2" (For Wheel Rings)	6
11	17503	Lower Bearing Bushing (Used with Self-Aligning Thrust Bearing)	1
12		Style 52A - 1/2" x 1 1/2"	8
13		Style 183 - 1/8" x 5 3/4"	1
	26926	Lower Bearing Bushing - Use with MRC-1125-F Thrust Bearing	



IMPORTANT: Always give serial number of grinder when ordering repair parts.

KEY NO.	PART NO.	DESCRIPTION	QUANTITY
14	23898	Lower Bearing Dust Guard (17504 up to 6062)	1
15	929817	UPPER BEARING	
16		17546 Upper Bearing Oil Retainer	1
17		Style 52A - 5/8" x 1 1/2"	4
	17542	Front Gib (Not Shown)	1
	17543	Rear Gib (Not Shown)	1
		Style 52A - 5/8" x 2"	14
	30607	Rear Gib - Serial 6683 & up	1
18	17547	Upper Bearing Cover	1
19		Style 52A - 3/8" x 3/4"	6
20	17548	Filler Tube	1
21		Style 108 - 5/8" Drain Plug	1
	17555	Head Cover (not used after serial 2734)	1
		Style 52A - 5/16" x 3/4"	6
	20716	Motor Cover (Serial 2735 to Serial 3385)	1
		Style 52A - 3/8" x 3"	3
22	22729	Air Inlet Horn (Serial 3386 up)	1
23		Style 52A - 3/8" x 3"	3
24	X20739	Air Baffle	1
25	29816	Head (Serial 2545-2823 use 17581)	1
	20855	Ventilator Grille (Not Shown)	1
		Style 53 - 1/4" x 1/2"	1
26	23710	Lower Bearing Grease Case	1
		(17583 if oil lubricated)	
27		Style 52A - 3/8" x 1" (Not Shown)	8
	18386	Lower Filler Plug (oil lubricated only)	1
	18567	Fan (not used after serial 2734)	1
28	929891	FAN ASSEMBLY, includes Serial 2735 up	1
		20718 Fan Hub	1
		X29891 Fan	1
		Style 53 - 1/4" x 1/2"	6
29	19195	Outside Water Bracket	1
30		Style 52A - 1/2" x 1 1/4"	2
31		J.H. Williams Thumb Screw	
		Style C - 3/8" x 1"	1
32	X10412	Nozzle	1
	X10469	Eye Bolt (Not Shown)	1
33	X11148	Water Hose	2
34	X11150	Nozzle Cock	2
		Style 83 - 1" x 5"	1
		Style 83 - 1" x 10"	1
		Style 83 - 1" x 3 1/2"	2
		1" 90° Elbow	1
35	X16341	Oil Drain Plug Washer (Plugs and Drains)	4
	X17249	Lower Bearing Felt (Oil lubricated only)	1

IMPORTANT: Always give serial number of grinder when ordering repair parts.

KEY NO.	PART NO.	DESCRIPTION	QUANTITY
36	X17375	Lower Oil Case Gasket	1
37	X17545	Fan Washer	1
38		Style 52A - 3/4" x 1 3/4"	1
39		Style 100A - 3/4" Lockwasher	1
40	X17551	Upper Splash Vane	1
	X17586	Air Baffle (not used after serial 2734)	1
	X30748	Column Waterguard (22352 before serial 6639)	1
		Style 63 - 5/8"	2
		Style 76 - 5/8" x 1"	2
	917622	WHEELGUARD - Used Up to Serial 7562, includes	1
		X17621 Wheelguard Support	2
		Style 52A - 5/8" x 2"	2
	935818	Wheelguard - Serial 7563 and up	
	X22350	Front Head Waterguard (see Page 104)	1
	X17624	Rear Head Waterguard (see Page 104)	1
	X17666	Front Rubber Binder - Long (not shown)	1
	X23351	Front Rubber Binder - Short (not shown)	1
	X17668	Rear Rubber Binder - Long (not shown)	1
	X17669	Rear Rubber Binder - Short (not shown)	1
41	X17992	Spindle Spring	20
	X18565	Cover Post (not used after serial 2734)	6
	X18566	Guard (not used after serial 2734)	1
42		Upper Radial Bearing	1
		MRC #216-R or SKF #1216	
43		Lower Radial Bearing	1
		MRC #319-S or SKF #6319	
44		* Lower Thrust Bearing	
		MRC #1125-U3 or AETNA 1425-5	1

* In Series Of 18 and 18C Grinders Between 6063 and 8071, Most Spindles Use 1125F Bearings Except Those Listed Below Which Can Use Standard Self Aligning Bearings.

6477	7093	7243	7300	7375	7415	7447
6906	7101	7250	7313	7376	7416	7461
7014	7106	7254	7314	7380	7417	7462
7016	7146	7270	7315	7381	7418	7463
7018	7157	7275	7316	7409	7419	7464
7023	7163	7277	7317	7410	7420	7497
7033	7233	7278	7318	7411	7421	7506
7041	7235	7296	7320	7412	7434	7513
7091	7236	7297	7321	7413	7438	7520
7092	7239	7299	7322	7414	7444	7523

7529	7677	7753	7847	7908	7963	8036
7531	7678	7755	7848	7910	7964	8037
7532	7694	7791	7849	7912	7966	8038
7533	7696	7792	7850	7913	7967	8039
7535	7697	7793	7851	7914	7968	8040
7536	7698	7796	7852	7915	7969	8041
7542	7700	7799	7853	7916	7970	8042
7544	7701	7800	7854	7917	7971	8043
7548	7703	7801	7855	7918	7972	8044
7550	7704	7805	7856	7919	7973	8045
7552	7706	7806	7857	7921	7974	8046
7557	7708	7810	7858	7922	7975	8047
7558	7709	7811	7860	7923	7976	8048
7559	7710	7812	7861	7928	7977	8049
7560	7713	7814	7862	7929	7978	8050
7563	7715	7815	7863	7930	7979	8051
7564	7717	7817	7864	7931	7981	8052
7585	7718	7818	7865	7932	8012	8053
7587	7719	7819	7866	7933	8013	8054
7589	7720	7820	7867	7934	8016	8055
7590	7721	7822	7868	7935	8017	8056
7593	7722	7823	7869	7936	8018	8057
7594	7726	7826	7870	7937	8019	8058
7597	7728	7827	7885	7939	8020	8059
7601	7729	7828	7888	7940	8021	8060
7602	7730	7829	7889	7941	8022	8061
7604	7732	7830	7890	7942	8023	8062
7605	7738	7831	7891	7943	8024	8063
7606	7739	7832	7892	7952	8025	8064
7607	7740	7833	7893	7953	8026	8065
7657	7741	7834	7895	7954	8027	8066
7658	7742	7835	7897	7955	8028	8067
7659	7743	7836	7899	7956	8029	8068
7660	7745	7839	7900	7957	8030	8069
7662	7747	7840	7901	7958	8031	8070
7666	7748	7842	7904	7959	8032	8071
7667	7750	7843	7905	7960	8033	& up.
7669	7751	7844	7906	7961	8034	
7675	7752	7846	7907	7962	8035	

IMPORTANT: Always give serial number of grinder when ordering repair parts.

KEY NO.	PART NO.	DESCRIPTION	QUANTITY
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The following parts, although on the column, are listed for convenience with the Head Unit.
(See illustration Page 58)

10617	Retaining Ring (serial 2545 to 6638)	1
14805	Feed Screw Dust Guard	1
	Style 51 - 5/16" x 3/4" (Not Shown)	2

IMPORTANT: Always give serial number of grinder when ordering repair parts.

KEY NO.	PART NO.	DESCRIPTION	QUANTITY
	17544	Taper Gib (Not Shown)	3
		Style 91 - 1/2" - 20 x 4"	3
		1/2" - 20 Finished & Hardened Nut	3
	17587	Feed Screw Cap	1
	18763	Feed Screw Nut (In Head)	1
		Style 52A - 3/8" x 7/8"	3
		Style 100 - 3/8"	3
		(This should always be ordered with a new Feed Screw.)	
		Feed Screw Lubrication Unit (Not Shown) consists of:	
		Style 83 - 1/8" x 3 1/4"	1
		Style 105 - #1601 Alemite Fitting	1
		1/8" - 90° Elbow	1
		3/16" Tube - 1/8" Male Pipe Thread	
		Solderless Compression Sleeve Type	
		Straight Tube Fittings	2
		3/16" Soft Copper Tubing 18" Long	
	X10616	Feed Screw Bevel Gear (serial 2545 to 6638)	1
	X10628	Retaining Ring Set Screw Block	1
		Style 57 - 3/8" x 3/8"	1
	X17502	Bearing Sleeve	1
	X17702	Feed Screw (serial 2545 to 6638)	1
		Style 64 - 1/8" x 1 1/2"	1
		Style 66 - #9 Key	1
		7/8" - 14 SAE Castellated Nut	1
	18815	6" Extended Feed Screw	
	22111	12" Extended Feed Screw	
	X18768	Feed Screw Guard	1
	18814	Feed Screw Guard 6" Extended	
	X18845	Feed Shaft Pinion (serial 2545 to 6638) (see Upper Gear Box)	1
	X19132	Fitting Washer	1
	X19133	Feed Screw Washer	1
		Style 83 - 1/4" x 19 3/8" Grease Pipe	1
		Style 105 - #1610 Alemite Fitting	1
		1/4" x 1/8" Reducing Coupling	1
		1/4" Allen Pipe Plug	1
		308-R Gurney Radial Bearing	1
		1110-U Gurney Thrust Bearing	1
	X11609	Column Screw Washer (Plain)	2
	X11610	Column Screw Washer (Graduated - Not Shown)	1
	X17626	Column Screw	3
	X17629	Column Screw Bushing (Not Shown)	3

To Remove Head From Column

1. Disconnect 2 coolant hoses. No. 33
2. Disconnect electrical leads to Motor at Junction Box on Head.
3. Remove Column Waterguard 30748 serial 6639 and up. Part 22352 before serial 6639.
4. Remove Button on back of Head that trips Limit Switch.
5. Run Head up to extreme position. DO NOT RUN HEAD OFF FEED SCREW UNDER POWER.
6. With a hoist of sufficient capacity to support the weight of the Head (approx. 1900 lbs.) turn Hand Wheel until Head is free of Feed Screw, and hoist straight up until Head is free of Column.

TO DISASSEMBLE HEAD UNIT

(This May Be Done With Head On Or Off Machine)

1. First drain oil from Upper Bearing and remove Filler Tube No. 20.
2. Remove Air Inlet Horn No. 22.
3. Remove Bolt No. 38 from upper end of Spindle and Fan No. 28 may be lifted out; this exposes Upper Bearing Cover No. 18 which is removed.
4. Remove 4 CapScrews No. 17 from Upper Bearing Housing No. 15 and with a sling and hoist pull Upper Bearing Housing from Head. This will also remove the Upper Radial Bearing from Spindle.
5. Next block up Face Plate No. 9 and remove Face Plate Nut No. 1. (Face Plate will not come off Spindle until Lower Bearing Grease Case No. 26 is removed.) Remove Grease Slinger No. 8 from Face Plate. This Slinger has a Left-Hand Thread and a wrench for this purpose is provided. Lower Bearing Grease Case No. 26 and Thrust Bearing No. 44 may then be removed.
6. With Eye Bolt screwed in upper end, Spindle and Rotor may then be hoisted clear of Head bringing Lower Radial Bearing No. 43 with it.
7. Dust Guard No. 14 can be moved up on Spindle No. 2 and Lower Radial Bearing No. 43 can be driven off with a soft mallet or pulled off with a wheel puller.
8. This bearing No. 43 is replaced by heating in clean oil to not over 150°F and placed on spindle so that thrust is down against springs No. 41.

TO REMOVE STATOR

1. After Rotor and Spindle are removed, remove Sheet Metal Air Baffle No. 24.

2. Disconnect Stator Leads and pull wires inside Head Casting.
3. Back out 2 set screws on opposite sides of head.
4. Insert Long Shank Eye Bolts in top of Stator, attach a hoist and lift Stator straight out. A "Spreader" Bar between the Eye Bolts is helpful.
5. The Stator is reassembled in the Head in the reverse order.

TO REASSEMBLE HEAD

1. Assemble Rotor and Spindle No. 2 and 3 with Upper Bearing Box No. 15 as a unit. Lower Spindle and Upper Bearing Box in Head and secure Upper Bearing Box in place. Complete assembly of Upper End of Spindle.
2. Assemble Face Plate No. 9, Lower Grease Slinger No. 8, Lower Bearing Grease Case No. 26, and Thrust Bearing No. 44 as a unit. Place on Spindle and tighten Face Plate Nut No. 1 securely. This produces the proper pre-load on the Spindle Bearings.

TO REPLACE HEAD ON COLUMN

1. Lower Head until it gently touches Feed Screw.
2. Replace Taper Gibs to align Head. Gibs are numbered 1-2-3 front to rear.
3. Turn Hand Wheel until Feed Screw and Nut engage, lower Head on Column.
4. Taper Gibs have horizontal line that approximates their original setting. Adjust further until a .002 feeler fits snugly between Gibs and Column Ways.

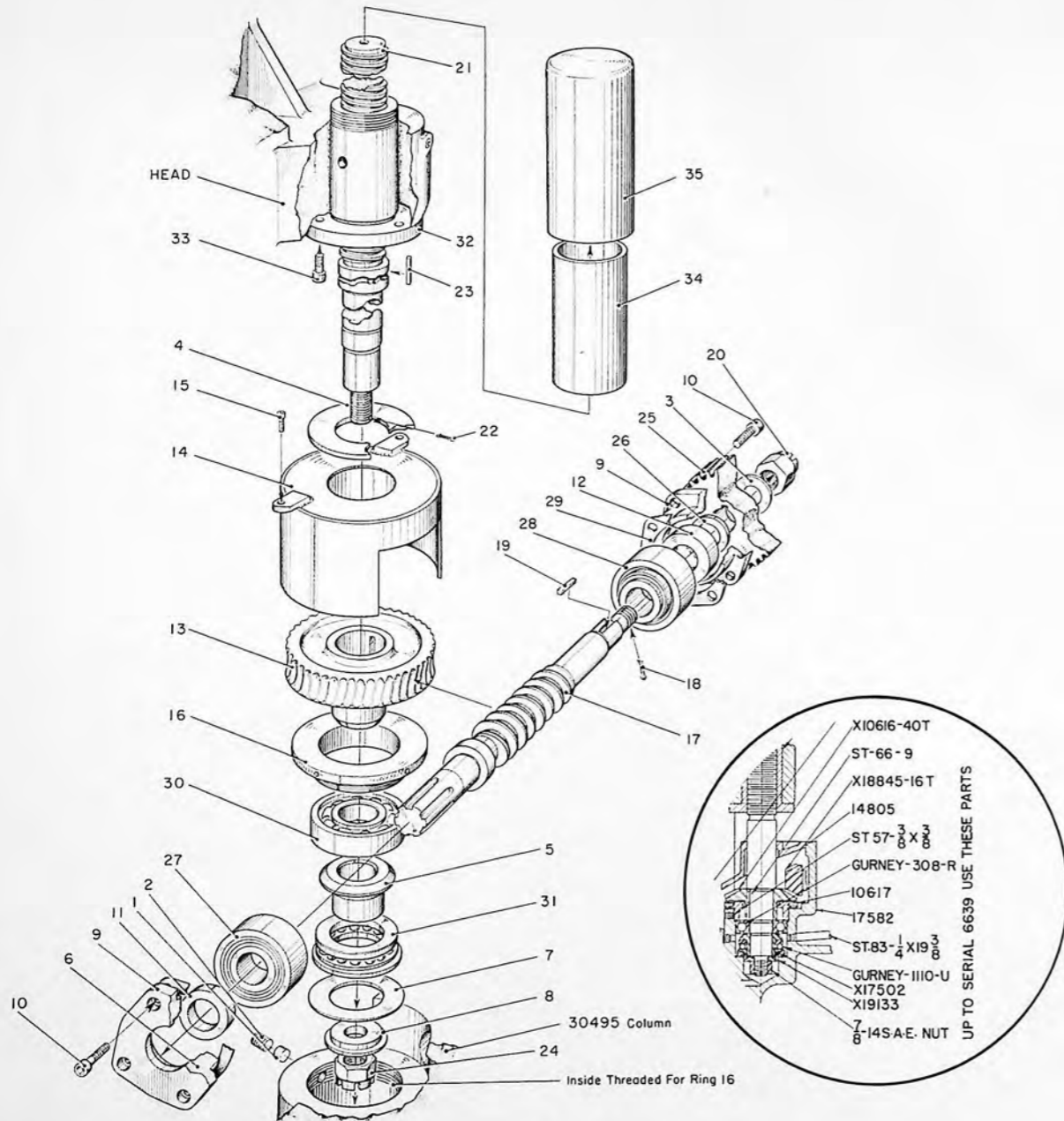
TO REMOVE FEED SCREW AND NUT FROM SERIAL #2545 to #6638

1. Raise Head off Feed Screw. (Use a sling and hoist to support Head approx. 1900 lbs.) Use method previously described. It is not necessary to lift Head clear of Column Ways if space above will allow easy removal and replacement of Feed Screw.
2. Remove Upper Gear Box using method described in that section.
3. Remove Feed Screw Nut from Head.
4. Take out Feed Shaft Pinion 18845.
5. Remove Feed Screw Dust Guard 14805.
6. Loosen Set Screw St. 57 3/8 x 3/8 and unscrew Retaining Ring 10617.
7. Lift out Feed Screw.
8. Reassemble in reverse order.

Feed Screw Unit

PLATE 2

930497 Feed Screw Unit



IMPORTANT: Always give serial number of grinder when ordering repair parts.

KEY NO.	PART NO.	DESCRIPTION	QUANTITY
	930497	NEW FEED SCREW UNIT - Serial 6639 and up.	
		FEED SCREW	
1		10628 Set Screw Block	1
2		Style 57A - 3/8" x 7/8"	1
3		12890 Washer	1
4		17178 Washer	1
5		17502 Bearing Sleeve	1
6		17644 Gasket	1
7		19132 Fitting Washer	1
8		19133 Feed Screw Washer	1
9		20473 Bearing Cap	2
10		Style 52A - 3/8" x 3/4"	8
11		National Oil Seal 51035	1
12		National Oil Seal 51052	1
13		20474 Worm Gear	1
14		20479 Oil Case	1
		20475 Oil Case Cap	1
15		Style 52A - 5/16" x 3/4"	2
16		20476 Retaining Ring	1
17		20477 Worm Shaft	1
18		Style 64 - 1/8" x 1 1/4"	1
19		Style 98 - 1/4" x 1"	1
20		3/4" S.A.E. Castellated Nut	1
21		30497 Feed Screw	
22		Style 64 - 1/8" x 1 1/2"	1
23		Style 104 - 1/4" x 2 1/4"	1
24		7/8" S.A.E. Castellated Nut	1
		30498 6" Extended Feed Screw	
		30499 12" Extended Feed Screw	
25		30503 Gear	1
26		30504 Spacer	1
		30527 Motor Pinion (Not Shown) For 204	
		Frame Motor	1
		38611 Motor Pinion For 182 Frame Motor	
27		Timken Bearing Cone 36137	1
		Cup 36300	
28		Timken Bearing Cone 3191	1
		Cup 3129	
29		#12 Timken Shims 3-.005", 3-.007", 3-.020"	1 set
30		MRC 308R Bearing	1
31		MRC 1110U Bearing	1
	16D1200-2	Snap Lock Limit Switch (attached to rear of Column)	1
32		18763 Feed Screw Nut	1
33		Style 52A - 3/8" x 7/8"	3
34		18768 Feed Screw Guard	1
35		17587 Feed Screw Cap	1



TO REMOVE FEED SCREW AND NUT
FROM SERIAL 6639 AND UP

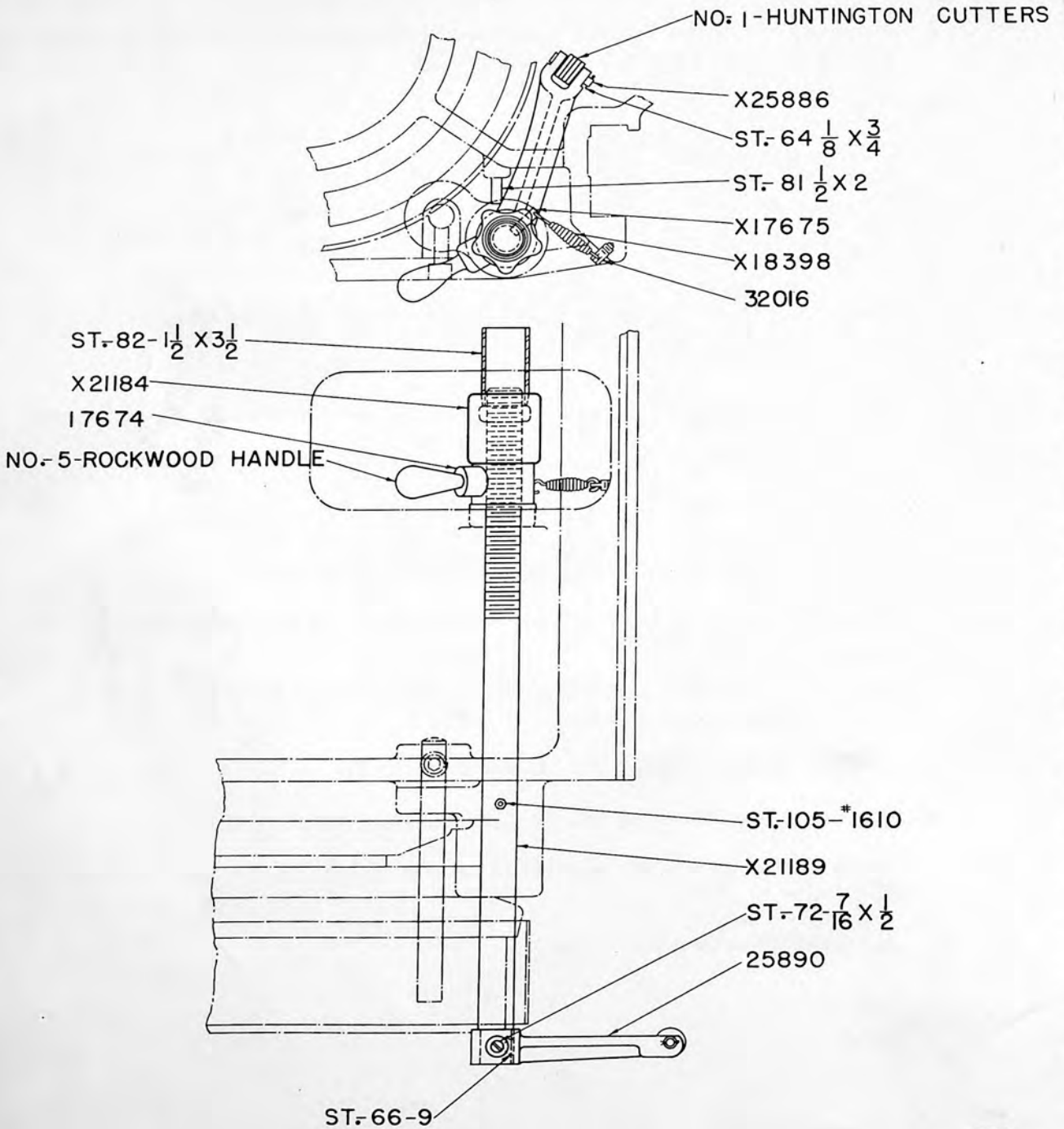
1. Raise Head off Feed Screw and remove Upper Gear Box and Torque Motor as described in those sections.
2. Remove Feed Screw Cap No. 35, Feed Screw Guard No. 34, and setscrew No. 33 with Lock Washer.
3. Remove Feed Screw Nut No. 32.
4. Remove Gear No. 25.
5. If Worm No. 17 is not to be replaced, simply remove Bearing Cap No. 9 and Timken Cup No. 28. This leaves enough play to move the Worm clear of the Worm Wheel.
6. Next, remove washer No. 4, Oil Case Cap, and Oil Case No. 14.
7. Remove Set Screw No. 2 and Set Screw Block No. 1.
8. Unscrew Retaining Ring No. 16 and Feed Screw No. 21 may be lifted out.
9. Reassemble in reverse order.

TO DISASSEMBLE FEED SCREW BEARING

1. With Feed Screw No. 21 out of Column, first remove Cotter Key No. 22 and 7/8" S.A.E. Nut No. 24.
2. Next remove Feed Screw Washer No. 8 and Serial 6639 and up. Remove Fitting Washer No. 7 also.
3. Remove Thrust Bearing No. 31 and Bearing Sleeve No. 5.
4. Remove Radial Bearing No. 30 and Retaining Ring No. 16.
5. The Feed Screw Bevel Gear 10616 or Worm Gear No. 13 may be then removed.
6. Reassemble in reverse order.

PLATE 3

921189 Wheel Dresser Unit



IMPORTANT: Always give serial number of grinder when ordering repair parts.

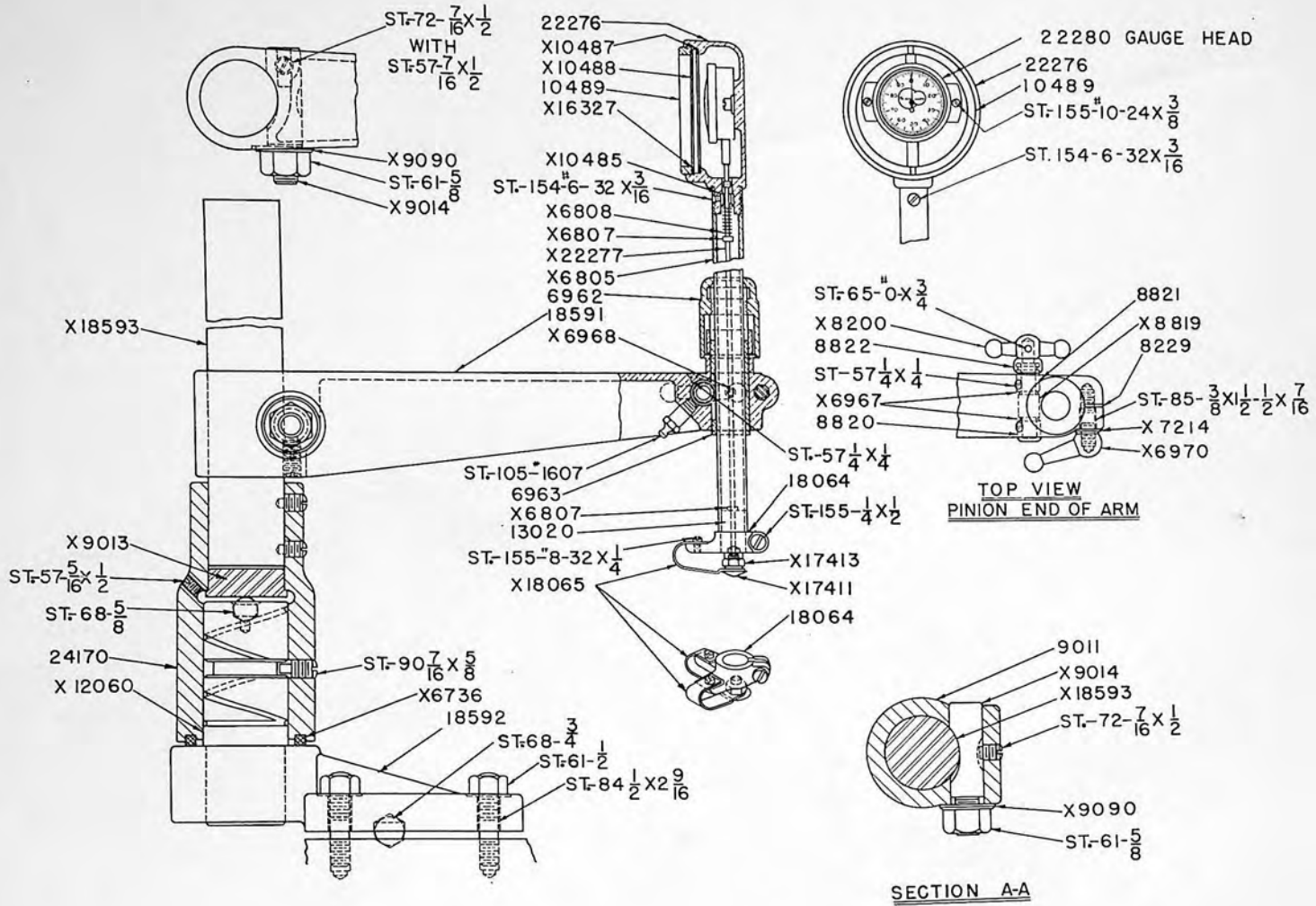
KEY NO.	PART NO.	DESCRIPTION	QUANTITY
	921189	WHEEL DRESSER UNIT This unit is standard on all #18 grinders (from Serial #2545 and up.) It is part of the head unit and is supplied with each machine or replacement head.	
	21184	Adjusting Nut	1
	23653	Adjusting Nut used on No. 18-42" Machines	
	17674	Handle Hub	1
		#5 Rockwood Handle	1
	23671	Handle Hub used on No. 18-42" Machines	
	23672	Spring Hub used on No. 18-42" Machines	
	925890	WHEEL DRESSER ARM, includes	1
		25890 Arm (not sold separately)	1
		X25886 Pin	1
		Style 64 - 1/8" x 3/4"	1
		Style 72 - 7/16" x 1/2"	1
		#1 Huntington Emery Wheel Cutters 12 cutters and 6 spacers per set)	1 .50
	940781	WHEEL DRESSER ARM (for 20" Extended Head on No. 18-42")	1
	21189	Dresser Shaft	1
		Style 66 - #9 Key	1
		Style 82 - 1 1/2" x 3 1/2"	1
		Style 105 - Alemite #1610	1
	32016	Spring Holder Stud	1
	17675	Handle Hub Key	1
	18398	Spring	1
		Style 81 - 1/2" x 2" Stop Stud	1

TO REMOVE WHEEL DRESSER

1. Loosen Set Screw St. 72 7/16 x 1/2 and Wheel Dresser Arm 925890 can be removed from Shaft.
2. Unhook Spring 18398 and Unscrew Adjusting Nut 21184. Wheel Dresser Shaft 21189 will soon be loose and can be withdrawn downward toward Base.
3. Reassemble in reverse order.

Caliper Attachment

Open Fold-Out for Plate 4



918591 Caliper Attachment

PLATE 4

26

IMPORTANT: Always give serial number of grinder when ordering repair parts.

KEY NO.	PART NO.	DESCRIPTION	QUANTITY
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<u>918591</u>		#18 CONTINUOUS READING CALIPER ATTACHMENT English or Metric Graduations. This is the latest style Caliper Attachment and can be used on #18 Grinder with either 30" or 36" chucks from Serial #2545 and up. Individual parts may be ordered separately except where otherwise noted.	
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906805		PLUNGER TUBE includes	
		18064 Bottom Guide	1
		Style 155 - #8-32 x 1/4"	2
		Style 155 - 1/4"-20 x 1/2"	1
		*X6805 Plunger Tube	1
		*X22277 Plunger	1
		X6807 Plunger Stop	2
		X6808 Plunger Spring	1
		X13020 Lower Bushing	1
		X17411 Button	1
		X17413 Button Nut	1
		X18065 Button Spring	2
		NOTE: Bushing X13020 can only be supplied with Plunger Tube X6805; Stops X6807 can only be supplied with Plunger X6806.	

* NOTE: Order Part No. 23548 Plunger Tube And Part No. 23547 Plunger For No. 18-42" Machines.

922276		CALIPER CASE (without Dial), includes	
		22276 Case	1
		10486 Cap	1
		10489 Screw Ring	1
		X10485 Case Bushing	1
		X10487 Inner Gasket	1
		X10488 Glass	1
		X16327 Outer Gasket	1
		Style 154 - #6-32 x 3/16"	1
		Style 155 - #8-32 x 1/2"	2

X22280		DIAL - #55 Ames Gauge Head (Blanchard Type. Graduated in .001" or millimeters).	1
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NOTE: A new Dial may be ordered or an old one repaired by sending it to us or directly to the maker, B. C. Ames Co., Waltham, Mass.



IMPORTANT: Always give serial number of grinder when ordering repair parts.

KEY NO.	PART NO.	DESCRIPTION	QUANTITY
	24170	Swivel, includes	1
		X12060 Pivot Stud (Lapped with Swivel 24170 and supplied together)	1
		Style 57 - 5/16" x 1/2"	1
		Style 68 - 5/8" Steel Ball	1
		Style 90 - 7/16" x 5/8"	1
		X6736 Dust Ring	1
		X9013 Swivel Plug	1
		Style 72 - 7/16" x 5/8"	2
	18591	Caliper Arm, includes	1
		8820 Pinion Bushing, closed	1
		8821 Pinion Bushing, open	1
		8822 Pinion Cap	1
		Style 57 - 1/4" x 1/4"	2
		X6967 Pinion Washer	2
		X6968 Guide Screw	1
		X6970 Small Handle	1
		X7214 Washer	1
		Style 85 - 3/8" x 1 1/2"-1/2" x 7/16"	1
		X8200 Pinion Handle	1
		Style 65 - #0-3/4" Taper Pin	1
		X8229 Fibre Filling	1
		X8819 Pinion	1
		Style 105 - #1607 Alemite Fitting	1
		X9014 Clamp Bolt	1
		X9090 Clamp Bolt Washer	1
		Style 57 - 7/16" x 1/2"	1
		Style 61 - 5/8"	1
		Style 72 - 7/16" x 1/2"	1
	6962	Pinion Rack Sleeve Nut	1
	6963	Pinion Rack Sleeve	1
	18592	Caliper Base	1
		Style 61 - 1/2"	3
		Style 68 - 3/4" Steel Ball	1
		Style 84 - 1/2" x 2 9/16"	3
	X18593	Column	1
		NOTE: On Grinder with Extended Column, Caliper Column X19461 is used in place of X18593.	
		#5 Wrench - J.H. Williams	1

TO DISASSEMBLE CALIPER ATTACHMENT

1. Remove Bottom Guide 18064 and loosen Pinion Rack Sleeve Nut 6962. Plunger Tube and Caliper Case may be drawn upward.

2. Remove Brass Machine Screw St. 154 #6-32 x 3/16 and remove Caliper Case 22276. Plunger 6806 and Plunger Stops 6807 may be removed.
3. Remove Screw Ring 18409 and Glass and Ames Indicator 22280 are accessible.
4. Loosen Hex. Nut St. 61 5/8" and Caliper Arm will slide off Column.
5. Remove Set Screw St. 90 7/16 x 5/8 and Swivel 24170 can be removed from Pivot Stud 12060.
6. By loosening 2 Set Screws on Swivel Column 18593 is removed from Swivel.
7. Remove 3 Hex. Nuts St. 61 1/2 and Caliper Base 18592 can be removed from Table Body.

Upper Gear Box
(Serial No. 2545 to 6638)

PLATE 5

917811 Upper Gear Box

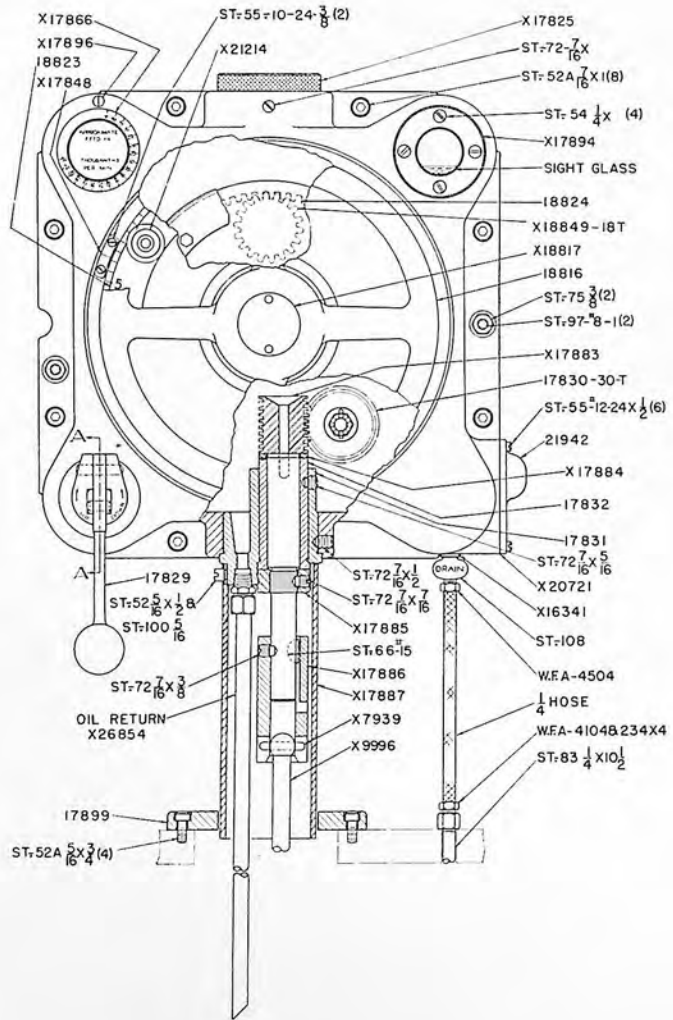
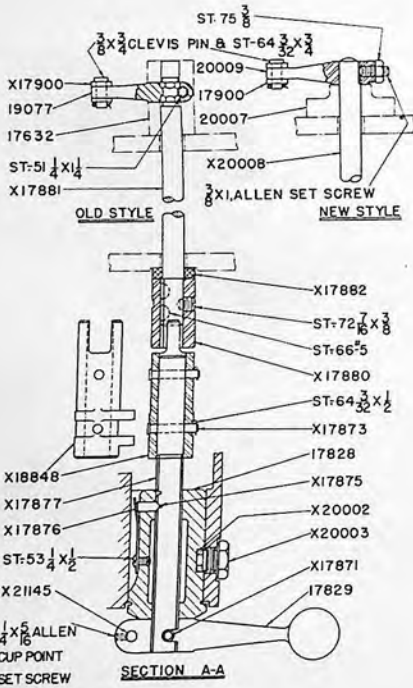
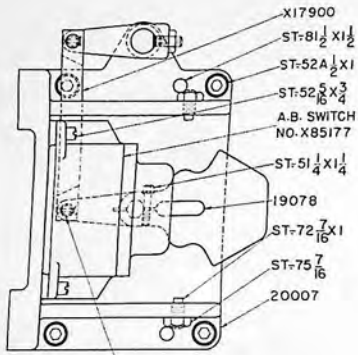
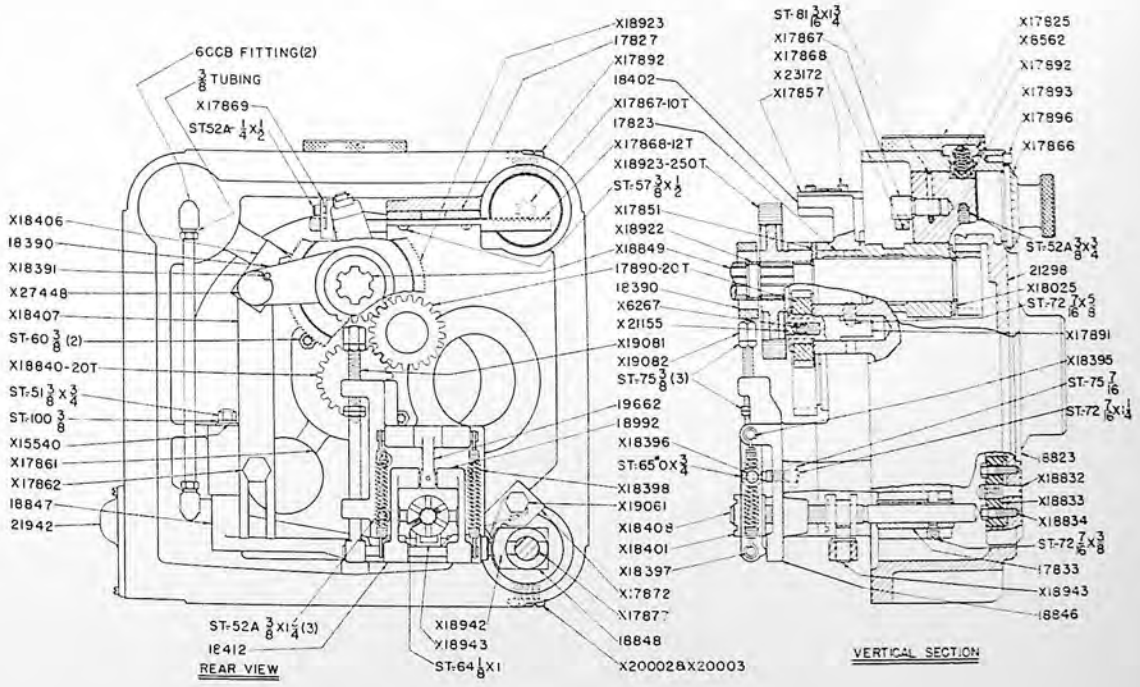
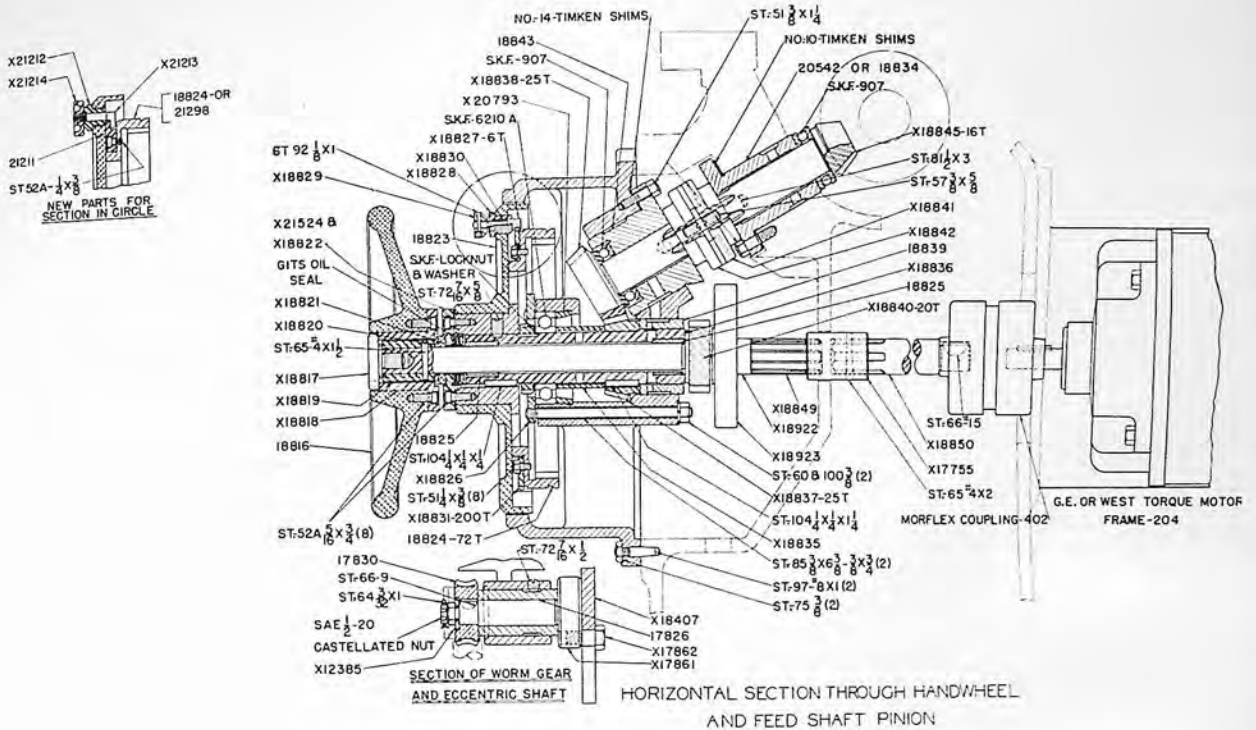


PLATE 6

917811 Upper Gear Box



IMPORTANT: Always give serial number of grinder when ordering repair parts.

KEY NO.	PART NO.	DESCRIPTION	QUANTITY
917811		UPPER GEAR BOX This is the complete unit used on all #18 grinders from serial #2545 to 6638. Individual parts can be supplied except in special cases where noted.	
17811		Upper Gear Box attached to column by following parts:	1
		Style 52A - 7/16" x 1"	8
		Style 75 - 3/8"	2
		Style 97 - #8 x 1" Taper Dowel	2
917828		FEED CONTROL SHAFT, includes	
		17828 Feed Control Shaft Bearing	1
		X20002 Shoe	1
		X20003 Retaining Screw	1
		17829 Control Lever	1
		X21145 Pin	1
		Style 57A - 1/4" x 5/16"	1
		X17875 Feed Latch	1
		X17876 Feed Latch Spring	1
		Style 53 - 1/4" x 1/2"	1
		X17877 Control Shaft	1
		X17871 Pin	1
		X18848 Control Shaft Sleeve	1
		X17873 Retaining Pin	2
		Style 64 - 3/32" x 1/2"	2
		In addition to the above Sub-Assembly the following parts are used to connect with the Allen Bradley Push Button Station:	
		X85177 Head Travel Motor Switch	1
		Style 52 - 5/16" x 3/4"	4
19078		Counterweight Lever	1
		Style 51 - 1/4" x 1 1/4"	1
20007		Motor Bracket (Interchangeable with 17632 old style bracket)	1
		Style 51 - 3/8" x 1 1/2" (in motor feet not shown)	4
		Style 52A - 1/2" x 1"	4
		Style 72 - 7/16" x 1" - Counterweight Lever Stops	2
		Style 75 - 7/16" x 1" - Counterweight Lever Stops	2
		Style 81 - 1/2" x 1 1/2"	2

IMPORTANT: Always give serial number of grinder when ordering repair parts.

KEY NO.	PART NO.	DESCRIPTION	QUANTITY
	921942	OIL FILTER, includes	1
		X21941 Screen	1
		21942 Flange	1
	X20721	Oil Filter Gasket	1
		Style 55 - #12-24 x 1/2"	6
	X16341	Leather Washer	1
		Style 108 - 5/8" Drain Plug	1
	917861	ECCENTRIC SHAFT, includes	
		17826 Eccentric Shaft Bushing	1
		Style 72 - 7/16" x 3/8"	2
		17830 Worm Gear (meshes with X17883)	1
		X12385 Washer	1
		X17861 Eccentric Shaft	1
		Style 64 - 3/32" x 1"	1
		Style 66 - #9 Key	1
		1/2" x 20 S. A. E. Castellated Nut	1
		X17862 Eccentric Shaft Stud	1
	917866	FEED RANGE DIAL, includes	
		X17866 Feed Range Dial	1
		Style 52A - 3/8" x 3/4"	1
		X17867 Feed Range Dial Pinion (meshes with X17868)	1
		Style 81 - 3/16" x 1 3/4"	1
	17827	Feed Adjusting Rack Bushing	2
		Style 57 - 3/8" x 3/8"	2
	X17868	Feed Adjusting Rack (meshes with 17867)	1
	X17869	Feed Adjusting Rack Collar	1
		Style 51 - 1/4" x 1/2"	1
	X17892	Detent Screw - includes	1
		X8562 Spring	1
	X17893	Detent Plunger	1
	X17896	Index Button	1
	918816	HANDWHEEL, includes	
		18816 Handwheel	1
		X18818 Handwheel Bushing	1
		Style 52A - 5/16" x 3/4"	4
		X18819 Handwheel Sleeve	1
		Style 65 - #4 x 1 1/2" Taper Pin	1
		X18820 Handwheel Bushing Washer	1
		X18821 Handwheel Thrust Washer	1
	X18822	Dial Retaining Cap	1
		Style 52A - 5/16" x 3/4"	4
		O.S. 1000 Gits Oil Seal	1

Parts used to replace Reset Ring Gear and Pinion in Upper Feed Box of #18 Grinders up to 2921 as per F-21442.

IMPORTANT: Always give serial number of grinder when ordering repair parts.

KEY NO.	PART NO.	DESCRIPTION	QUANTITY
	921213	CLAMP, includes	1
		X21212 Bushing	1
		X21213 Clamp	1
		X21214 Clamping Nut	1
	21211	Friction Ring	1
		Style 52A - 1/4" x 3/8"	8
	918823	DIAL, includes	
		18823 Dial	1
		X18832 Trip Screw	1
		X18833 Trip Screw Block	1
		X18834 Drilled head cap screws	2
	X17848	Index Plate	
		Style 55 - #10-24 x 3/8"	2
	918824	INTERNAL GEAR, includes	
		18824 Internal Gear	1
		Style 72 - 7/16" x 5/8"	1
		X18831 Reset Ring (meshes with X18827)	1
		Style 51 - 1/4" x 3/8"	8
	918838	FEED SHAFT BEVEL GEAR, includes	
		18843 Feed Shaft Extension Bushing	1
		Style 51 - 3/8" x 1 1/4"	4
		X18838 Feed Shaft Bevel Gear (meshes with X18837)	1
		Style 81 - 1/2" x 3" Pin	1
		X18842 Driving Flange	1
		Style 57 - 3/8" x 5/8"	1
		SKF #907 or Gurney #1107 F Thrust Bearing	1
		#14 Timken Shims - 3-.005" (as needed)	
		3-.007"	
		1-.020"	

Following are parts of Column Unit but for convenience are shown and listed with Upper Gear Box.

918845	FEED SHAFT PINION, includes	
	18844 Feed Shaft Bushing (Serial 2545 to 2921)	1
	Style 72 - 7/16" x 3/4" (Not Shown)	1

NOTE: After Serial 2922 Feed Shaft Bushing 18844 which is threaded is replaced by:

20542 Feed Shaft Bushing (serial 2922 and up)	1
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IMPORTANT: Always give serial number of grinder when ordering repair parts.

KEY NO.	PART NO.	DESCRIPTION	QUANTITY
		Style 51 - 3/8" x 1 1/4"	4
		#10 Timken Shims 3-.005" (as needed)	
		3-.007"	
		1-.020"	
		X18841 Driven Flange	1
		Style 57 - 3/8" x 5/8"	1
		X18845 Feed Shaft Pinion (meshes with X10616)	1
		SKF 907 or Gurney 1107 F Thrust Bearing	1
918840		HANDWHEEL SHAFT PINION, includes	
		18839 Rear Sleeve Bearing	1
		Style 72 - 7/16" x 3/8" (Not Shown)	2
		X18835 Spacer Sleeve	1
		X18836 Handwheel Shaft Sleeve	1
		18825 Handwheel Shaft Bearings (always order with X18836)	2
		Style 104 - 1/4" x 1/4" x 1 1/4" Key	2
		X18837 Handwheel Shaft Bevel Gear (meshes with X18838)	1
		X18840 Handwheel Shaft Pinion (meshes with 17890)	1
		3 3/8" below Coupling Shaft X18850	
		X20793 Spacer	1
		6210A-SKF Radial Bearing	1
		W-10-SKF Lockwasher	1
		N-10-SKF Locknut	1
X18817		Handwheel Screw	1
X18826		Clamp Ring, includes	1
		Style 85 - 3/8" x 6 3/8" - 3/8" x 3/4" Studs integral with X18826	2
		Style 60 - 3/8" Nut	2
		Style 100 - 3/8" Lockwasher	2
918846		BRIDGE, includes	
		18412 Lower Toggle Bar - Left Hand	1
		18846 Bridge	1
		Style 52A - 3/8" x 1 3/4"	3
		Style 72 - 7/16" x 1 1/4" Screw Stop	1
		Style 75 - 7/16"	1
		NOTE: Serial #2545-2710 has old style Bridge - replacements of Bridge only should include Upper Toggle Bar 19662.	
		18992 Lower Toggle Bar - Right Hand	1



IMPORTANT: Always give serial number of grinder when ordering repair parts.

KEY NO.	PART NO.	DESCRIPTION	QUANTITY
		19662 Upper Toggle Bar (used from serial 2711 up, if ordered for earlier machine include Bridge 18846)	1
		X18395 Upper Hinge Pin	1
		X18396 Middle Hinge Pin	1
		Style 65 - #0-3/4" Taper Pin	1
		X18397 Lower Hinge Pin	1
		X18398 Toggle Springs	2
		X18401 Trip Plunger Spools	2
		Style 64 - 1/8" x 1"	2
		X18408 Trip Plunger	1
		X19081 Pawl Plunger	1
		Style 75 - 3/8"	3
		X19082 Plunger Adjusting Nut	1
17833		Trip Plunger Bushing	1
		Style 72 - 7/16" x 3/8"	1
918847		TRIP LEVER, includes	
		18847 Trip Lever	1
		Style 51 - 3/8" x 3/4"	1
		Style 100 - 3/8"	1
		X15540 Washer	1
		X18942 Trip Lever Plug	1
		X18943 Trip Lever Swivel Block	1
918849		DRIVE SHAFT, includes	
		17823 Drive Shaft Bushing	1
		Style 72 - 7/16" x 1/2" (Not Shown)	1
		18390 Trip Arm	1
		18402 Pawl Arm	1
		X17851 Thrust Washer	1
		X17857 Pawl Arm Stop	1
		X17858 Drilled Head Set Screws	2
		X18025 Drive Shaft Washer	1
		X18391 Trip Arm Dowel	1
		X27448 Pawl Arm Stud with C93 Bunting Bushing	1
		X12385 Washer (Not Shown)	1
		Style 64 - 3/32" x 3/4" (Not Shown)	1
		1/2"-20 SAE Castellated Nut (Not Shown)	1
		X18406 Pawl	1
		X18407 Eccentric Link	1
		X18849 Drive Shaft Pinion (meshes with 18824)	1
		X18922 Retaining Spring	1
		X18923 Ratchet Pinion (meshes with 17890)	1
		Additional parts to connect with Power Raise and Lower Motor, listed on next page.	

IMPORTANT: Always give serial number of grinder when ordering repair parts.

KEY NO.	PART NO.	DESCRIPTION	QUANTITY
X17755		Coupling	1
		Style 65 - #4 x 2" Taper Pin	1
X18850		Coupling Shaft (3 3/8" above Handwheel Pinion Shaft X18840)	1
		Style 66 - #15	1

NOTE: On Grinders Serial #2545-2554 Coupling X17755 and Shaft X18850 were integral. Replacement must include both parts.

Climax #400 Single Coupling - without covers (Advise Frame Size Of Torque Motor When Ordering Coupling) 1

UNGROUPED PARTS

17890		Idler Gear (meshes with 18923 and X18840)	1
		X6362 Idler Gear Spring	1
		X6363 Idler Gear Plunger	1
		X17891 Idler Gear Stud	1
		Style 72 - 7/16" x 7/16"	1
X17825		Cover	1
		Style 72 - 7/16" x 5/8"	1
X17872		Interlocking Plate	1
		X19061 Interlocking Plate Screws	2
X17894		Oil Sight Glass Retaining Ring	1
		Style 54 - 1/4" - 20 x 3/4"	4
		1/4" Flush Pipe Plug (Not Shown)	2
		#110 Lunkenheimer Sight Glass Cat. #58	
		Fig. 954	1
		#172 Lunkenheimer Cork Washer Cat. #58	
		Fig. 1062 (Not Shown)	4
		6CCB Parker Tube Connectors	2
		3/8" Annealed Copper Tubing 14-1/2"	1
X17897		Gasket (between Gear Box and Column) (Not Shown)	1
		Style 93 - 1 1/8" Welch Plug (near Feed Range Dial) (Not Shown)	1

TO REMOVE UPPER GEAR BOX
SERIAL #2545 TO #6638

Upper Gear Box 917811 is attached to the Column by the following parts :

- 8-St. 52A 7/16 x 1 Socket Head Cap Screws
- 2-St. 75 3/8 Check Nuts
- 2-St. 97 #8 x 1 Taper Dowels

1. First Disconnect 1/4" Oil Hose and drop Vertical Shaft Guard 17887.
2. This exposes Connecting Shaft 9996 and Oil Return Tube 26854. Disconnect both these parts.
3. Remove 4 Hold Down Screws on Torque Motor on back of Column and move Motor back until Coupling 17755 is free of Drive Shaft 18849.
4. Take out 8 Socket Head Cap Screws St. 52A 7/16 x 1 and two Taper Dowel Pins St. 97 #8 x 1. The Gear Box is ready to lift out. CAUTION: Due to the angle at which the Feed Shaft Pinion engages the Feed Screw Bevel Gear, the Box will not come off straight, but must be removed at an angle of 45° to the right.

TO DISMANTLE UPPER GEAR BOX
SERIAL #2545 TO #6638

1. Remove Bridge Assembly 918846 by first removing Trip Lever 18847.
2. Remove 3 Socket Head Cap Screws St. 52A 3/8 x 1 1/4 and Bridge Assembly may be lifted out.
3. Remove Cover 17825 from top of Gear Box. This exposes 2 Set Screws which are removed next.
4. Drive Shaft 18849 and Idler Gear Stud 17891 are now loose and both should be removed simultaneously so that the Spring Tension will not bind either member. The Idler Gear Spring 6262 and Idler Gear Plunger 21155 act as a brake on the Ratchet Pinion 18923 to prevent it from slipping back when the Pawl is not engaged.
5. Remove Feed Shaft Bevel Gear Unit by removing 4 Cap Screws St. 51 3/8 x 1 1/4 Feed Shaft Extension. Bushing 18843 may now be withdrawn bringing the Bevel Gear and 907 Bearing with it.
6. To remove Handwheel 18816, remove Handwheel Screw 18817 and the Handwheel and Bushing 18818 can be removed.
7. Remove 4 Set Screws St. 52A 5/16 x 3/4 and Clamp Nut 21214. The Dial Retaining Cap 18822 and Dial are now removed.
8. Remove Handwheel Sleeve 18819 by driving out Taper Pin St. 65 #4 x 1 1/2.
9. Handwheel Shaft Pinion 18840 may now be drawn out through the rear of the Gear Box.

10. Remove Retaining Screw 20003 on outside bottom of Gear Box and pull Feed Control Shaft Bearing 17828 straight out.

This unit may be removed with Gear Box on machine by loosening Lever 20009 on Shaft Extension 20008. Remove Retaining Screw 20003, turn Feed Control Lever to the left or "up" position and pull unit straight out. NOTE: It is necessary to remove this unit to replace a broken Control Lever.

11. Remove Set Screws St. 72 7/16 x 1/2. On the inside of the Box a Shoulder of Worm Shaft Bearing 17831 is accessible. By tapping and prying the Bearing may be removed. The Worm Shaft 17883 is not concentric with Bearing so care must be taken not to turn the Bearing as this will cause binding on Worm 17830.
12. Remove S. A. E. 1/2" Castellated Nut and Drive Eccentric Shaft free through the back of the box.
13. Remove Detent Screw 17892. You may then draw out Feed Range Dial Unit 17866. If it is necessary to remove Feed Adjusting Rack 17868, knockout Welch Plug directly below Rack and remove through this opening.

TO REASSEMBLE UPPER GEAR BOX
SERIAL #2545 TO #6638

1. With Rack 17868 in position, insert Feed Range Dial 17866 and secure with Detent Screw 17892. Then turn Dial to "76" and Mesh Rack and Pinion from this position.
2. Eccentric Shaft 917861 is then replaced with Worm Gear 17830 and Worm Shaft 917831 is inserted to mesh with Worm Shaft. The Eccentric Shaft should be approximately 2 7/16" from the finished surface of the Box to the outside edge of the Shaft to insure proper reciprocating action of the Eccentric Link 18407.
3. Handwheel Shaft Pinion 18840 may be put back after Rear Sleeve Bearing 18839 is in place along with Handwheel Shaft Bevel Gear 18837.
4. Insert Feed Shaft Bevel Gear 918838 to mesh with Handwheel Shaft Bevel Gear 18837 and secure in place.
5. Next, replace Drive Shaft Assembly 918849 and Idler Gear 17890. Be sure that Drive Shaft Bushing 17823 with Oil Groove is in correct position.
6. Replace Bridge Assembly 918846.
7. Replace Trip Lever 918847 and connect to Bridge.
8. Insert Feed Control Shaft 917828 and connect with Trip Lever.
9. Replace Internal Gear 921298 on Handwheel Shaft.

10. Replace Dial 18822 and Handwheel 918816 to complete assembly.

NOTE: If Feed Range Dial 17866 and Rack 17868 have been removed, they must be readjusted. Adjustments must be made with Box in an upright position, similar to its position on the machine. Revolve Eccentric Shaft 17861 until Eccentric Shaft Stud 17862 is in a vertical position. Eccentric Link 18407 should be at the extreme height of its stroke.

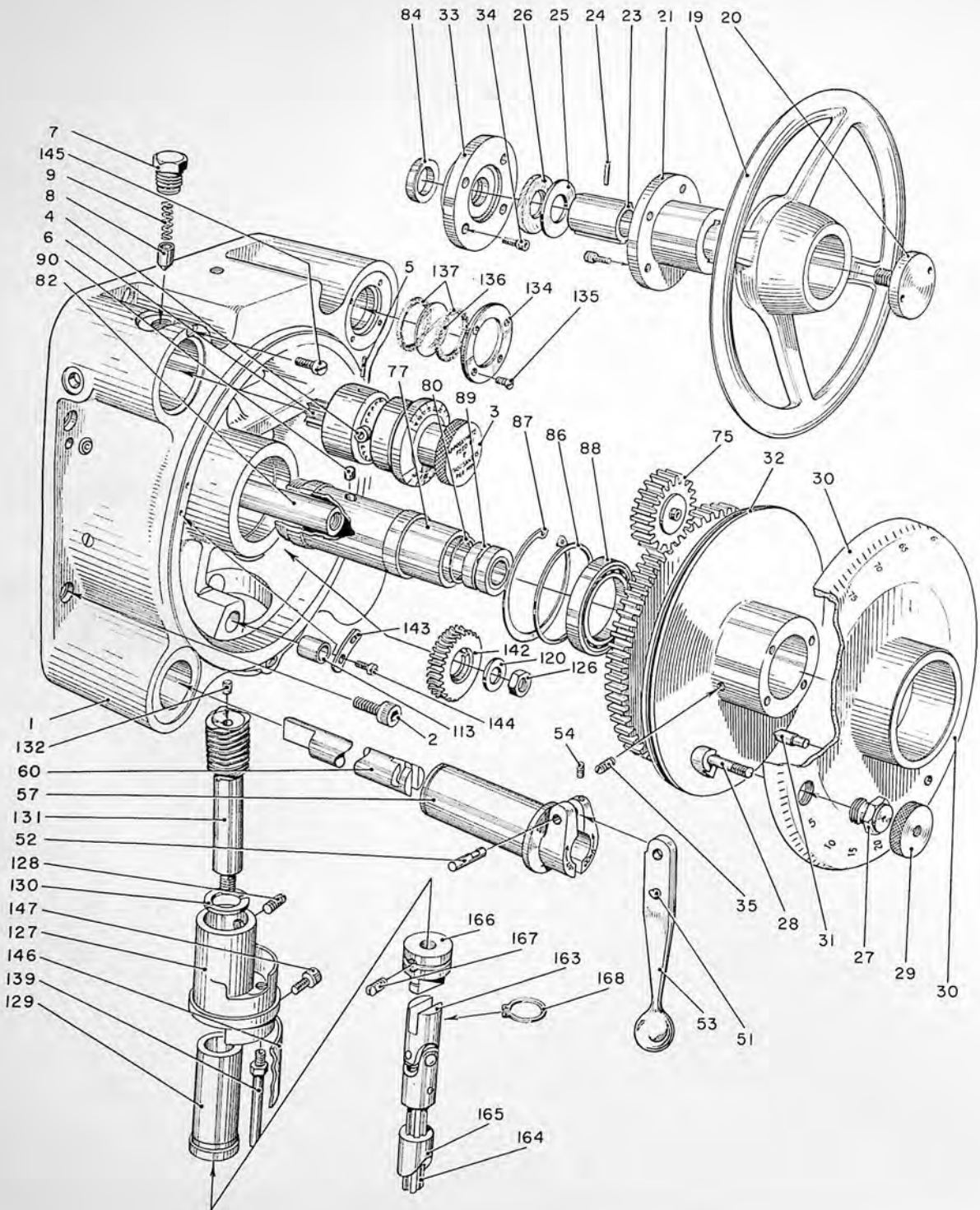
Set Feed Range Dial 17866 to the first graduation, which is one line below the .004 mark.

Set Feed Adjusting Rack Collar 17869 so there is from .035 to .040 clearance between Adjusting Rack 17868 and Pawl Arm Stop 17857. Lock Rack in position. Replace Gear Box on Machine in reverse order it was removed.

Upper Gear Box
(Serial No. 6639 and up)

Please Turn Flap

PLATE 7
 930417 Upper Gear Box
 (New Style)



IMPORTANT: Always give serial number of grinder when ordering repair parts.

KEY NO.	PART NO.	DESCRIPTION	QUANTITY
	930417	No. 18 UPPER GEAR BOX ASSEMBLY from Serial 6639 and up.	
1		30417 Upper Gear Box	1
2		Style 52A - 7/16" x 1" (Gear Box to Column)	8
		Style 108 - 5/8"	1
		Style 109 - 1/8"	1
		Style 109 - 1/4"	3
	917866	FEED RANGE DIAL ASSEMBLY, includes	
3		17866 Feed Range Dial (English 25 & 60 cycle)	1
4		Style 52A - 3/8" x 3/4"	1
5		Style 92 - 3/16" x 1 3/4"	1
		21379 English Feed Range Dial (50 cycle)	
		21400 Metric Feed Range Dial (50 cycle)	
		27312 Metric Feed Range Dial (50 cycle) (In French)	
		Specify one of above when ordering	
6		17867 Feed Range Dial Pinion	1
	917892	DETENT SCREW ASSEMBLY, includes	1
7		17892 Detent Screw	1
8		17893 Detent Plunger	1
9		8562 Spring	1
	918390	TRIP ARM ASSEMBLY, includes	1
10		18390 Trip Arm	1
11		Style 65 - #4 x 1 1/4"	1
12		18391 Trip Arm Dowel	1
13		18406 Pawl	1
14		18407 Eccentric Link	1
15		27448 Pawl Arm Stud	1
16		Bunting Bushing C-93	1
17		30422 Pawl Arm	1
18		30445 Pawl Arm Stop Pin	1
	918816	HAND WHEEL ASSEMBLY, includes	1
19		18816 Hand Wheel	1
20		18817 Hand Wheel Screw	1
21		18818 Hand Wheel Bushing	1
22		Style 52A - 5/16" x 3/4"	4
23		18819 Hand Wheel Sleeve	1
24		Style 65 - #4 x 1 1/2"	1
25		18820 Hand Wheel Bushing Washer	1
26		18821 Hand Wheel Thrust Washer	1
	921213	CLAMP ASSEMBLY, includes	1
27		21212 Reset Bushing	1
28		21213 Reset Clamp	1
29		21214 Reset Clamping Knob	1



IMPORTANT: Always give serial number of grinder when ordering repair parts.

KEY NO.	PART NO.	DESCRIPTION	QUANTITY
	930419	RING GEAR ASSEMBLY, includes	1
30		30418 Dial (English)	1
		30699 Metric Dial (foreign)	1
31		30433 Trip Button	1
32		30419 Ring Gear	1
33		30432 Dial Retaining Cap	1
34		Style 52A - 5/16" x 3/4"	4
35		Style 72 - 7/16" x 1/2"	1
	930421	TOGGLE BRIDGE ASSEMBLY, includes	1
36		18395 Upper Hinge Pin	1
37		18396 Middle Hinge Pin	1
38		18397 Lower Hinge Pin	1
39		18398 Toggle Spring	2
40		18412 Lower Toggle Bar Left Hand	1
41		18992 Lower Toggle Bar Right Hand	1
42		19081 Plunger	1
43		Style 75 - 3/8"	1
44		19082 Plunger Adjusting Nut	1
45		19662 Upper Toggle Bar	1
46		Style 65 - #0 x 3/4"	1
47		30421 Toggle Bridge	1
48		Style 52A - 3/8" x 2 1/2"	3
49		Style 72 - 7/16" x 1"	2
50		Style 75 - 7/16"	1
	930423	CONTROL LEVER ASSEMBLY, includes	1
51		17871 Pin	1
52		21145 Hinge Pin	1
53		30423 Control Lever	1
54		Allen Cup Point Set Screw 1/4" x 5/16"	1
	930427	CONTROL SHAFT & EXTENSION ASSEMBLY includes	1
55		15731 Collar	1
56		Style 72 - 7/16" x 1/2"	1
57		30420 Feed Control Shaft Bushing	1
58		Style 66 - #5	1
59		Tru-Arc Ring 5100 - 200	1
60		30427 Control Shaft	1
61		30526 Switch Shaft - up to serial 8793	1
		38445 Switch Shaft - serial 8794 and up	
62		30534 Coupling Sleeve	1
		Style 65 - #3 x 1 3/8"	1
63		31023 Feed Operating Bar	1
64		Style 72 - 7/16" x 1/2" (Stake at Assem.)	1

IMPORTANT: Always give serial number of grinder when ordering repair parts.

KEY NO.	PART NO.	DESCRIPTION	QUANTITY
	930429	OUTPUT SHAFT ASSEMBLY, includes	1
65		12260 Washer	1
66		30425 Output Shaft Bushing	1
		Style 72 - 7/16" x 7/16" (Not Shown)	1
67		30429 Output Shaft	1
68		Style 52A - 5/16" x 3/4"	1
69		Style 66 - #3	1
70		30435 Lock Wire	2
71		30436 Thrust Washer	1
72		30439 Feed Drive Gear	1
73		30440 Needle Bearing Spacer	1
74		30441 Special Thrust Washer	1
75		30442 Dial Drive Gear	1
76		Bantam Needle Bearing 202816) I 162016)	2
	930437	HAND WHEEL SHAFT ASSEMBLY, includes	1
77		30428 Hollow Shaft	1
		Style 72 - 7/16" x 1/2" (same as #35)	2
78		30434 Hollow Shaft Nut	1
79		Style 157 - 5/16" x 9/16"	1
80		30435 Lock Wire	2
81		30436 Thrust Washer	1
82		30437 Hand Wheel Shaft	1
		Style 65 - #4 x 1 1/2" (same as #24)	1
83		Style 66 - #5	1
84		Perfect Oil Seal 1481	1
85		30438 Hand Wheel Shaft Gear	1
86		30470 Timken Thrust Ring	2
87		Tru-Arc Ring 5000 - 362	2
88		Timken Bearings Cone LL 510749) Cup LL 510710)	2
89		Bantam Needle Bearings 202816) I 162016)	2
90		Brass Tube 5/8" x 3/8"	1
	930443	RATCHET PINION ASSEMBLY, includes	1
91		12260 Washer	2
92		30443 Ratchet Pinion	1
93		30444 Ratchet Stud	1
94		Style 52A - 5/16" x 3/4"	2
		Style 72 - 7/16" x 1/2"	1
95		Style 72 - 7/16" x 5/8"	1
96		30514 Thrust Washer	1
	930446	1st IDLER STUD ASSEMBLY, includes	1
97		29370 Spring	1
98		30424 Idler Gear	1



IMPORTANT: Always give serial number of grinder when ordering repair parts.

KEY NO.	PART NO.	DESCRIPTION	QUANTITY
99		30446 1st Idler Stud	1
100		Style 52A - 5/16" x 1 1/4"	1
101		Style 81 - 3/16" x 1/2"	1
102		30448 Idler Gear Spacer	1
103		30449 Friction Plug	1
	930447	2nd IDLER STUD ASSEMBLY, includes	1
104		30424 Idler Gear	1
105		30447 2nd Idler Stud	1
106		Style 52A - 5/16" x 1 1/4"	1
107		Style 109 - 3/8"	1
108		30448 Idler Gear Spacer	1
109		Style 81 - 3/16" x 1/2"	1
	930450	TRIP PLUNGER ASSEMBLY, includes	1
110		18401 Trip Plunger Spools	1
111		Style 64 - 1/8" x 1"	1
112		30450 Trip Plunger	1
113		Bunting Bushing C - 167	2
114		31011 Trip Plunger Spools	1
115		Style 64 - 1/8" x 1"	1
	930451	FEED ADJUSTING RACK ASSEMBLY, includes	1
116		30451 Feed Adjusting Rack	1
117		1/2 - 20 S. A. E. Check Nut	1
118		30452 Feed Adjusting Rack Collar	1
119		Style 93 - 1 1/8"	1
	930453	ECCENTRIC SHAFT ASSEMBLY, includes	1
120		12385 Washer	1
121		17862 Eccentric Shaft Stud	1
122		30426 Eccentric Shaft Bushing	1
123		Style 52A - 5/16" x 3/4"	2
124		30453 Eccentric Shaft	1
125		Style 66 - #9	1
126		1/2" S. A. E. Check Nut	1
	930454	WORM SHAFT ASSEMBLY, includes	1
127		17831 Worm Shaft Bearing	1
128		Style 72 - 7/16" x 5/16"	1
129		17832 Worm Shaft Bushing	1
130		17884 Worm Thrust Washer	1
131		30454 Worm Shaft	1
		Style 72 - 7/16" x 1" (Not Shown)	1
132		Felt Plug 3/8" x 3/4"	1
	921942	OIL FILTER	1
133		21942 Oil Filter Flange	1
134		Style 55 - 12-24 x 1/2"	6
135		20721 Oil Filter Gasket	1
133		21941 Oil Filter Screen	1

IMPORTANT: Always give serial number of grinder when ordering repair parts.

KEY NO.	PART NO.	DESCRIPTION	QUANTITY
		OIL SIGHT GLASS	1
134		17894 Oil Sight Glass Retainer Plug	1
135		Style 54 - 1/4" x 5/8"	4
136		Lunkenheimer Cat. #58 #110 Sight Glass	1
137		Cork Washer 2-1/8" x 1-3/4" x 1/8"	2
138		OIL SUPPLY ASSEMBLY	1
		1/4" Oilproof Duprene Hose H-134	1
		A-4504 Hose Fitting	1
		A-4104 Fitting with 234 x 4 Connector	1
139		OIL RETURN ASSEMBLY	1
		26854 Oil Return Tube	1
		W68 x 8 Fitting	1
UNGROUPED PARTS			
140		16341 Washer	1
141		17755 Coupling	1
		Style 65 - #4 x 2	1
142		17830 Worm	1
143		17848 Index	1
144		Style 55 - 10-24 x 3/8"	2
145		17896 Index Button	1
146		30460 Vertical Shaft Guard	1
147		Style 52A - 5/16" x 1/2"	1
		30467 Gear Box Gasket (Not Shown)	1
		30616 Oil Retainer Tube (Not Shown)	1
		30617 Oil Drip Tube (Not Shown)	1
148		Weatherhead 69 x 6	2
149		3/8 Copper Tubing 12" long	1
150		32667 Spacer	2
151		Style 52A - 5/16" x 1"	2
152		37903 Head Traverse Switch Cam	1
153		Style 66 - #5	1
		15731 Collar (same as #55)	1
		Style 72 - 7/16" x 1/2" (same as #56)	1
154		38444 Switch Return Lever	2
		38445 Switch Shaft (same as #61)	1
155		29U083 Elastic Stop Nut	1
156		A-1213-3 Oilite Bushing	1
157		38447 Washer	1
158		Extension Spring	1
159		Style 72 - 7/16" x 3/4"	1
160		Style 81 - 5/16" x 1 1/2"	2
161		Style 81 - 3/8" x 3"	1
162		T-1001-1 Oilite Thrust Bearing	1

IMPORTANT: Always give serial number of grinder when ordering repair parts.

KEY NO.	PART NO.	DESCRIPTION	QUANTITY
		CONNECTING SHAFT	
163		30456 Universal Joint (see Chuck Speedbox)	2
164		30457 Spline Shaft	1
165		30458 Spline Coupling	2
		30459 Connecting Shaft (Not Shown)	1
166		30455 Worm Shaft Collar	1
167		Style 72 - 7/16" x 7/16"	2
168		5100-125 Tru-Arc Ring	2

TO REMOVE UPPER GEAR BOX
SERIAL #6639 AND UP

The Gear Box No. 1 is attached to Column by the following parts:

8-Socket Head Cap Screws St. 52A 7/16 x 1 (No. 2)
2-Dowel Pins St. 81 7/16 x 1 1/4

1. Drop Vertical Shaft Guard No. 146.
2. Remove 2 Tru-Arc Rings 5100 - 125 No. 168 and remove Spline Shaft No. 164.
3. Disconnect Oil Supply No. 138 and Return Tube No. 139.
4. Remove 8 Socket Head Cap Screws St. 52A 7/16 x 1 No. 2 and 2 Dowels St. 81 7/16 x 1 1/4.
5. Pull Gear Box No. 1 straight off machine.

TO DISASSEMBLE UPPER GEAR BOX
SERIAL #6639 AND UP

1. To remove Toggle Bridge No. 47, first take out 2 Socket Head Cap Screws and Spacers No. 150 & 151 which limit the travel of the feed Control Lever. This will free the Feed Operating Bar No. 63 from the Spool No. 114.
2. Next, remove 3 Cap Screws No. 48 and Bridge No. 47 may be removed as a unit with Trip Plunger Rod No. 112.
3. Remove Ratchet Pinion No. 92 by removing Cap Screw 94 and Washer No. 91.
4. Drive out Taper Dowel Pin No. 11 from Pawl Arm Stud No. 17.
5. Ratchet Pinion No. 92, Pawl Arm Stud No. 15, Pawl No. 13, Eccentric Link No. 14, Pawl Arm No. 17, and Trip Arm No. 10 are now removed.

CAUTION: In back of Ratchet Pinion in the center of the Idler Gear No. 98 is a brass Friction Plug No. 103 under tension from Spring No. 97. This acts as a brake on the Ratchet Pinion to keep it from slipping when not engaged by the Pawl. Ease Ratchet Pinion off carefully to prevent forceful ejection of the plug.

6. Removal of Ratchet Pinion exposes one of two Idler Gears No. 98 (The other Idler Gear is accessible without removing any parts.)
7. Remove Spring No. 97 from one Gear and Allen Pipe Plug No. 107 from other. This exposes Set Screws No. 100 & 106 in center hole of both Idler Studs No. 99 and No. 105.
8. Remove these Set Screws and Idler Studs and Idler Gear Spacers No. 102 & 108 may be removed.
9. The Output Shaft Assembly No. 67 is removed as a unit by removing Headless Set Screw St. 72 7/16 x 1/2 on outside of Box, and drawing Shaft straight out through the back of the Box.

NOTE: Put Pipe Compound on Screw when replacing to prevent oil leak.

10. Remove Hand Wheel Screw No. 20 and remove Hand Wheel No. 19.
11. Drive out Taper Dowel No. 24 and Handwheel Key Sleeve No. 23 will come free of Shaft.
12. Take out 4 Socket Head Cap Screws No. 34 and remove Dial Retaining Cap No. 33.
13. Unscrew Reset Clamping Knob No. 29 until Reset Clamp No. 28 is free of Ring Gear No. 32 and Dial No. 30 may be removed.
14. Remove Headless Set Screw No. 35 and Ring Gear No. 32 can be removed.
15. Remove Set Screw No. 128 from front of Box and drive Worm Shaft Assembly No. 131 free.
16. Remove Check Nut No. 126 and Worm Gear No. 142 from Shaft No. 124 and draw out through back of Box.
NOTE: This Worm Gear is accessible only with the Handwheel, Dial, and Ring Gear removed. When reassembling, be sure that Oil Groove in Eccentric Shaft Bushing No. 122 is at side toward Worm.
17. With Handwheel, Dial, and Ring Gear removed, tap Handwheel Shaft No. 82 free through rear of Box.
18. Remove Hollow Shaft Nut No. 78 and drive Hollow Shaft No. 77 out through front of Box.
19. Remove Coupling Sleeve No. 62 and Feed Operating Bar No. 63. Feed Control Shaft No. 60 may be withdrawn.

NOTE: Gear Box must be removed to take out Feed Control Shaft or change Feed Control Handle.

20. Take out Detent Screw No. 7, Plunger No. 8, and Spring No. 9 on top of Box and Feed Range Dial No. 3 may be removed.
21. Remove Feed Adjusting Rack Collar No. 118 and knock out Welch Plug No. 119 in side of Box. Feed Adjusting Rack No. 116 is withdrawn through this opening.

TO REASSEMBLE UPPER GEAR BOX
SERIAL #6639 AND UP

When reinstalling Feed Adjusting Rack No. 116 and Pinion No. 6 mesh Teeth with Feed Range Dial at maximum reading of 80 on first tooth of Rack.

If Bridge Assembly No. 47 has been disturbed it must be readjusted.

On back of Bridge is a set Screw No. 49 and a Lock Nut No. 50. Adjust this screw so that Middle Hinge Pin No. 37 is 1/16" below center when the Bridge is in an engaged position.

Adjust Spool No. 110 so that Trip Plunger Rod No. 112 is 3/8" from the Bridge.

To adjust Feed turn Feed Range Dial No. 3 to 0. Set Eccentric Shaft 124 on highest point of its stroke. Adjust Plunger Nut No. 44 so there is 1/16" clearance between Pawl No. 13 and Ratchet Pinion No. 92.

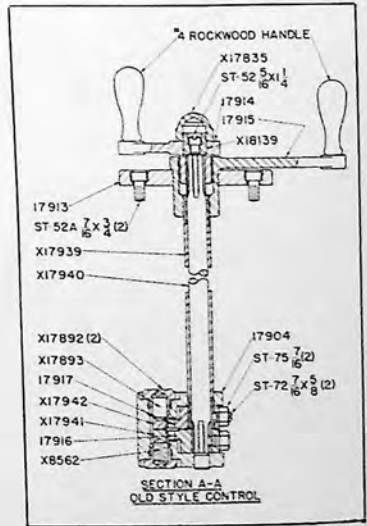
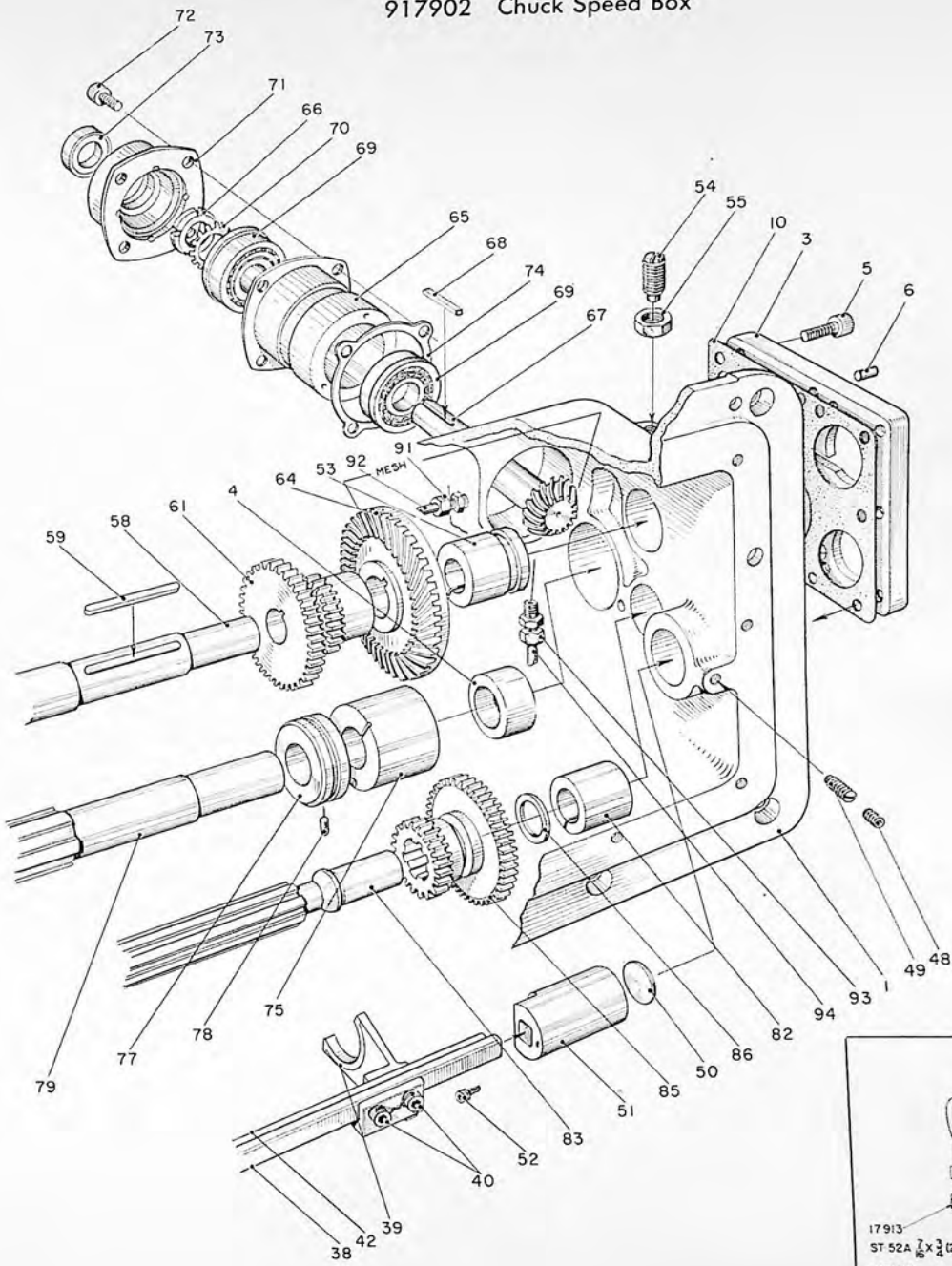
There should also be a 1/16" clearance between Trip Arm No. 10 and Plunger Adjusting Nut No. 44 when Pawl is engaged to the full depth of a tooth.

Engage Feed and while turning the Worm No. 131 by hand, move Feed Adjusting Rack Collar No. 118 until Pawl picks up one tooth with the Feed Range Dial No. 3 set at .004. If adjustment is correct, the Pawl should pick up 20 Teeth with Dial set at .080.

To facilitate Adjusting Rack Collar No. 118, back off Feed Range Dial No. 3 until Pinion No. 6 is free of Rack No. 116 and revolve Rack in place. Mark Feed Range Dial Pinion and Rack while still meshed to insure returning to its original position

PLATE 10

917902 Chuck Speed Box



IMPORTANT: Always give serial number of grinder when ordering repair parts.

KEY NO.	PART NO.	DESCRIPTION	QUANTITY
	917902	CHUCK SPEED BOX	
		The following units are listed covering specific serial numbers as several important changes have been made, particularly in the Speed Control Unit, the older or Rack Type Unit being described first. Individual parts can be supplied except as noted.	
1		17902 Chuck Speed Box (attached to machine by the following parts - not shown)	1
2		Style 52A - 5/8" x 1 1/4"	7
		Style 75 - 7/16"	2
		Style 97 - #9 x 1 1/2" Dowel Pin	2
3		17911 Right End Cover	1
4		19630 End Cover Bushing (used after Serial 2629 but can be supplied in cover for earlier machines)	1
5		Style 52A - 3/8" x 1"	9
6		Style 81 - 3/8" x 1 3/8"	2
7		17912 Left End Cover	1
		X17938 Square Washer	4
		Style 51 - 3/8" x 2 1/2"	4
8		Style 52A - 3/8" x 1"	5
9		50071 National Oil Seal	2
10		21323 End Cover Gasket	2
	917903	SPEED CONTROL UNIT - Rack Type (Serial #2545-2710)	
		17903 Chuck Speed Box Cover - Rack Type	1
		X16341 Washer	1
		X19331 Gasket	1
		Style 52A - 3/8" x 7/8"	10
		Style 108 - 5/8" Oil Drain Plug	1
		L-P-1405 Gits Oil Cup	1
		17904 Shifter Bushing - Left	1
		X8562 Spring	1
		X17892 Detent Screw	2
		X17893 Detent Plunger	2
		Style 57 - 7/16" x 1/2"	1
		Style 72 - 7/16" x 7/16"	1
		Style 93 - 1 1/2" Welch Plug	1
		17913 Speed Dial	1
		Style 52A - 7/16" x 3/4"	2
		17914 Upper Control Handle	1
		17915 Lower Control Handle	1
		#4 Rockwood Handle (Each Control)	1



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KEY NO.	PART NO.	DESCRIPTION	QUANTITY
		17916 Five Tooth Segment (meshes with X17941)	1
		Style 72 - 7/16" x 5/8"	1
		Style 75 - 7/16"	1
		17917 Nine Tooth Segment (meshes with X17942)	1
		Style 72 - 7/16" x 5/8"	1
		Style 75 - 7/16"	1
		17924 Shifter Bushing - Right	1
		Style 57 - 7/16" x 1/2"	1
		Style 72 - 7/16" x 7/16"	1
		Style 93 - 1 1/2" Welch Plug	1
		X17939 Shifter Sleeve	1
		X17940 Shifter Shaft	1
		X17835 Nut	1
		X18139 Lock Screw	1
		Style 52 - 5/16" x 1 1/4"	1
		X17941 Bottom Shifter Bar (meshes with 17916)	1
		17905 Shifter Fork	1
		X17953 Drilled Head Cap Screws	2
		X17942 Top Shifter Bar (meshes with 1917)	1
		17905 Shifter Fork	1
		X17953 Drilled Head Cap Screws	2
	919761	SPEED CONTROL UNIT Lever Type (Serial 2711 and up), includes	
11		19761 Speed Box Cover	1
12		Style 52A - 3/8" x 1 1/4"	9
13		Style 108 - 5/8" Oil Drain Plug	1
14		X16341 Washer	1
15		L-P-1405 Gits Oil Cup	1
16		19764 Inner Control Lever (must be fitted at Assem.)	1
17		X23165 Dog Point Screw	2
18		19765 Control Shaft Bushing	1
19		19768 Outer Control Lever	1
20		24056 Control Handle and Knob 24059	1
21		X19783 Hinge Pin	1
22		19770 Control Ball Crank	1
23		X19785 Driving Shoe	1
24		19782 Chuck Speed Index Plate	1
25		Style 52A - 1/4" x 1/2"	2
26		Style 80 - 1/4"	2
27		X19331 Gasket	1
28		X19767 Control Shaft	1
29		X19784 Control Shaft Pin	1
30		Style 65 - #3-1 1/4" Taper Pin	1

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KEY NO.	PART NO.	DESCRIPTION	QUANTITY
31		X19778 Control Connecting Link	1
32		X19779 Retaining Screw	2
33		Style 64 - 3/32" x 1"	2
34		X19780 Bell Crank Pivot Pin	1
35		Style 60 - 1/2"	1
36		Style 100 - 1/2"	1
37		X19781 Control Shaft Spool	1
	919774	OUTER SHIFTER BAR (Serial 2711 and up), includes	
38		X19774 Outer Shifter Bar	1
39		19762 Right Shifter Fork	1
40		X23173 Drilled Head Cap Screws	2
41		X19777 Driving Pin	1
	919775	INNER SHIFTER BAR (Serial 2711 and up), includes	
42		X19775 Inner Shifter Bar	1
43		19763 Left Shifter Fork	1
		X23173 Drilled Head Cap Screws (same as #40)	2
		X19777 Driving Pin (same as #41)	1
44	19766	Shifter Bushing - Left	1
45		X8562 Spring	2
46		X17892 Detent Screw	1
47		X19776 Detent Plunger	2
48		Style 57A - 7/16" x 1/2"	1
49		Style 72 - 7/16" x 7/16"	1
50		Style 93 - 1 1/2" Welch Plug	1
51	19773	Shifter Bushing - Right	1
		Style 57A - 7/16" x 1/2" (same as #48)	1
		Style 72 - 7/16" x 7/16" (same as #49)	1
		Style 93 - 1 1/2" Welch Plug (same as #50)	1
52		Style 52A - 1/4" x 1/2"	1
	917907	FIRST SHAFT (Serial 2545 and up) includes	
53		17921 First Shaft Bushing - Right	1
		Style 72 - 7/16" x 7/16" (Not Shown)	1
54		X17931 Eccentric Screw	1
55		5/8"-18 S. A. E. Check Nut	1
		Used to adjust 17921 First Shaft Bushing. Minimum Backlash .004"	
56		17922 First Shaft Bushing -Left	1
57		Style 72 - 7/16" x 1/2"	1
58		X17907 First Shaft	1
59		X17935 Key	1
60		Style 66 - #A Key	1

IMPORTANT: Always give serial number of grinder when ordering repair parts.

KEY NO.	PART NO.	DESCRIPTION	QUANTITY
61		X17910 First Shaft Cluster Gear (meshes with X17930)	1
62		X17936 Washer	1
63		X17943 14 T Spiral Gear (meshes with 17944)	1
64		X20743 Spiral Bevel Gear G-815-AL-45 (For 50 or 60 cycle motor) (meshes with X18714) Must be supplied with X18714. NOTE: 25 cycle drive use Bevel Gear X19188, to mesh with X19187. See note on Drive Shaft Sub-Assembly 919016.	1
	919016	DRIVE SHAFT AND PINION (Serial #2545 and up), includes	
65		19016 Bearing Sleeve	1
66		X18713 Special N-6 Locknut	1
67		X18714 Drive Shaft & Pinion - meshes with X20743 (For 50 and 60 cycle motor) Must be supplied with X20743.	1
68		Style 98 - 1/4" x 1 1/2" (in coupling) NOTE: 25 Cycle Drive use Drive Shaft Pinion X19187 meshing with X19188 - See note on First Shaft Sub-Assembly 917907.	1
69		Timken Bearings 2631-B-Cup 2689 - Cone	2 2
70		W-6 Lockwasher	1
71	18712	Bearing Cover	1
72		Style 51 - 3/8" x 1 1/4"	4
73		50041 National Oil Seal	1
74		#14 Timken Shims - .005", .007", .020"	1 ea.
	*X30659	15" Climax Double Coupling (Not Shown)	1
	25147	Key	1
		*NOTE: Motor Frame Must Be Given As Hub Size Varies With Frame Size Of Motor.	
	919072	HOLLOW SHAFT (Serial 2611 and up) includes	
75		17919 Hollow Shaft Bushing - Right Style 72 - 7/16" x 1/2" (Not Shown)	1 1
76		19071 Hollow Shaft Bushing - Left (see note) Style 72 - 7/16" x 1/2"	1 1
77		X17933 Collar	1
78		Style 72 - 7/16" x 3/4"	1
79		X19072 Hollow Shaft (see note)	1
80		X19073 Hollow Shaft Cluster Gear (meshes with X17929)	1

IMPORTANT: Always give serial number of grinder when ordering repair parts.

KEY NO.	PART NO.	DESCRIPTION	QUANTITY
81		Style 90 - 7/16" x 1/2" NOTE: Serial 2545-2610 had a smaller diameter shaft 17908 with Left Hand Bushing 17920 and Cluster Gear X17909. Replacement of any of these parts must include all three corresponding new parts - 19071, X19072, and X19073.	1
82	917928	IDLER SHAFT (Serial 2545 and up) includes 17923 Idler Shaft Bushings	2
		Style 72 - 7/16" x 1/2"	2
83		X17928 Idler Shaft	1
84		X17929 Idler Shaft Triple Cluster Gear (meshes with X19073)	1
85		X17930 Idler Shaft Double Cluster Gear (meshes with X17910)	1
86		X17936 Washer	2
		OIL PUMP AND PIPING (Serial 2545 and up)	
87	X18788	Oil Pump (Brown and Sharpe)	1
88		21974 Gasket	1
89		Style 52 - 1/4" x 1/2"	6
90		Style 98 - 3/16" x 15/16"	1
		Oil Piping	
91		#4 F.B. Parker Tube Coupling	1
92		1/4" Copper Tubing 8 3/8"	1
93		#6 F.B. Parker Tube Coupling	2
94		3/8" Copper Tube 10"	1
	930459	CONNECTING SHAFT (Serial 6639 and up) 26854 Oil Return (See Upper Gear Box)	1
		Style 65 - 4" x 1 1/4"	
95		30456 Universal Joint	2
		30457 Spline Shaft	1
		30458 Spline Coupling See Upper Gear Box	1
		30459 Connecting Shaft	1
96		Truarc 5100-125	
	917946	VERTICAL SHAFT (Serial 2545 to 6638) includes	
97		17925 Bushing	1
98		Style 72 - 7/16" x 7/16"	1
99		17944 Spiral Gear (meshes with X17943)	1
100		X11965 Collar	1
101		X14631 Locking Wire	1
102		X30461 Vertical Shaft (6639 and up)	1
		Style 98 - 3/16" x 15/16" Square Key (same as #90)	1
103		X17950 Washer	1



IMPORTANT: Always give serial number of grinder when ordering repair parts.

KEY NO.	PART NO.	DESCRIPTION	QUANTITY
	X9996	Connecting Shaft (Serial 2545 to 6638) (See Upper Gear Box)	1
		X7939 Connecting Shaft Pin (See Upper Gear Box)	2

TO REMOVE CHUCK SPEED BOX

Chuck Speed Box is attached to Base by the following parts:

- 7- Socket Head Cap Screws St. 52A 5/8 x 1 1/4 (No. 2)
- 2- Check Nuts St. 75 7/16
- 2- Taper Dowels St. 97 #9 x 1 1/2

1. Disconnect Chuck Cable at Switch.
2. Remove Front End Plate 17592 and Rear End Plate 17593. On Way Covers.
3. Remove Rocker 17605 and drop Trip Bar 17608 clear. (This is directly below "Table Stop Adjustment" Cover.)
4. Remove Sleeve Flange 17596. This exposes Square and Hollow Shafts.
5. Move Table out until Square Shaft 17570 is clear of Hollow Shaft 19072. Table Body may be removed if necessary to clear Shafts.
6. Remove Motor Connection to Drive Shaft. (This is a Climax Double Coupling.)
7. If Upper Gear Box is in place, drop Vertical Shaft Guard 30460 and remove Truarc Rings from Vertical Shaft, also disconnect Oiling Tubes.
8. Chuck Speed Box may be pulled straight off.

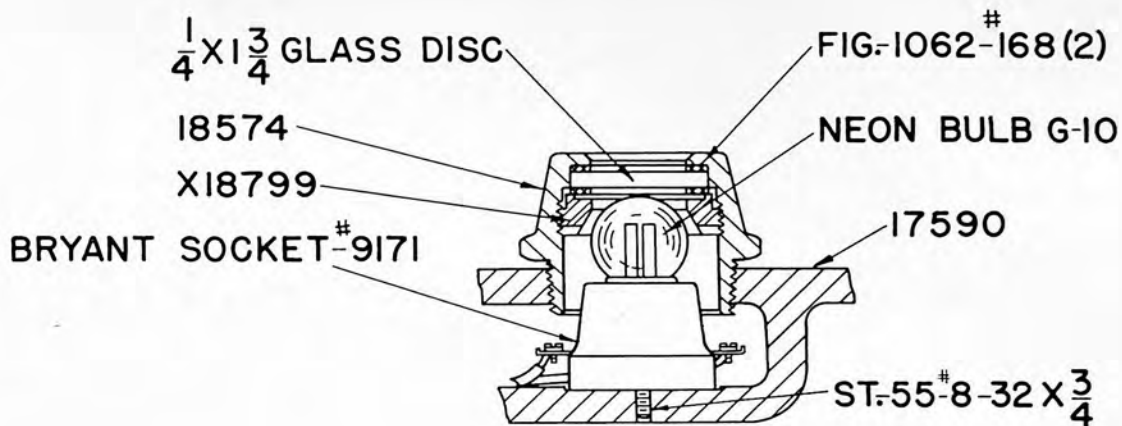
TO DISASSEMBLE CHUCK SPEED BOX

1. Remove 9 CapScrews No. 12 and lift off Speed Box Cover No. 11 vertically to disengage Inner Control Lever No. 16 and Outer Control Lever No. 19 from the Shifter Bar.
2. Remove Control Shaft Spool No. 37, Hinge Pin No. 21, and Control Shaft Pin No. 29.
3. Control Shaft No. 28 and Control Handle No. 20 may be withdrawn and Control Levers removed.

4. Remove Right End Cover No. 3 and Left End Cover No. 7.
5. Remove 2 Set Screws No. 48 and 2 Set Screws No. 49, remove Detent Screw No. 46 and Detent Plunger No. 47 and Spring No. 45.
6. Take Right Shifter Fork No. 39 from Outer Shifter Bar No. 38 and drive out Shifter Bushing (Right) No. 51.
7. Shifter Bars No. 38 and No. 42 may be removed and Shifter Bushing (Left) No. 44 removed from inside of Box.
8. Remove 2 Set Screws St. 72 7/16 x 1/2 and drive out Idler Shaft Bushings No. 82.
9. Remove Idler Shaft No. 83, Idler Shaft Triple Cluster Gear No. 84 and Idler Shaft Double Cluster Gear No. 85 will come free as Shaft is withdrawn.
10. Remove 4 Cap Screws No. 72 and drive Shaft and Pinion No. 67 can be removed as a unit.
NOTE: When reassembling adjustment for proper mesh with Spiral Gear No. 64 is made with Timken Shims No. 74 between Bearing Sleeve No. 65 and Gear Box.
11. Remove 2 Set Screws No. 57 and Eccentric Screw No. 54.
12. Drive out First Shaft Bushings No. 53 and No. 56 and remove First Shaft No. 58.
NOTE: Eccentric Screw No. 54 is used in assembly to adjust the Spiral Bevel Gear No. 64 in relation to the Drive Shaft and Pinion No. 67. If original setting does not correspond, readjust with Eccentric Screw and Timken Shims for proper mesh. Approximately .004" Backlash is recommended. Respot Bushing in new location for Set Screw.
13. Remove 2 Set Screws No. 78 and loosen Collar No. 77.
14. Remove Hollow Shaft Bushings No. 75 and No. 76 and remove Hollow Shaft No. 79.
15. Remove Set Screw No. 98 from Bushing No. 97. Remove Collar No. 100 and Spiral Gear No. 99, Vertical Shaft No. 102 may now be withdrawn.
16. Remove 6 Cap Screws No. 89 and Oil Pump No. 87 will come free.
17. Reassemble Chuck Speed Box in reverse order.

PLATE 11

918574 Pilot Light Unit



IMPORTANT: Always give serial number of grinder when ordering repair parts.

KEY NO.	PART NO.	DESCRIPTION	QUANTITY
	918574	PILOT LIGHT UNIT (Serial 2545 and up) includes	
		18574 Pilot Light Cap	1
		X18799 Glass Retainer Ring	1
		Bryant Socket #9171	1
		Style 55 - #8-32 x 3/4"	1
		Neon Clear Bulb-G-10 - Medium Screw Base	1
		NOTE: Specify voltage - (110 v. or 220 v. D.C.)	
		Cork Washer - Lunk. #168 Fig. 1062	2
		Clear Glass Disc 1 3/4" D x 1/4" thick	1

Resistors for Blanchard
Magnetic Chuck Controllers
Diagram 144325D1

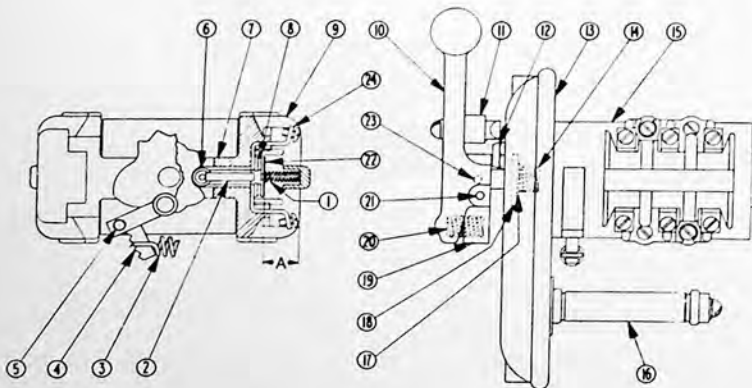
Voltage	Chuck Sizes	R1-R2		R2-R3		R4-R5	
		Part No.	Ohms Per unit	Part No.	Ohms Per unit	Part No.	Ohms Per unit
115	30 36 42	643-274	5	643-277	25	643-272	
	30 & 36 Double Coil	643-273	2.5	643-277*	25	643-272	1
230	30 36 42	643-276	20	643-279	100	643-273	2.5
	30 & 36 Double Coil	643-275	10	643-279*	100	643-273	2.5

* 2 units required. Connect in parallel.

For Machines Before Serial No. 6600 Complete Switch & Mounting Pad 21988 Must Be Ordered.

PLATE 12

WHEN TO RENEW CONTACTS: REFER TO CROSS-SECTIONAL VIEW BELOW. WITH A NARROW POCKET DEPTH RULE, MEASURE DEPTH "A". WHEN THE CONTACTS ARE NEW, THIS DIMENSION SHOULD BE ABOUT 23/32", REPLACE WHEN DEPTH "A" BECOMES 25/32".



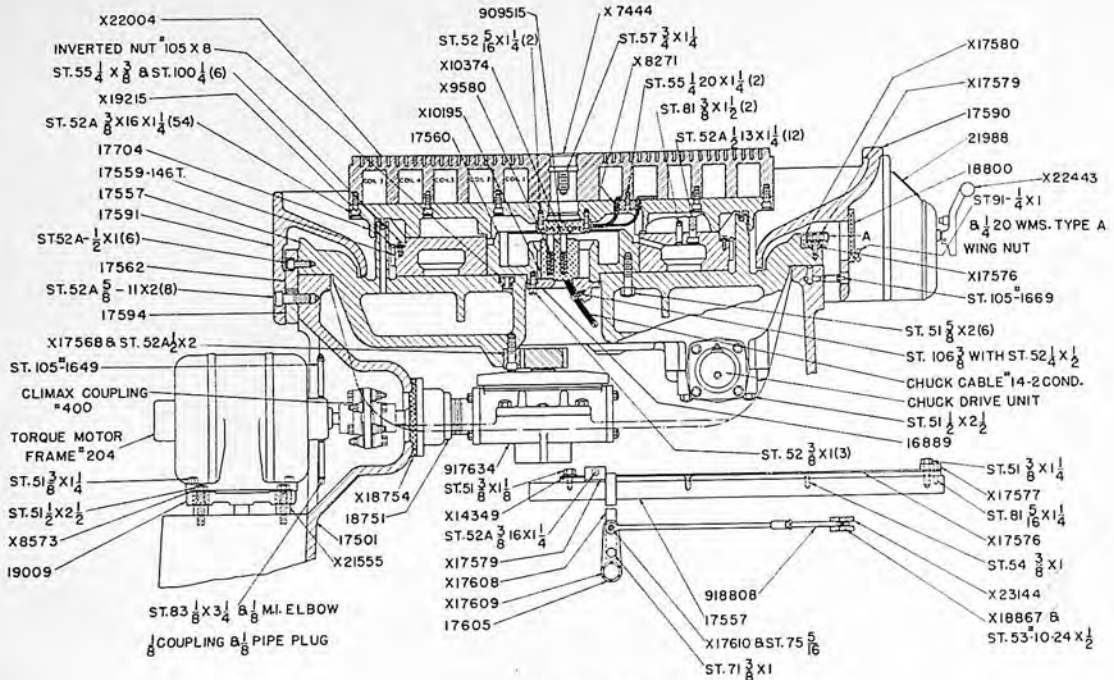
ITEM NO.	DESCRIPTION OF PART	NO. REQ.	PART NO.
1.	SPRING	6	969-404 F 1
2.	PUSH BOARD	6	61-920
3.	SPRING	1	969-15J
4.	STARWHEEL LEVER	1	24-2359-3
5.	SNAP RING	1	28-71
6.	CAM ROLLER	6	29-1690
7.	TERMINAL BOARD	2	81-3653
8.	SET OF CONTACTS (INCLUDES ITEMS 1, 22 AND 24)	2	6-136-14
9.	CONTACT BOARD	2	81-4951
10.	HANDLE	1	24-3387
11.	LATCH	1	52-666
12.	LOCK POST	1	18-1133
13.	FLUSH PLATE	1	47-6887
14.	SPRING	1	769-52
15.	FRAME WITH SHAFT AND CAMS (GIVE NAMEPLATE DATA)	1	
16.	RESISTOR (GIVE NAMEPLATE DATA)	3	
17.	STEEL WASHER	1	29-934
18.	FELT WASHER	1	16-213
19.	BLOCK	1	54-2971
20.	SPRING	1	969-1296J
21.	PIN	1	13-1380
22.	MOVABLE CONTACT	6	23-2279
23.	PIN	1	13-121
24.	STATIONARY CONTACT	12	23-1945

WHEN ORDERING RENEWAL PARTS, GIVE THIS DRAWING NUMBER (B70-1539), ITEM NUMBER, DESCRIPTION, PART NUMBER, AND COMPLETE NAMEPLATE DATA.

Assembly of Chuck Units
Chuck Rotation Unit

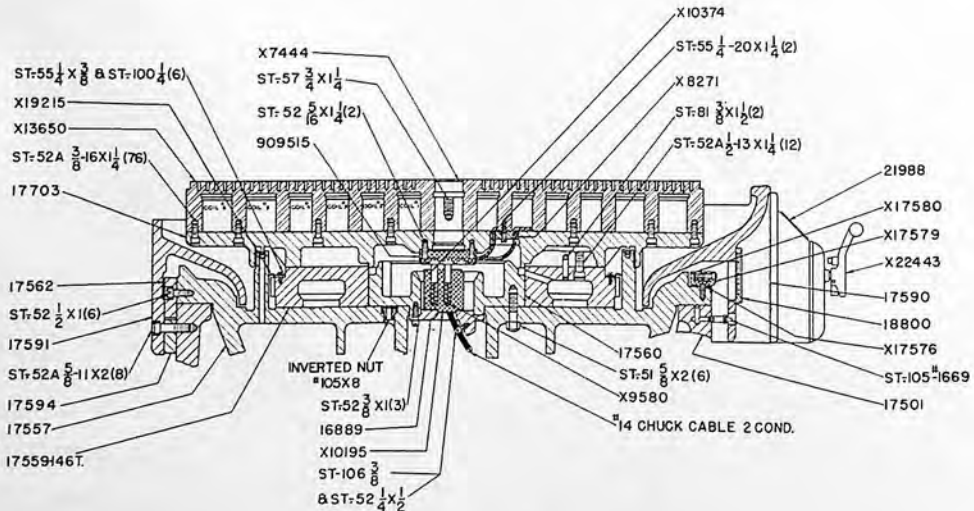
PLATE 13

Assembly of Chuck Units



VIEW AT-A-TABLE TRAVERSE CONTROL

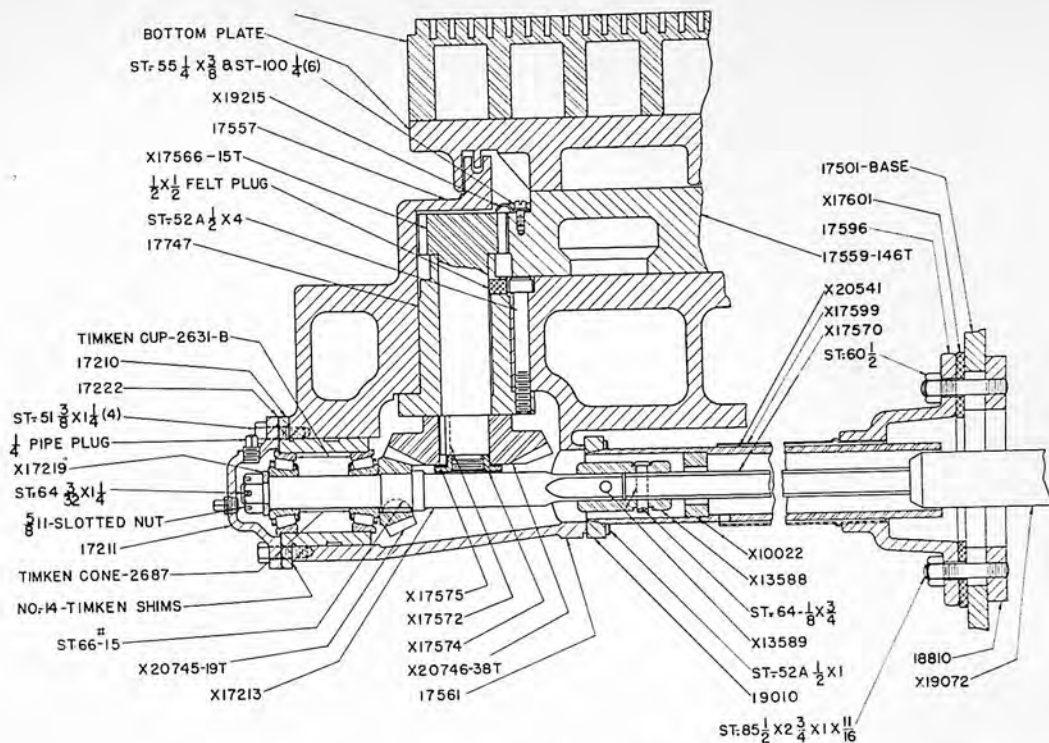
922004 30" MAGNETIC CHUCK



917703 36" MAGNETIC CHUCK

PLATE 14

Chuck Rotation Unit



IMPORTANT: Always give serial number of grinder when ordering repair parts.

KEY NO.	PART NO.	DESCRIPTION	QUANTITY
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CHUCK AND TABLE UNITS (Serial 2545 and up)

The magnetic Chucks are made in three sizes, 30", 36", and 42". The 30" and 36" are interchangeable. All other parts are the same for each size of chuck. The brass rings in the face of the chuck are $\frac{5}{8}$ " center to center. Specify D.C. voltage when ordering.

IMPORTANT: If electrical trouble develops with any Blanchard Magnetic Chuck and is shown after testing to be inside the chuck, return chuck to us with bottom plate for repairs.

922004	30" MAGNETIC CHUCK UNIT, includes X8282 Dirt Screws (in face of chuck) (Not Shown)	1
		16

IMPORTANT: Always give serial number of grinder when ordering repair parts.

KEY NO.	PART NO.	DESCRIPTION	QUANTITY
		X9202 30" Outer Chuck Ring (Not Shown)	1
		10056 Inner Chuck Ring (Not Shown)	1
		909515 Contact Ring Holder (complete with screws)	1
913650		36" MAGNETIC CHUCK UNIT, includes X8282 Dirt Screws (in face of chuck) (Not Shown)	1
		909515 Contact Ring Holder (complete)	19
		10056 Inner Chuck Ring (Not Shown)	1
		X13655 36" Outer Chuck Ring (Not Shown)	1
930113		42" MAGNETIC CHUCK UNIT (Not Shown)	1
		8282 Dirt Screws (in face of chuck)	12
		909515 Contact Ring Holder	1
		10056 Inner Chuck Ring	1
		21847 42" Outer Chuck Ring	1
909515		CONTACT RING HOLDER	1
		Style 52 - 5/16" x 1 1/4"	2
		NOTE: This is used on either chuck. Specify 110 or 220 volts.	
910195		BRUSH HOLDER UNIT, includes X9580 Brush Spring	2
		X10195 Brush Holder	1
		Style 52 - 3/8" x 1" (Not Shown)	2
		Style 80 - 3/16" (Not Shown)	4
		Style 155 - #10-24 x 3/8" (Not Shown)	4
		X10374 Brush - 1/2" D. x 1 1/4" L.	2
		Sealing Compound	1 lb.
		NOTE: Brushes and Springs may be ordered separately as spare parts.	
		#14-2 Wire Tirex Chuck Cable 5' L.	1
		CGB-195 Connector	2
17557		TABLE, BODY	1
		X18736 Waterguard Support Bushing (See Page 104)	1
		C. P. #1305 Gits Oil Cup	1
		1" Malleable Street Elbow	1
		1" Close Nipple	1
		Style 108 - 5/8" Drain Plug (Not Shown)	1
		X16341 Washer	1
		Weatherhead Inverted Nut - 105 x 8	1
		27769 Brush Holder Support	1
		Style 52 - 3/8" x 1"	3
		Style 106 Cable Clip	1
		Style 52 - 1/4" x 1/2"	1

IMPORTANT: Always give serial number of grinder when ordering repair parts.

KEY NO.	PART NO.	DESCRIPTION	QUANTITY
		17560 Table Bearing Hub	1
		Style 51 - 5/8" x 2"	6
		Weatherhead Inverted Nut - 105 x 8 (Not Shown)	1
		X17568 Traverse Rack (meshes with X19017)	1
		Style 52A - 1/2" x 2"	3
		Style 81 - 1/2" x 2" (Not Shown)	2
		22163 Traverse Rack For No. 18-42"	

TABLE GUIDE AND GREASE FITTINGS IN WAY-COVERS

17590	Front Way Cover (attached to Base 17501 by following screws - Not Shown)	1
	Style 52A - 5/8" x 1"	2
	Style 52A - 5/8" x 2"	8
	Style 105 - #1669 Alemite Fitting	1
	17592 Front End Plate	1
	Style 52A - 3/8" x 3/4" (Not Shown)	3
	18800 Handhole Cover	1
	Style 91 - 1/4" x 1" Threaded Stud	2
	1/4"-20 Williams Type A Wing Nut	2
	X20742 Front Way Cover Felt (near Pilot Light) (Not Shown)	1
17591	Rear Way Cover	1
	Style 52A - 5/8" x 2"	8
	Style 105 - #1610 Alemite Fitting (Not Shown)	1
	Style 105 - #1669 Alemite Fitting (Not Shown)	1
	17562 Table Guide	1
	Style 52 - 1/2" x 1"	6
	17593 Rear End Plate	1
	Style 52A - 3/8" x 3/4" (Not Shown)	3
	17594 Guide Spacer	2
	X17753 Filler Piece (Not Shown, near Column)	1
	Style 81 - 1/4" x 1 1/4" (Not Shown)	1
	X20741 Rear Way Cover Felt (Not Shown) (near Filler Piece)	1

IMPORTANT: Always give serial number of grinder when ordering repair parts.

KEY NO.	PART NO.	DESCRIPTION	QUANTITY
		CHUCK ROTATION UNIT (Serial 2545 and up)	
		This unit, consisting of the Drive Shaft from the Chuck Speed Box and the Pinion Shaft driving the Ring Gear and adjoining parts, is grouped in two Sub-Assemblies, but individual parts can be supplied.	
917213		CHUCK ROTATION SHAFT, includes	
		17210 Bearing Sleeve	1
		X17213 Chuck Drive Shaft	1
		X17219 Washer	1
		X17573 Key	1
		Style 64 - 3/32" x 1 1/4"	1
		Style 81 - 1/8" x 1/2" Dowel (Not Shown)	1
		5/8" - 11 Slotted Nut	1
		X20745 Spiral Bevel Pinion (G 738-AL-19) (meshes with X20746)	1
		Timken Bearings 2631-B - Cup	2
		2687 - Cone	2
		#14 Timken Shims 2 - .005" as needed	
		1 - .007"	
		1 - .020"	
917566		CHUCK PINION SHAFT, includes	
		17747 Vertical Shaft Bushing	1
		Style 52A - 1/2" x 4"	1
		1/2" x 1/2" Felt Plug	1
		X17566 Pinion & Shaft (meshes with 17559)	1
		X17572 Key	1
		X17574 Pinion Shaft Nut	1
		X17575 Locking Washer	1
		X20746 Spiral Bevel Gear (G-719-AR-38) (meshes with X20745)	1
17211		Bearing Cover	1
		X17222 Gasket	1
		Style 51 - 3/8" x 1 1/4"	4
		1/4" Pipe Plug	1
17561		Chuck Rotation Cover	1
		Style 51 - 1/2" x 1 1/2" (Not Shown)	4
		Style 51 - 1/2" x 2 1/2"	2
		Style 81 - 3/8" x 1 1/4" (Not Shown)	2
920541		DRIVE SHAFT GUARD - MOVEABLE, includes	1
		X10022 Guard Collar	1
		19010 Pipe Flange	1
		Style 52A - 1/2" x 1"	1



IMPORTANT: Always give serial number of grinder when ordering repair parts.

KEY NO.	PART NO.	DESCRIPTION	QUANTITY
	13588	Drive Shaft Coupling	1
		13589 Coupling Pin	2
		Style 64 - 1/8" x 3/4"	2
	17570	Square Shaft	1
		22166 Square Shaft For No. 18-42"	
	22962	Shaft Guard Sleeve Stationary	1
		22961 Sleeve Flange (before Serial 3451)	1
		include:	
		22965 Sleeve Packing	1
		Style 52A - 1/4" x 5/8"	1
		Style 57A - 3/8" x 7/8"	2
		Style 151 - 3/8" x 1 1/4"	2
	17559	RING GEAR (meshes with X17566)	1
		Style 52A - 1/2" x 1 1/4"	12
		Style 81 - 3/8" x 1 1/2" Dowels	2
		NOTE: Ring Gear 17559 must be scraped to fit Table Body 17557 & Bottom Plate.	

TO REMOVE MAGNETIC CHUCK & CHUCK ROTATING UNIT

1. Insert 3/4" Eyebolt in center of Chuck and hoist Chuck straight up. Rotate Chuck slightly in each direction as it is being hoisted out to free it from bearing surface. Weight of Chuck to be hoisted 30" 1100 lbs., 36" 1400 lbs., 42" 2200 lbs.
 2. With Chuck Speed Box removed, see page 89, hoist Table Body 17557 from machine. (Cast Lugs on ends of Table Body are used for lifting.) Weight to be lifted 1050 lbs.
 3. Remove Pipe Flange 19010 and tap out Coupling Pin 13589. Coupling 13588 and Square Shaft 17570 may be removed.
 4. Remove Bearing Cover 17211 and Chuck Rotation Cover 17561. Chuck Drive Shaft 17213 may be lifted out.
 5. Remove Socket Head Cap Screw St. 52A 1/2 x 4 from Chuck Bearing Side of Table. Chuck Pinion Shaft Assembly 917566 is free to be removed.
 6. Ring Gear 17559 is removed from Chuck by taking out 12 Cap Screws St. 52A 1/2 x 1 1/4.
- NOTE: Ring Gear must be scraped to a good Bearing with Table Body.

TO INSTALL NEW CHUCK CABLE

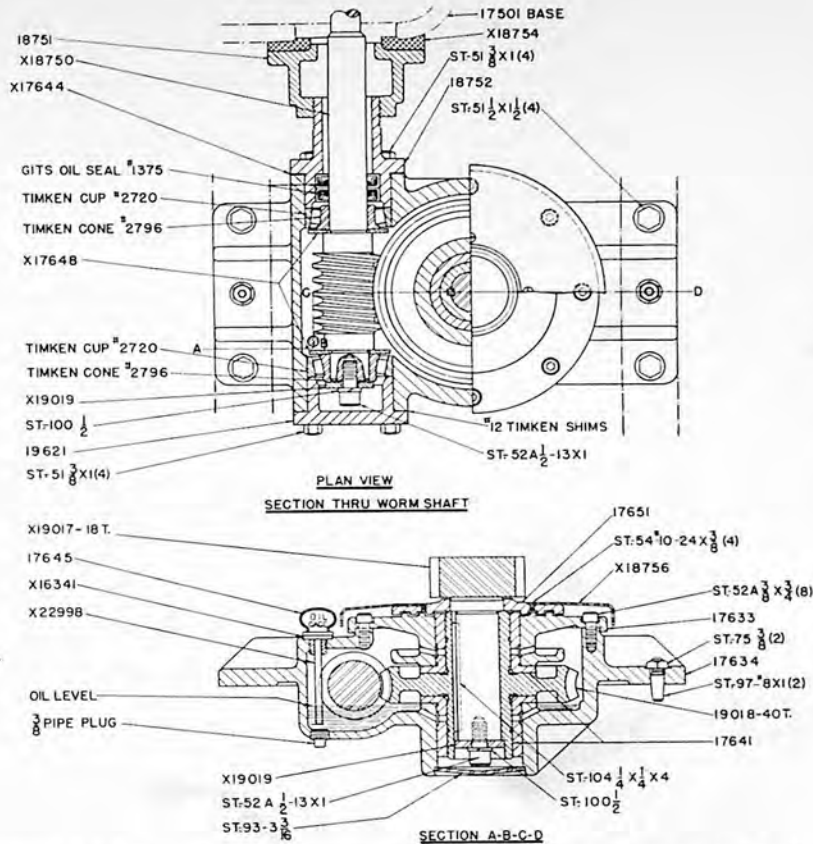
1. Traverse Table to loading position. End Plates may be removed and Table run off Rack if necessary.
2. Remove Cable from Chuck Switch.
3. Remove 3 Socket Head Cap Screws St. 52A 3/8 x 1 and Cable Clamp from under Table.
4. Brush Holder Support 27769 with Brush Holder 910195 and Cable will drop out bottom.
5. Reassemble in reverse order.

TO REMOVE WAY COVERS

1. Break all electrical connections to push buttons and Chuck Switch, also remove Chuck Cable.
2. Take off Rocker 17609 and remove Grease Fitting St. 105 #1669.
3. Take off front End Plate 17592 and remove Cap Screws St. 52A 5/8 x 2. Front Way Cover 17590 may be lifted off.
4. Remove Rear End Plate 17593 and Coolant Supply Pipe from Pump.
5. Remove Grease Fittings St. 105 #1669 and Cap Screws St. 52A 5/8 x 2. Rear Way Cover 17591 may be lifted out.

PLATE 15

917634 Table Traverse Box



IMPORTANT: Always give serial number of grinder when ordering repair parts.

KEY NO.	PART NO.	DESCRIPTION	QUANTITY
	917634	TABLE TRAVERSE BOX (Serial 2545 and up) This can be supplied as a unit, in single sub-assemblies or as individual parts. It is driven by a Torque Motor, through a Climax Coupling. Grease Lubricated (Serial 6830 and up)	
	918750	WORM SHAFT includes (up to serial 6819) X18750 Worm Shaft (meshes with X19018) X19019 Lockwasher Style 52A - 1/2" x 1" Style 100 - 1/2" Timken Bearings, 2720 Cup 2796 Cone Style 98 - 1/4" x 1 1/4" Sq. Key (for Coupling) #12 Timken Shims .005" - .007" - .020" as needed	1 1 1 1 2 2 1

IMPORTANT: Always give serial number of grinder when ordering repair parts.

KEY NO.	PART NO.	DESCRIPTION	QUANTITY
18751		Guard Flange	1
		X18754 Packing	1
18752		Bearing Cover	1
		X17644 Gasket	1
		Style 51 - 3/8" x 1"	4
		OS-1375 Gits Oil Seal	2
19621		Bearing Cap	1
		Style 51 - 3/8" x 1"	4
919017		TRAVERSE PINION & SHAFT, includes	
		17633 Worm Gear Case Cover	1
		Style 52A - 3/8" x 3/4"	8
		17641 Worm Gear Bushing (upper)	1
		17651 Splash Guard	1
		X18756 Guard Cover	1
		Style 54 - #10-24 x 3/8"	4
		X19017 Traverse Pinion & Shaft (meshes with Rack X17568)	1
		X19019 Lockwasher	1
		Style 52A - 1/2" x 1"	1
		Style 100 - 1/2"	1
		Style 104 - 1/4" x 4" Square Key	1
		X19018 Worm Gear (meshes with X18750)	1
17634		Worm Gear Case	1
		17641 Worm Gear Bushing (lower)	1
		Style 51 - 1/2" x 1 1/2"	4
		Style 75 - 3/8"	2
		Style 97 - #8 x 1"	2
917645		OIL GAGE up to 6820	
		Style 93 - 3 3/16" Welch Plug	1
		3/8" Pipe Plug	1
		*#400 Climax Coupling without Covers (For following parts see illustration Page 94	1
19009		Motor Base for 204 frame motor	1
		X8573 Washer (under Style 51 - 1/2" x 2 1/2"	3
		X18791 Adjusting Screw	3
		Style 51 - 3/8" x 1 1/2"	4
		Style 51 - 1/2" x 2 1/2"	3

* Frame Size of Torque Motor Must be Given as Hub Size of Coupling Varies with Frame Size of Motor.



TO REMOVE TABLE TRAVERSE BOX

1. With Table removed, disconnect Climax Coupling at Motor.
2. Remove Taper Dowels St. 97 #8 x 1 and Cap Screws St. 51 1/2 x 1 1/2. Traverse Box Assembly 917634 can be lifted out.
3. Remove Guard Flange 18751 and Bearing Cover 18752 with Gasket 17644.
4. Take off Bearing Cap 19621. Remove Timken Cups 2720 and Cones 2796 from each end of Worm Shaft and Worm Shaft 18750 may be withdrawn.
5. Take off Guard Cover 18756 and Worm Gear Case Cover 17633. Pinion and Shaft 19017 and Worm Gear 19018 are removed with the Case Cover.
6. Drive Welch Plug St. 93 3 3/16 from Worm Gear Case 17634 and Worm Gear Bushing (Lower) 17641 can be removed.
7. Worm Gear Bushing (Upper) 17641 can be pressed out of Cover.
NOTE: When reassembling, replace Worm Gear and Pinion before putting in Worm Shaft and Bearings.
8. Reassemble in reverse order.

Push Button Controls

Open Fold-out for Plate 16

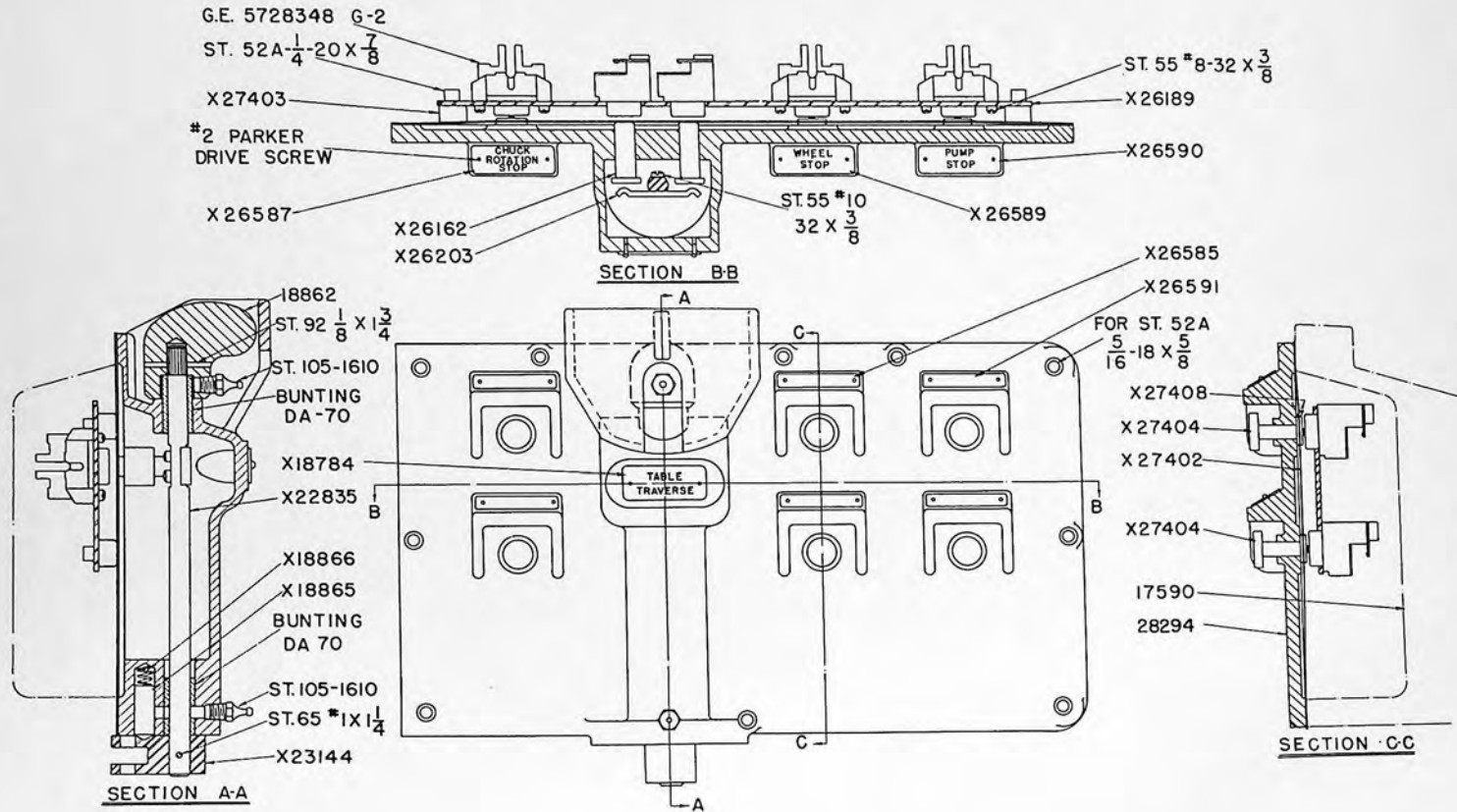


PLATE 16
Push Button Controls

IMPORTANT: Always give serial number of grinder when ordering repair parts.

KEY NO.	PART NO.	DESCRIPTION	QUANTITY
		Special Grease Fittings for Table Traverse Motor:	
		Style 105 - #1649 Alemite Fitting (G. E. Frame 204)	1
		Style 83 - 1/8" x 3 1/4" Overflow Pipe	2
		1/8" M.I. Elbow	1
		1/8" M.I. Coupling	1
		1/8" Pipe Plug	1
		Style 105 - #1649 Alemite Fitting (West. Frame W-204)	1
		Style 83 - 1/8" x 3 1/4" Filler Pipe (Not Shown)	1
		TABLE TRAVERSE CONTROL	
		Stop Mechanism Mounted on Table Body 17557	
X17576		Stop Bar	1
		X14349 Washer	1
		Style 51 - 3/8" x 1 1/8"	1
		Style 54 - 3/8" x 1"	2
X17577		Stop	1
		Style 51 - 3/8" x 1 1/2"	1
		Style 81 - 5/16" x 1 1/4"	1
X17579		Front Stop Block	1
X17580		Rear Stop Block	1
		Style 52A - 3/8" x 1 1/4"	1
		Linkage Mechanism Mounted on Base 29539	
917605		Rocker Assembly	
		17605 Rocker	1
		X17608 Trip Bar	1
		Style 71 - 3/8" x 1" Rivet	1
		X17609 Shoulder Screw	1
		X17610 Stud	1
		Style 75 - 5/16"	1
918808		LINK ASSEMBLY	1
		X18867 Pin	1
		Style 53 - #10 - 24 x 1/2"	1
21344		Table Traverse Switch Lever	
		Listed with Table Traverse Switch on page 103	

PUSH BUTTON CONTROLS are located on the front Way Cover of the machine and consist of commercial units arranged and mounted by us. Individual Stations or parts



IMPORTANT: Always give serial number of grinder when ordering repair parts.

KEY NO.	PART NO.	DESCRIPTION	QUANTITY
---------	----------	-------------	----------

listed below can be supplied. It is important to give the serial number of the grinder when ordering.

Momentary Contact Push Buttons used after serial 3315. On machines from 2545 to 3315 parts cannot be supplied. It is necessary to order complete Push Button Cover.

928294		PUSH BUTTON COVER (Serial #3315 and up), includes	1
		28294 Push Button Cover	1
		Style 105 - #1610	1
		Style 52A - 5/16" x 5/8"	10
		DA-70 Bunting Bushing	2
		Table Traverse Switch includes:	1
		18862 TT Switch Knob	1
		Style 92 - 1/8" x 3/4"	1
		Style 105 - #1610	1
		28297 PB Cover Gasket	1
		X23144 TT Switch Lever	1
		Style 64 - #1 x 1 1/4"	1
		X22835 TT Switch Shaft	1
		26203 Cam	1
		Style 55 - #10-32 x 5/8"	2
		X18865 Detent	1
		X18866 Detent Spring	1
		X26162 Plunger	2
		28012 TT Switch Guard for old machines	1
		Style 52A - 5/16" x 1"	2

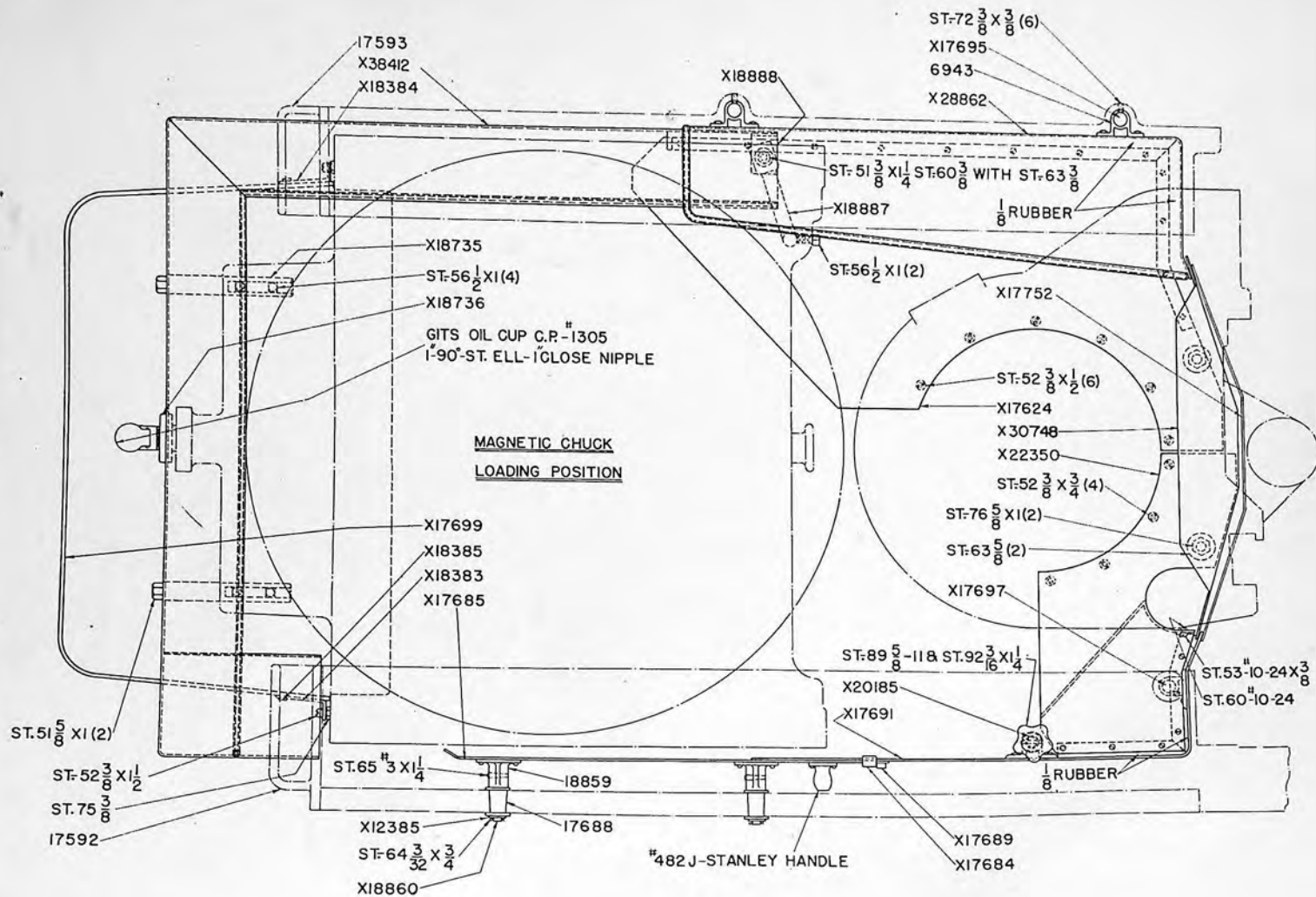
CHUCK ROTATION WHEEL & PUMP SWITCHES include the following:

		X27404 Push Button	6
		X27408 Washer	6
		926189 Push Button Plate, includes:	1
		X27403 Spacers	4
		Style 52A - 1/4" x 7/8"	4
		Style 63 - 1/4"	4
		G.E. Std. Duty Momentary Contact Button	
		Cat. No. 5728348G2 (after serial 5794)	8
		Style 55 - #8-32 x 3/8"	16

NOTE: Momentary Contact Button 4324194G1 used up to serial 5794 (Not Available Order New 926189 Push Button Plate)

Waterguards

Open Fold-out for Plate 17



IMPORTANT: Always give serial number of grinder when ordering repair parts.

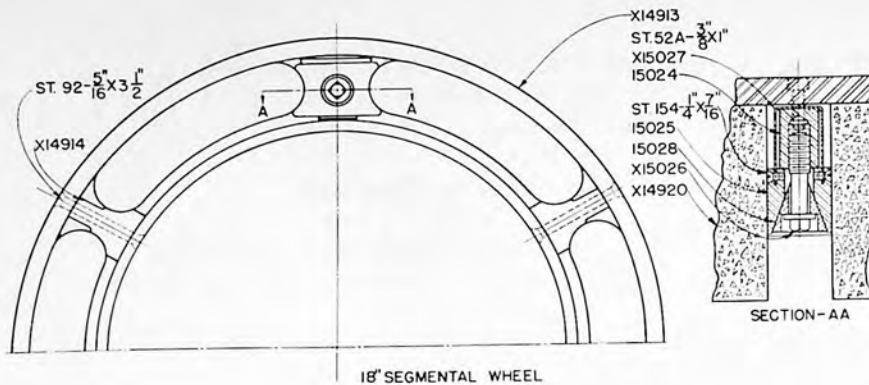
KEY NO.	PART NO.	DESCRIPTION	QUANTITY
		WATERGUARDS and attached parts are grouped in Sub-Assemblies, but individual parts can be supplied as listed. The following are Standard Waterguards for either 30" or 36" chuck, and will permit a swing of 38" Diameter, but the machine is designed to completely grind a maximum diameter of 36". Except as noted all parts apply to Serial #2545 and up.	
X30748		Column Waterguard, includes (Serial 6639 and up) (X22352 before 6638)	1
		Style 63 - 5/8" Washer	2
		Style 76 - 5/8" x 1"	2
922350		FRONT HEAD WATERGUARD, includes X22350 Front Head Waterguard	1
		1/8" Rubber and Binders - as needed	
		Style 52 - 3/8" x 3/4"	4
		Style 53 - #10-24 x 3/8"	1
		Style 60 - #10-24	1
917624		REAR HEAD WATERGUARD, includes X17624 Rear Head Waterguard	1
		1/8" Rubber and Binders - as needed	
		Style 52 - 3/8" x 1/2"	6
938412		TABLE WATERGUARD, includes	
		38412 Table Waterguard	1
		X18735 End Support Rod	2
		Style 51 - 5/8" x 1"	2
		Style 56 - 1/2" x 1"	4
		X18887 Bent Support Rod	1
		Style 51 - 3/8" x 1 1/4"	1
		Style 56 - 1/2" x 1"	2
		Style 60 - 3/8"	1
		Style 63 - 3/8"	2
		X18888 Table Waterguard Bracket	1
917685		DOOR, includes	
		X17685 Door	1
		17688 Roll	2
		18859 Roll Bracket	2
		X17689 Stop	1
		X18860 Roll Stud	2
		X12385 Washer	2
		Style 64 - 3/32" x 3/4"	2
		Style 65 - #3 x 1 1/4"	2
		#3 Stanley #482J Handle	1



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KEY NO.	PART NO.	DESCRIPTION	QUANTITY
917691		FRONT WATERGUARD, includes	
		X17691 Front Waterguard	1
		6943 Waterguard Bracket	4
		X17684 Clip	1
		X17697 Short Support Rod	1
		Style 72 - 3/8" x 3/8"	1
		X20185 Long Support Rod (Threaded)	1
		20184 - Support Bushing (in way cover - Not Shown)	1
		Style 89 - 5/8"-11 Clamp Handle	1
		Style 92 - 3/16" x 1 1/4"	1
		NOTE: Grinders Serial #2545-2710 had a shorter support rod without Bushing or Clamp Handle and replacements must include both of these parts.	
928862		REAR WATERGUARD, includes	
		28862 Rear Waterguard	1
		6943 Waterguard Bracket	4
		X17695 Support Rod	2
		Style 72 - 3/8" x 3/8"	2
917699		BASE WATERGUARD, includes	
		17699 Base Waterguard	1
		X18383 Right Hand Hook	1
		X18385 Hook Rivet	1
		X18384 Left Hand Hook	1
		X18385 Hook Rivet	1
		Style 52 - 3/8" x 1 1/2"	2
		Style 75 - 3/8"	2
X17752		Base Column Waterguard	1
		(located near Column Waterguard X17589) includes	
		Style 54 - 1/4" x 1/2" (Not Shown)	3
X18736		Waterguard Support Bushing - (See Page 94	
		C. P. 1305 Gits Oil Cup (Table Body	
		1" Malleable Street Elbow (17557	

PLATE 18



IMPORTANT: Always give serial number of grinder when ordering repair parts.

KEY NO.	PART NO.	DESCRIPTION	QUANTITY
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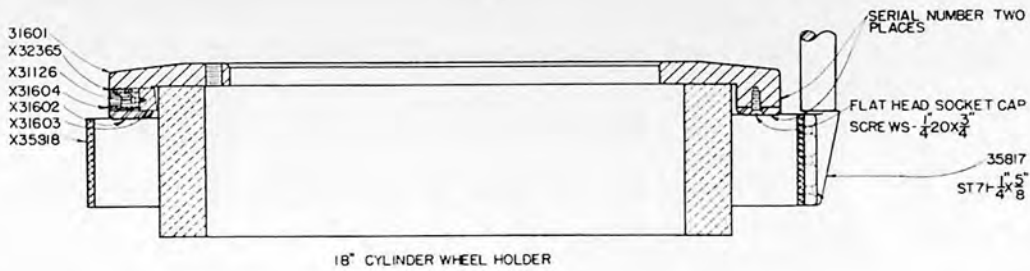
18" SEGMENT CHUCK

914913		18" SEGMENT CHUCK, includes	3
		15028 Wedge	3
		15024 Anchor	3
		Style 52 - 3/8" x 1"	3
		15026 Screw	3
		15027 Spring	3
		14914 Block	3
		Style 92 - 5/16" x 3 1/2"	6
		15025 Shoe	6
		Style 154 - 1/4"-20, 7/16" long	6
		14913 Wheel Body	1

ACCESSORIES

	Williams #265-H OFFSET HANDLE SOCKET WRENCH	1
	25928 Backing Block	6
	25929 Backing Block	6

PLATE 19



IMPORTANT: Always give serial number of grinder when ordering repair parts.

KEY NO.	PART NO.	DESCRIPTION	QUANTITY
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18" CYLINDER WHEEL HOLDER

NOTE: When ordering wheel holder or parts specify serial number of grinder and if possible the wheel holder serial number which is stamped on the body of the wheel holder.

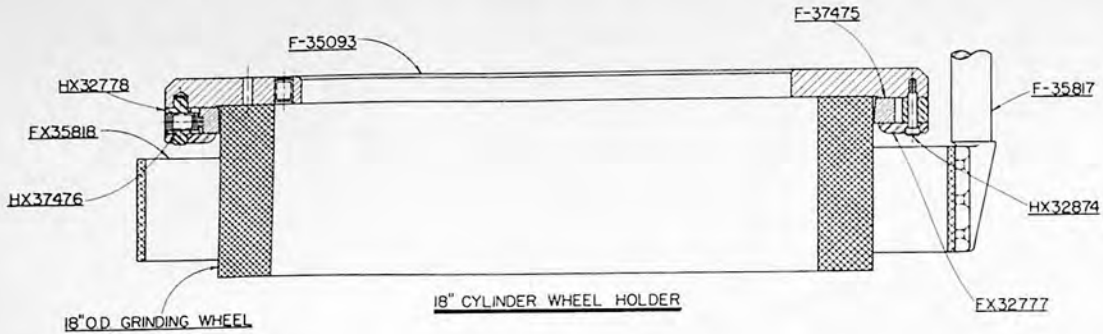
935093	18" CYLINDER WHEEL HOLDER	1
	*31604 Set Screw	5
	*31126 Lock Screw	5
	*31603 Clamp - For Blank Ring	5
	32777 Chuck Body Ring	1
	32780 Lock Screw Washer	5
	32874 Shoulder Screw	10
	35093 Chuck Body	1
	FLAT HEAD SOCKET CAP SCREWS	10
	1/4 - 20 x 3/4"	
931756	MOUNTING BOARD	
	31756 Mounting Board	1
	32338 Button	1
	FLAT HEAD BRASS WOOD SCREWS	
	7/8" - 10	3

ACCESSORIES

Vellumoid Strips .050" x 7/8" x 56 1/2"
 3-M Adhesive
 IS Unbrako Key

* No Longer Used. See Next Page For New Type Clamps and Screws Which Replace These Parts.

PLATE 20



IMPORTANT: Always give serial number of grinder when ordering repair parts.

KEY NO.	PART NO.	DESCRIPTION	QUANTITY
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CYLINDER WHEEL HOLDER

This is the latest design used on NO. 18 and NO. 18-C Grinders. On NO. 18-42" chuck grinders a 20" cylinder wheel holder is supplied. The illustration above shows the 18" wheel holder. Below are listed the parts for both 18" and 20" cylinder wheel holders.

935213	18" CYLINDER WHEEL HOLDER		
	35213 Chuck Body		1
	32777 Ring		1
	37475 Clamp		5
	37476 Set Screw		5
	32778 Set Screw Holder		5
933211	MOUNTING BOARD		1
	ACCESSORIES:		
	Vellumoid Strips .050" x 7/8" x 56 1/2"		
	3-M Adhesive		
	IS Unbrako Key		
935213	20" CYLINDER WHEEL HOLDER		
	35213 Chuck Body		1
	33209 Ring		1
	37680 Clamp		5
	37476 Set Screw		5
	33217 Set Screw Holder		5
933211	MOUNTING BOARD		1

ACCESSORIES:

Vellumoid Strips .050" x 7/8" x 62 3/4"

3-M Adhesive

IS Unbrako Key

Before Serial No. 7563 special wheel guards are required.

INTERPRETATION OF STYLE PARTS

#18 Blanchard High Power Vertical Surface Grinder

STYLE

COMMERICAL EQUAL

51	Oval Hex. Head Cap Screws
52A	Allen Socket Head Cap Screws
53	Round Head Machine Screws
54	Flat Head Machine Screws
55	Fillister Head Machine Screws
56	Square Head, Round Point Set Screws
57	Headless Set Screws
57A	Hollow Set Screw, Oval Point
60	Hex. Nut Semi-Finished
61	Hex. Nut Finished & Case Hardened
63	Standard Flat Washers
64	Spring Cotter Pins
65	Taper Pins
66	Woodruff Keys
68	Medium Grade Steel Ball
72	Headless Pivot Point Set Screws
75	Check Nut Hex. Case Hardened
76	U.S. Standard Hex. Head Cap Screw
80	Brass or Copper Connection Washer
81	Dowel Pins
82	W. I. Pipe, Pipe Thread on one end
83	W. I. Pipe, Pipe Thread on both ends
84	Studs
85	Special Stud
90	Headless Set Screw, long Pivot Point
91	Stud, Threaded Full Length
93	Welch Patent Expansion Plug
97	Taper Dowel Pin with Thread
98	Square Key (square ends)
100	Positive Lock Washer
100A	Shakeproof Lock Washer
104	Square Key (round ends)
105	Alemite & Lincoln Grease Fittings
106	Pipe Clamp (Malleable one hole clamp)
108	Oil Drain Plug
151	Cap Screw-Oval Hex. Head-Brass
154	Machine Screw-Flat Head-Brass
155	Machine Screw-Fillister Head-Brass
157	Set Screw-Headless-Brass

ELECTRICAL EQUIPMENT

AMMETER: The ammeter is a Weston Model 610 flush type, built into the column just above the upper gear box. This ammeter has a 5 amp. scale graduated in per cent of full load current of the main spindle motor. A Weston Model 604 current transformer 200:5 ratio is used with the ammeter. The transformer turns vary with the horsepower and voltage of the motor.

MOTORS: All standard grinders have 3 phase 220/440 or 550 volt motors.

The main spindle motor is a 25 H. P. or 35 H. P. rotor and stator built into the wheel head of the grinder. This motor (Westinghouse type CS Frame W-445; General Electric type CS Frame 446; or S. A. Woods Frame J-656) is rated at 40°C. continuous operation, and runs at 720 RPM on 60 cycle current or 750 RPM on 50 cycle current. After Serial No. 8314 motors have leads connected to Wye start & Delta run this motor.

The chuck rotation motor is a 2 H. P. or 3 H. P. totally enclosed ball bearing motor, 1200 RPM on 60 cycle current, 1000 RPM on 50 cycle, frame 254 UP TO SERIAL 8793. Serial 8794 and up, use frame 213 for 2 H. P. and frame 215 for 3 H. P.

3 H. P. Motor is used on NO. 18-42 Grinder.

The table traverse and head raise-and-lower motors are identical torque motors. These motors are rated 20 ft. lb. starting torque, 830 RPM full load speed. 55° rise, five minute duty. Frame 204 up to Serial 8793. Serial 8794 and up use Frame 182.

WATER PUMP UNIT: The water is circulated by a 1/2 H. P. totally enclosed ball bearing integral pump, 1725 RPM on 60 cycle current. One of the following is used:

Ruthman "Gusher"	Model 110230
Ingersoll-Rand	Size 1KRV - 1/2 Model B
Brown & Sharpe	Model 212

The pump is mounted in a pump bracket - 29666 - attached to the base by three Style 52-A 1/2" x 1 1/2" Cap Screws.

CONTROL PANEL: Up to Serial No. 8314 the panel houses resistance and plugging contractors for the spindle motor, individual line-starters for each of the four small motors, and thermal overload relays for all motors.

Serial No. 8315 AND UP. The panel contains contractors for Wye-Delta starting and plugging the wheel motor, individual line starters for each of the four small motors, and thermal overload relays for all motors - all housed in a Nema 12 dust-tight enclosure.

The panel is built to our specifications by the manufacturers, and replacements of parts should be ordered directly from them, giving the type and catalog number or the serial number of the panel. In ordering give also ALL the characteristics of the electric current in use, and the particular motor circuit for which the part is needed.

WRENCHES AND MISCELLANEOUS TOOLS

One of each required - not illustrated

WRENCH

PLACE USED

- 8459 Double End Wrench	X7302 Faceplate Nut X11619 & X11610 Column Screw Washers.
X17972 Spanner Wrench	17241 Oil Slinger
- #12 Wms. Finished Wrench	X17626 Column Screws
#34 Wms. Double End Wrench	17538 Head Upper Bearing. 9011 Caliper Swivel 18592 Caliper Base X17699 Base Waterguard.
#616 Walden-Worcester Special Ratchet Wrench with 3/8" Hexagon Male Extension on each side. (Dwg. #X-5911)	13632 Wheel Rings
7/32", 5/16", 3/8", 1/2" Allen Set Screw Wrenches	Style 52A Screws

#1016 Lincoln Compressor	All Grease Fittings
14" Squeegee Cleaner	To Clean Chuck
910403 Hoe	To Clean inside of Base.
X12769 Cleaning Bar	To remove scale from Base.
10469 Eye Bolt	To remove Spindle

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		20184 - Support Bushing (in way cover - Not Shown)	1
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		NOTE: Grinders Serial #2545-2710 had a shorter support rod without Bushing or Clamp Handle and replacements must include both of these parts.	
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		X18385 Hook Rivet	1
		X18384 Left Hand Hook	1
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		Style 75 - 3/8"	2
X17752		Base Column Waterguard (located near Column Waterguard X17589) includes	1
		Style 54 - 1/4" x 1/2" (Not Shown)	3
X18736		Waterguard Support Bushing - (See Page 94 C. P. 1305 Gits Oil Cup (Table Body 1" Malleable Street Elbow (17557	