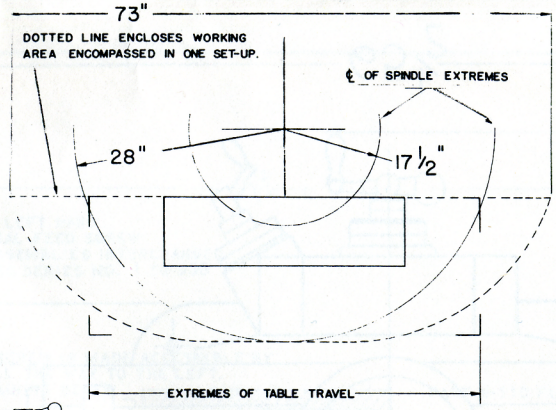
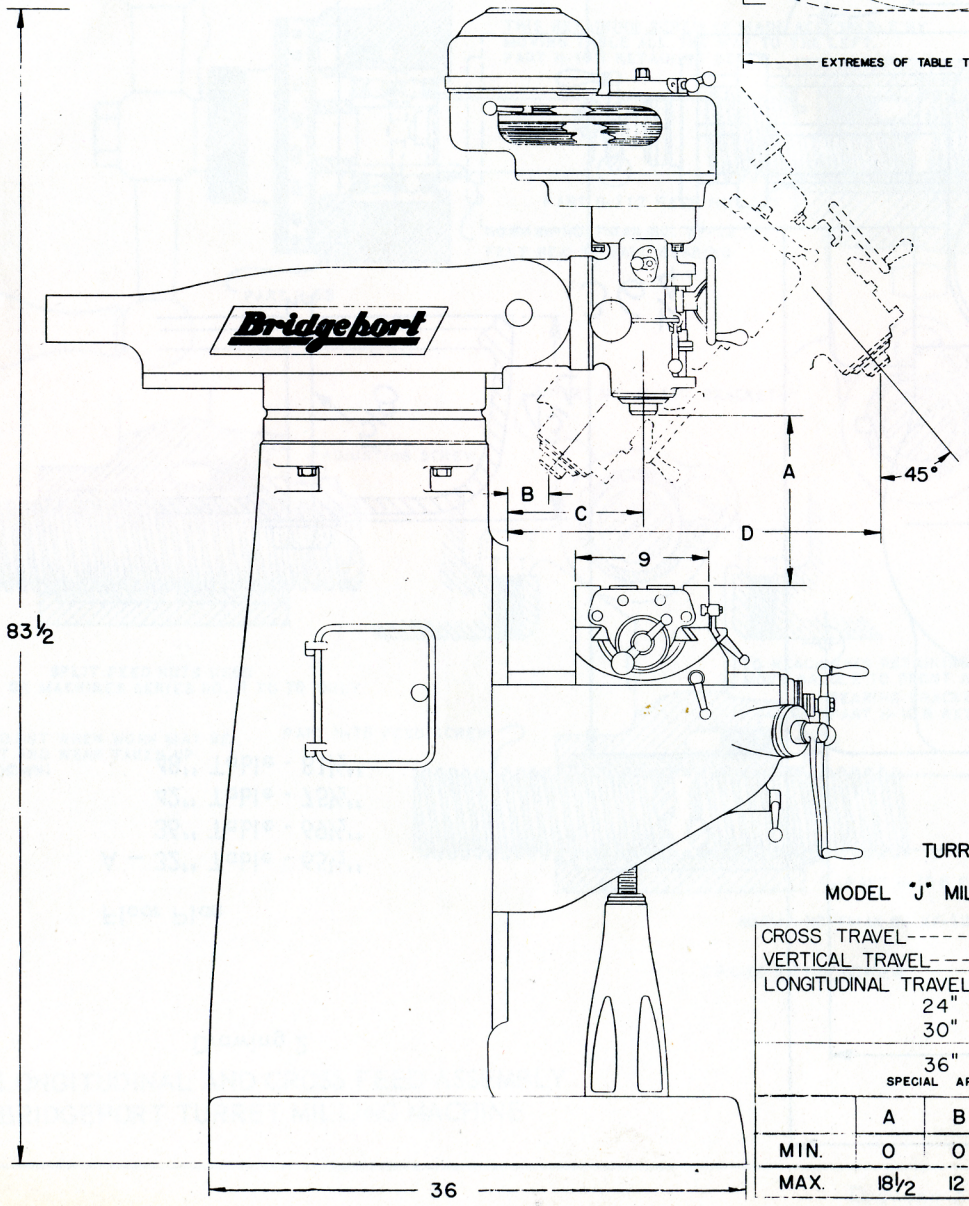
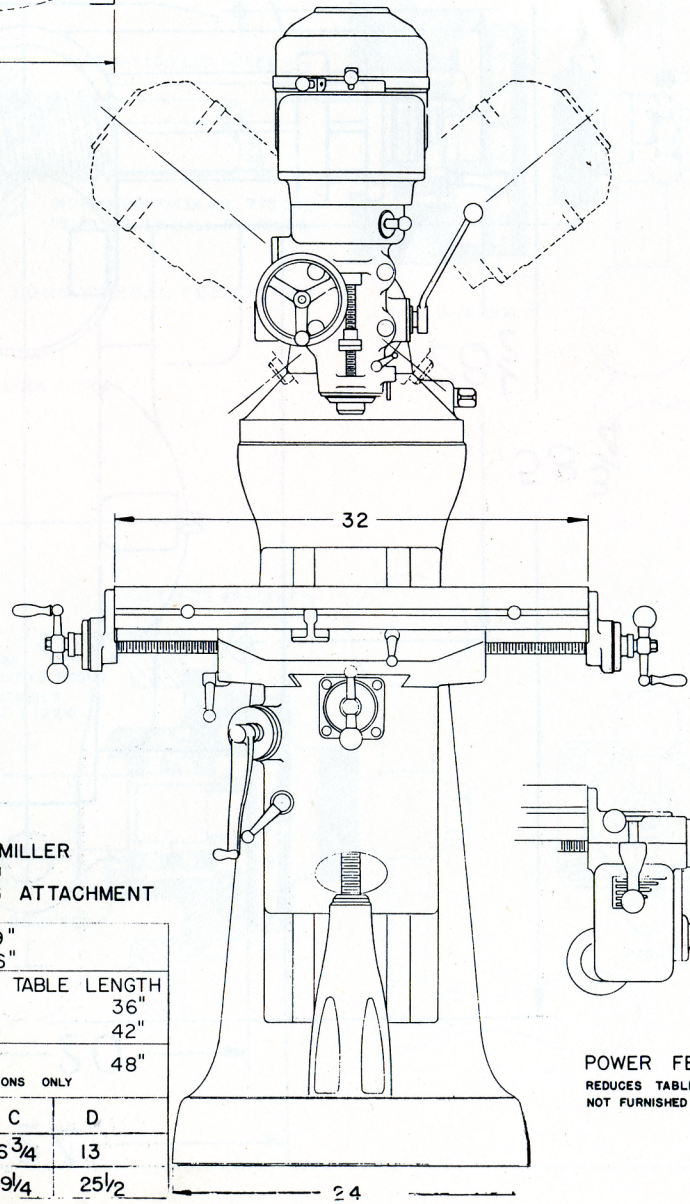
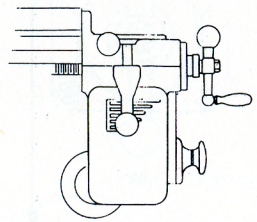
Drawing 1

Dimensional









TURRET MILLER
WITH
MODEL "J" MILLING ATTACHMENT

CROSS TRAVEL	9"
VERTICAL TRAVEL	16"
LONGITUDINAL TRAVEL	TABLE LENGTH
24"	36"
30"	42"
36"	48"

SPECIAL APPLICATIONS ONLY

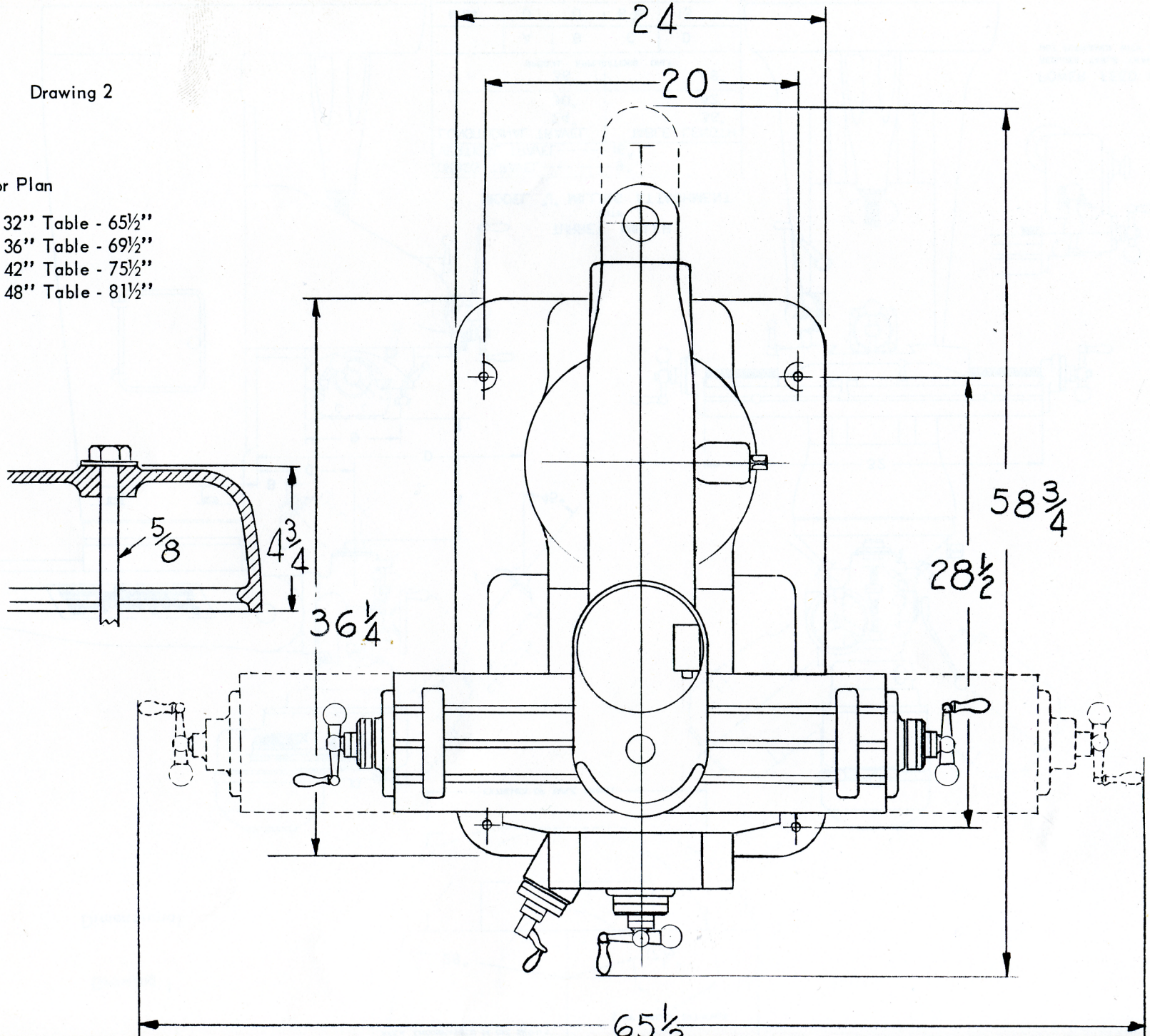
	A	B	C	D
MIN.	0	0	6 3/4	13
MAX.	18 1/2	12	19 1/4	25 1/2

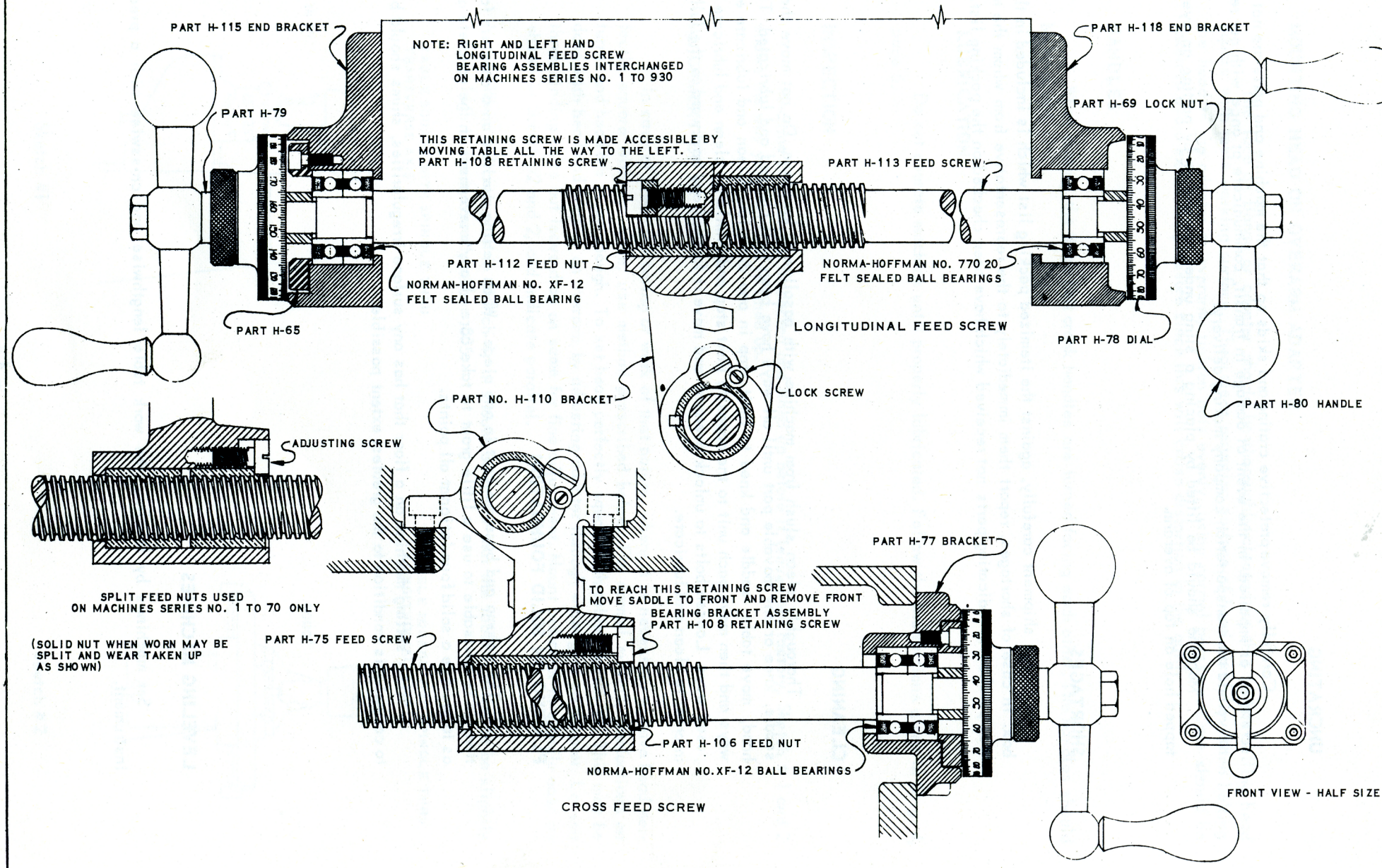
POWER FEED UNIT
REDUCES TABLE TRAVEL 2 1/2"
NOT FURNISHED WITH 48" TABLE

Drawing 2

Floor Plan

A – 32" Table - 65½"
36" Table - 69½"
42" Table - 75½"
48" Table - 81½"





LONGITUDINAL AND CROSS FEED ASSEMBLY
BRIDGEPORT TURRET MILLING MACHINE

Drawing 3

UNCRATING

Carefully remove protective crating and skids so that the machine and parts are not marred, scratched or impaired. In the event of damage in transit, communicate at once with our representative and the transportation company making delivery.

Machine should be lifted by placing a sling under overarm or by putting an eye bolt in tapped hole on top of overarm.

SHORTAGES

Check shipment carefully, against the itemized packing list which is included in the parts box. In case of shortages, report them immediately to the representative from whom the machine was purchased, indicating parts not received which have been checked on the packing list.

CLEANING

Thoroughly clean slush from machine with gasoline or kerosene. Do not move the table, saddle, knee or any movable part until all ways have been well cleaned and lubricated. Then, by hand, move table, saddle and knee to limit stop in one direction. Clean and lubricate exposed ways and then move each unit to the opposite limit stop and similarily clean and lubricate the exposed ways. Loosen bolts to unlock overarm, and move it forward and backward to the full length in order to clean and lubricate.

PLACING ON SOLID FOUNDATION

The column and base are cast in one piece. When setting machine on a concrete foundation, it is advisable to use a little grout to take care of any unevenness in the concrete as well as to provide a solid foundation at all points.

When setting machine on a floor that has any surface irregularities, shims should be used to correct this condition to the greatest extent possible.

LEVELING MACHINES

Set machines by leveling the work table lengthwise and crosswise with a precision instrument.

MOUNTING HEAD ON OVERARM ADAPTER

The face on flange or adapter should be thoroughly cleaned as this aligns milling head square with table working surface. Then clean mounting surface of head carefully. When bolting the head to the adapter or overarm, tighten nuts evenly, using normal pressure. Care should be taken to avoid excessive pressure since this will cause distortion in the quill.

HANDLES

When crating, the three ball crank handles are turned facing each other. The handles should be reversed.

LUBRICATION

Do not cperate machine until properly lubricated. Follow the instructions given in Dwg. 4, page 6.

INSPECTION

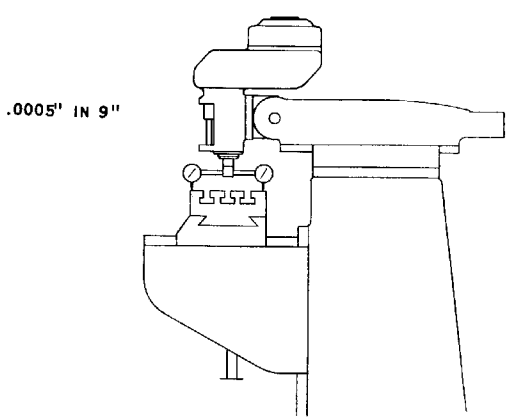
Machine is carefully inspected and lined up before it leaves our factory. Sketch # 1 and 2 shows the way your machine is lined up.

ALIGNMENT OF HEAD

In case of precision boring or work of that nature, where it is necessary to have head perfectly square with the table, use method prescribed below. For normal milling, graduations on turret and head are close enough. To set head perfectly square with table, Sketch #1. This may be done with head and adapter on overarm, by adjusting adapter through worm gear on adapter. Loosen three binding bolts but leave drag on same for fine adjustment. Mount indicator in spindle nose as shown in Sketch #2 and 2, and indicate parallel.

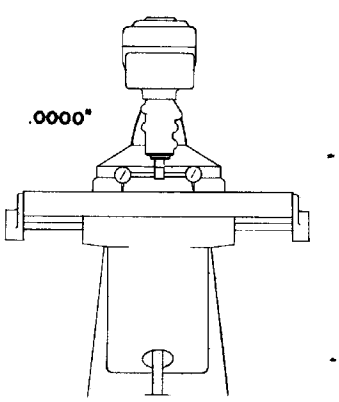
Note: When indicating as in Sketch 1, it should be noted that the table is fitted to be slightly high in front, usually about .005.

TABLE SQUARE WITH SPINDLE THRU TRANSVERSE AXIS



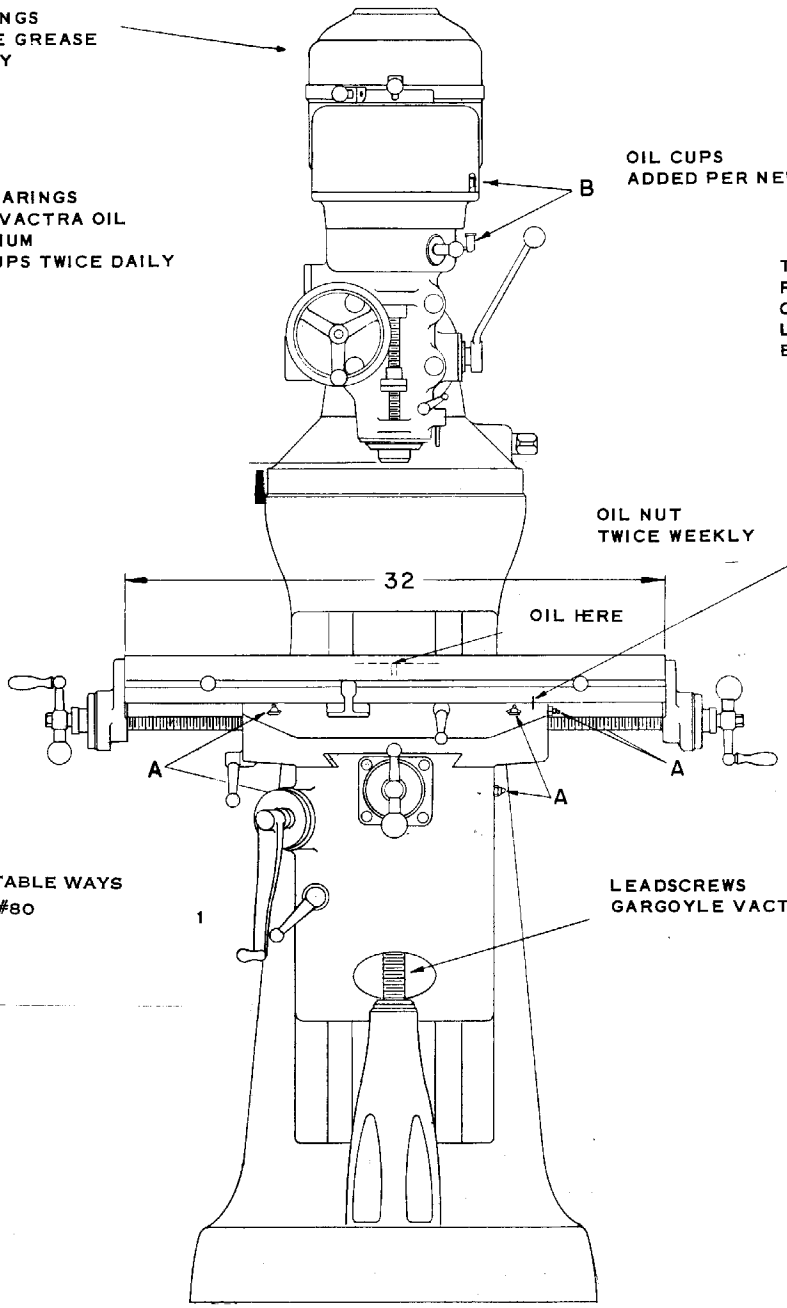
Sketch #1

TABLE SQUARE WITH SPINDLE THRU LONGITUDINAL AXIS



Sketch #2

RECOMMENDED LUBRICATION FOR THE BRIDGEPORT TURRET MILLING MACHINE



ADJUSTMENT OF TABLE GIB

The table is provided with a full length tapered gib in the saddle, with an adjusting screw on the left side. To take up gib, tighten large screw slightly and repeat until a slight drag is felt when moving the table by hand. (Sketch 3)

Sketch #3

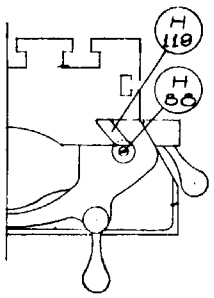
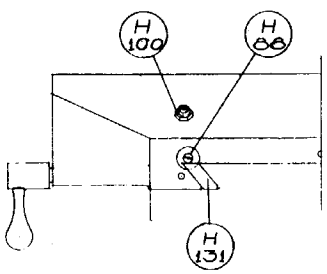


Table-saddle gib

ADJUSTMENT OF SADDLE AND KNEE GIBS

A tapered gib is used for adjusting the saddle bearing on the knee. This forms a guide for the saddle. To tighten gib same principal as described above is used; however, chip wiper has to be removed first. (Sketch 4)

Sketch #4

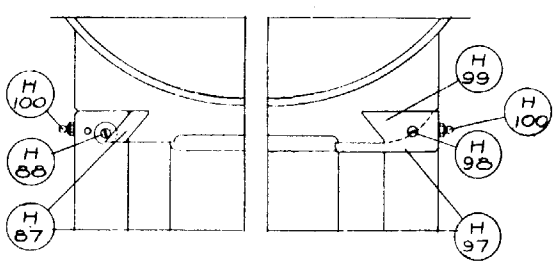


Saddle-knee gib

ADJUSTMENT OF KNEE GIB

Remove chip wiper and adjust screw until smooth movement is attained. (Sketch 5)

Sketch #5

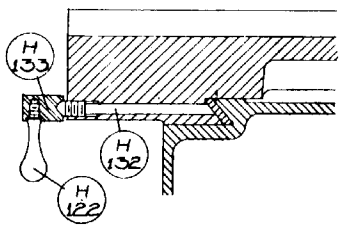


Knee-Column gib

CLAMPING TABLE, SADDLE AND KNEE

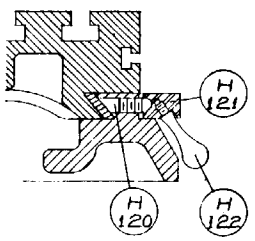
When milling with longitudinal table feed only, it is advisable to clamp the knee to the column and the saddle to the knee to add rigidity to these members and provide for heavier cuts with a minimum of vibration. The saddle locking lever is located on the left-hand side of saddle. (Sketch 6) Excessive pressure can cause slight table bind. Use moderate clamping pressure, as this will hold saddle sufficently.

Sketch #6



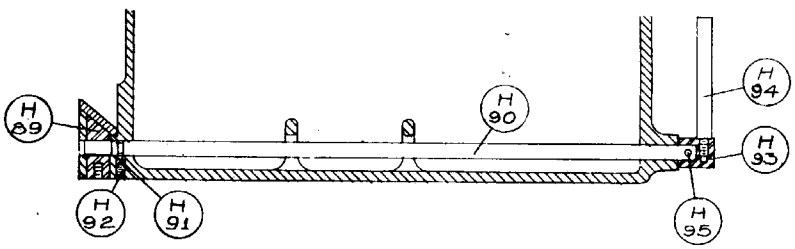
The table clamping lever is located on front of saddle and should always be clamped when longitudinal movement is not required. (Sketch 7)

Sketch #7



The knee clamping lever is at the left side of the knee and should be drawn upward to clamp the knee. (Sketch 8) This is only a tension brake and will not lock the knee completely. Leave clamped at all times unless using knee in operation.

Sketch #8



REMOVING OF TABLE

Remove as follows: Ball crank handles, dial holders, bearing brackets. Screw will then turn all the way so that it can be removed. When this is accomplished, the table can easily be taken off merely by sliding from saddle.

REMOVING OF SADDLE

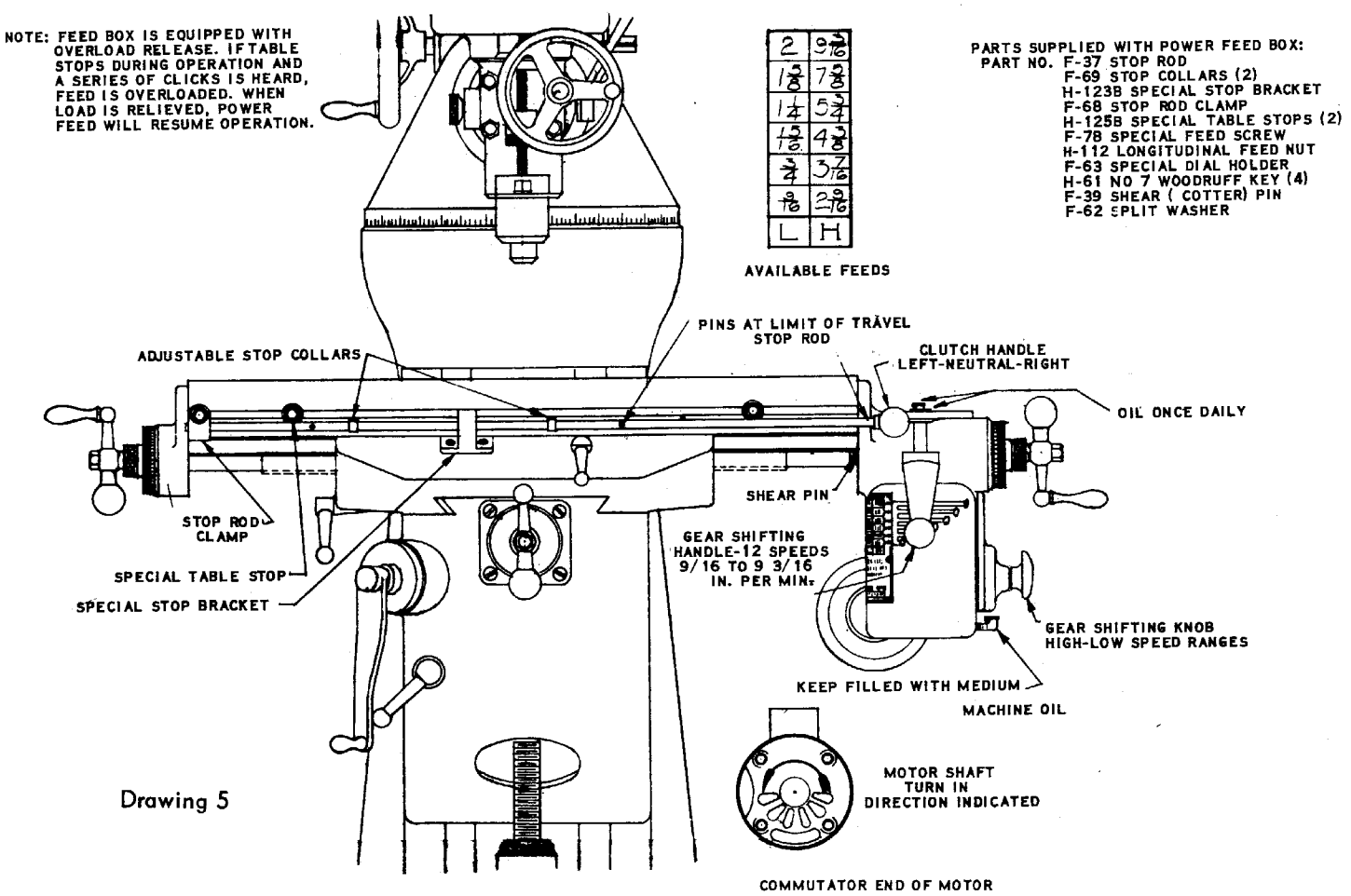
Follows along the same lines as removing table; however, it is necessary to remove entire front bracket assembly completely. Then remove nut bracket which has become accessible after table has been removed. See pages 9 and 10, Drawing 5 and 6.

POWER FEED ATTACHMENT

The feed box is equipped with an overload release. If the table stops during operation and a series of clicks is heard, feed is overloaded. When load is relieved, power feed will resume operation. If the overload clutch jams, the 1/8" shearing pin (Drawing 5) will break. This will prevent damage to the power feed box.

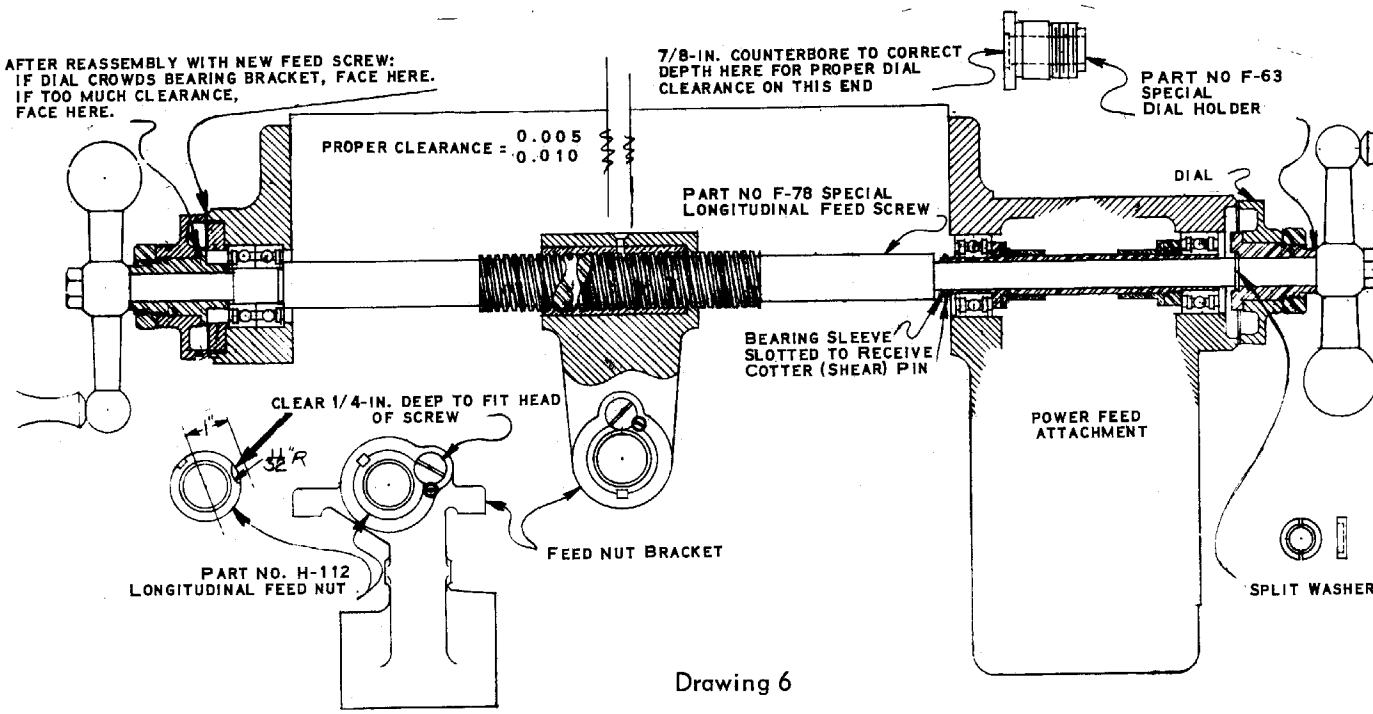
INSTRUCTIONS FOR INSTALLING POWER FEED IN FIELD

First remove left handle, lock nut, dial, and end bracket. Then remove right handle and also right bearing and bracket. The next step is to remove retaining screw (see Drawing 6) after lock screw has been taken out. The screw and nut will then slide out. This procedure is reversed for installing power feed screw and nut. Power feed unit is easily installed and needs little explanation. Do not neglect to put Shear Pin in Place. (Drawing #5).



Drawing 5

LONGITUDINAL FEED SCREW ASSEMBLY WITH POWER FEED



Drawing 6

REMOVING REGULAR SCREW

Remove (left side) bracket - (the 1/2" 20 nut, dial holder and nut, (4) 3/8 16 x 1" cap screws, and H-115 bracket and bearing by tapping with plastic hammer). Remove (right side) bracket - using same procedure. Remove 8/32" locking screw from feed nut bracket. Also remove 5/16" 18 binding screw. Pull, to remove lead screw and lead nut from lead screw bracket.

INSTALLING POWER FEED

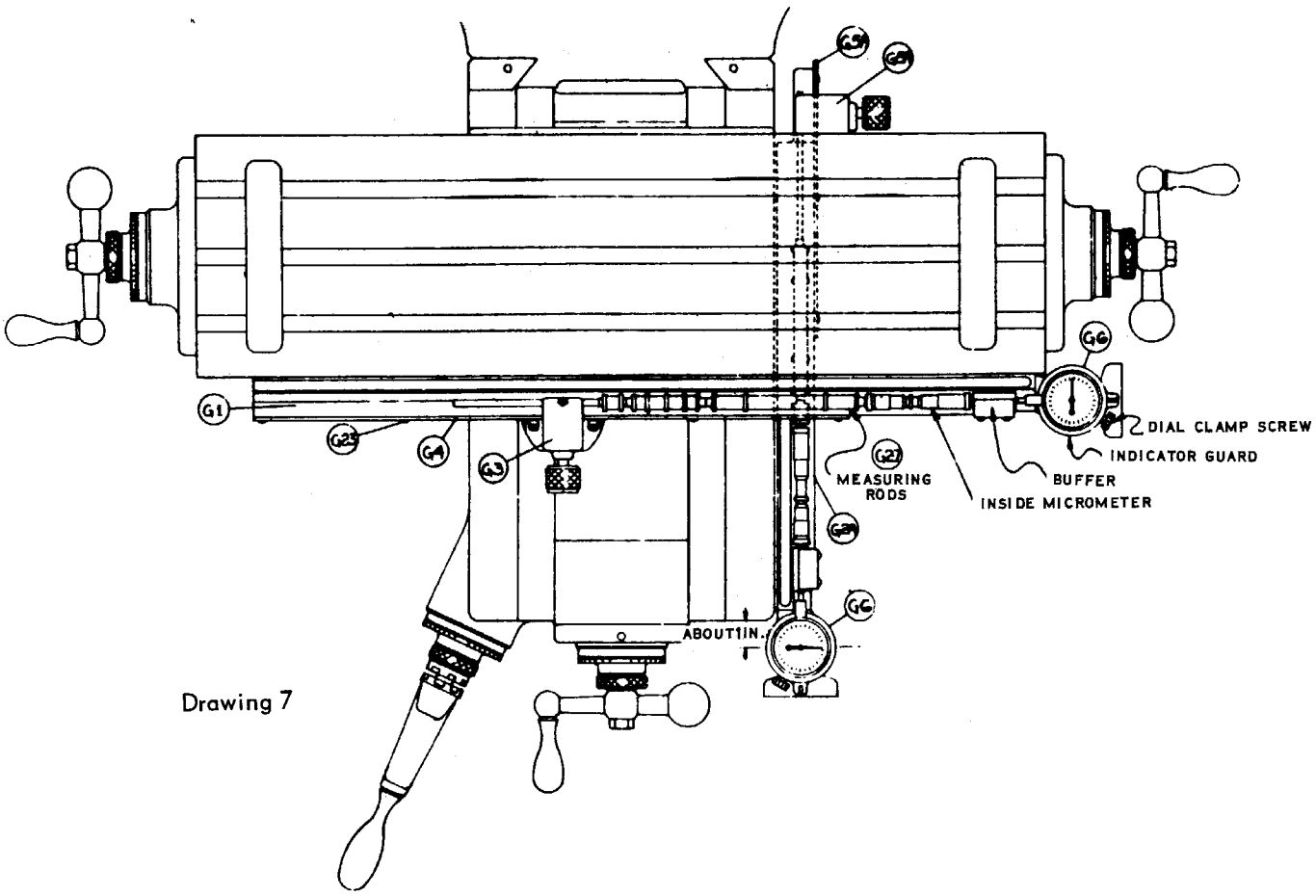
Move table to right side, half way. Insert power feed lead screw and nut into bracket from left side; long end of screw should be on right side.

Mark with scriber on bushing where binding screw goes; remove screw and nut from bracket. Remove the screw from the nut. File relief flat on nut to receive bidning screw. (Make certain flat is not filed too deep.) Insert screw and nut into bracket with binding screw and locking screw. Reassemble left hand bracket and dial holder complete. Mount power feed box on right with dowel pins and 3/8" cap screws (3). Insert split washer into groove in lead screw. Insert Woodruff keys. Push power feed dial holder onto screw. (Make sure split washer does not fall out.)

Assemble dial and nut onto dial holder. Insert cotter pin through hole in lead screw at back of power feed box. If dials drag, remove some stock from outside rib. If too much clearance, remove stock from inside rib. Remove door and fill with oil to height of oiler.

Assemble stop rod as illustrated. Drill 3/32" hole into stop rod to receive 3/32" pins which limit the travel of the power feed. Locate these by cranking table to each extreme travel and locate pin to kick off feed rod about 1/4" before extreme travel.

For locating holes to greater accuracy on the Bridgeport Vertical Milling Machine.



Drawing 7

INSTALLING MEASURING SYSTEM

I

Install knee trough in counterbored holes on right hand side of knee. Indicate from dovetail on knee for parallelism within .003 using 5/8 rod in trough – Indicate top and side. Bring saddle as far front as possible. Mount saddle bracket into trough with rolls on spindle of bracket Center rolls in trough and scribe holes in saddle. Drill 5/16 hole 1/2" deep (Caution on depth; do not drill into dovetail) Use 3/8-16 Tap. Mount Bracket with 3/8-16 x 1 1/2 Cap screw. Caution: Saddle and table bracket alignment with trough is essential for good operation.

II

TABLE TROUGH

Remove table stops and stop bracket from front of table. Remove table lock bolt and handle. (Reposition handle after trough is installed by facing end of lock bolt.

Mount table trough with tee nuts into tee slot on front of table. Indicate from top of table for parallelism - within .003 - same as cross feed trough.

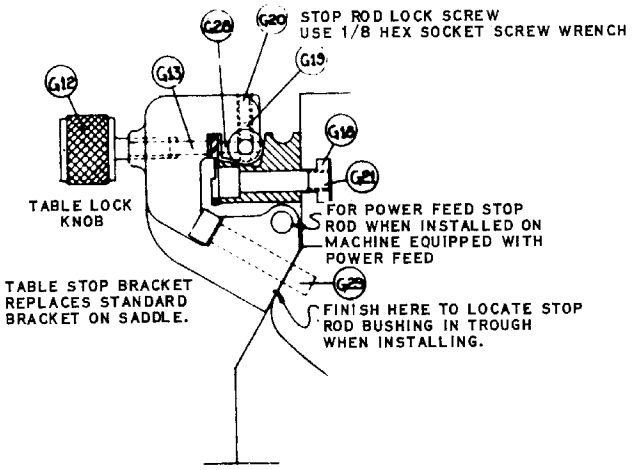
With rolls on spindle of table stop bracket, center rolls into trough and secure with 3/8-16 x 2" cap screw. Adjustment may be made by filing bottom of bracket or shimming if necessary.

Locking table on saddle with table lock knobs (Reed clamp on troughs) shouldn't disturb indicator needle more than .0001 if brackets are aligned properly.

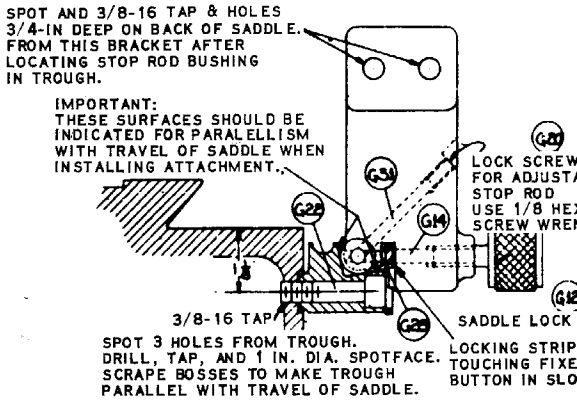
USING MEASURING ATTACHMENT

Any hole may be located by two dimensions at right angles. The table and saddle are located separately by combinations of positive measuring instruments consisting of measuring rods for even inches, an inside micrometer for fractions, and a dial indicator reading to one ten-thousandth. The "zero" point from which other dimensions are taken is established for each slide after locating the first hole and is not changed until the job is finished. Other holes to be bored are located from these two "zero" points by measurements at right angles. The measuring rods required are added, and the inside micrometers set and locked at the proper readings. The table and saddle are then carefully positioned with the dial indicators and clamped in place. After checking indicator readings, the hole is ready to be bored.

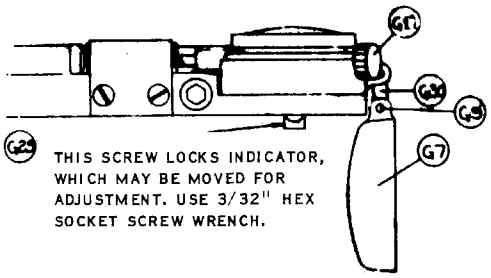
CAUTION: Make certain that the head is indicated properly so that the head is absolutely square with the table.



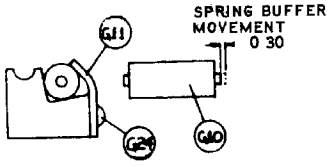
Sketch #9



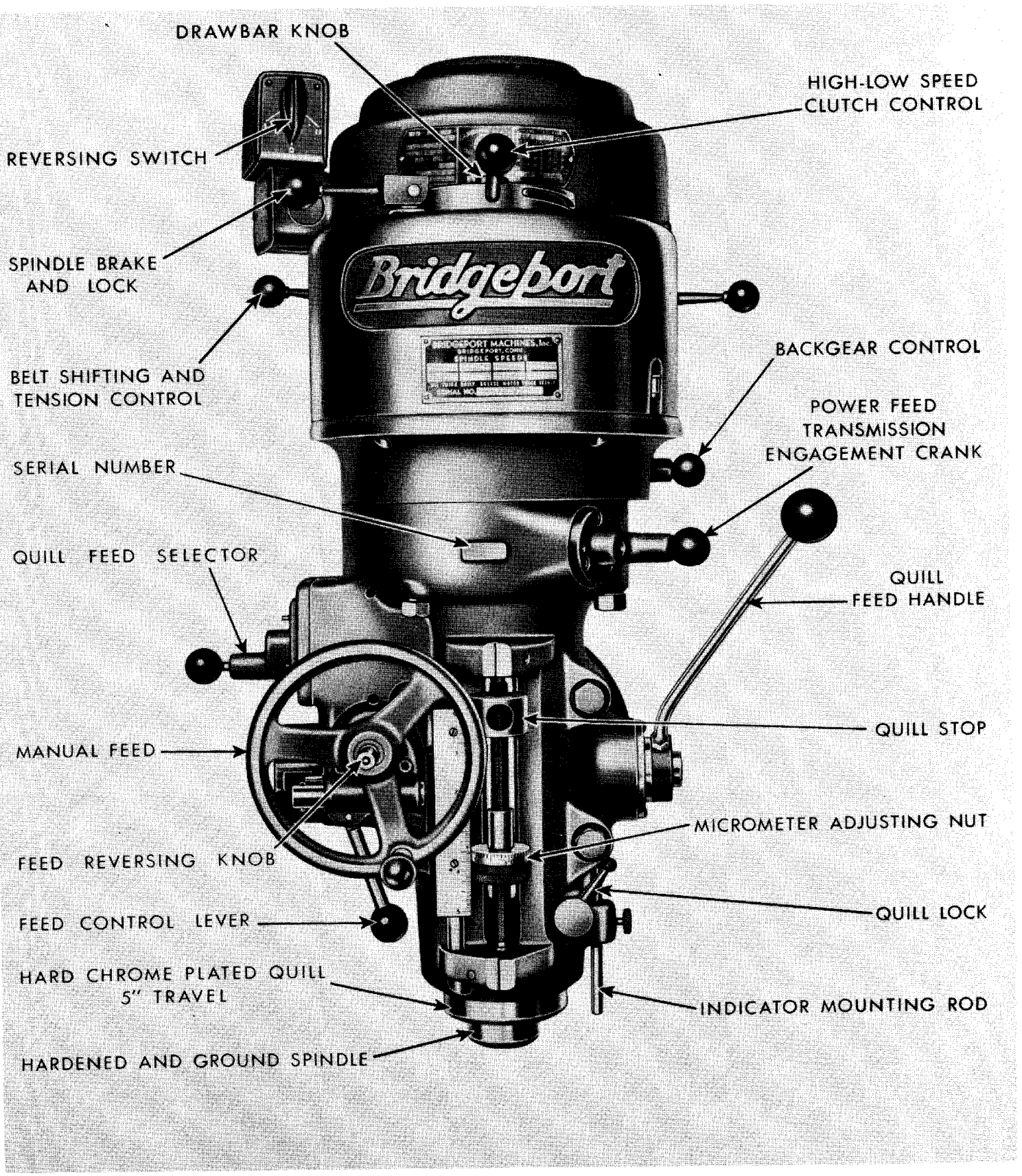
Sketch # 10



Sketch # 11



Sketch # 12



Photograph 1

MOUNTING MOTOR ON ATTACHMENT

Place belt over bottom step of spindle pulley, then place motor in housing and lower to place, switch being on left hand side.

PLACING AND ADJUSTING BELTS

Release lock nut handle which is the handle on right of belt housing and also handle on left side and adjust V belts to proper driving tension, then tighten both motor clamping handles.

MACHINE IS READY TO OPERATE

If quill and head are to be used in stationary position, quill lock should be applied. Micrometer depth stop scale is graduated in 20ths of an inch, pitch is .050 and nut is graduated in thousands. By utilizing these graduations it is possible to work very accurately as far as different depths are concerned. Micrometer nut when in position is locked securely by tightening micrometer lock nut.

OPERATING INSTRUCTIONS

When tightening or loosening the draw bar it is necessary to lock the spindle. To accomplish this, use spindle brake and lock which is located at top of belt housing, turning it either to the right or left until it binds, then raise handle.

Drawbar has 7/16-20 right hand thread and should be tightened with normal amount of pressure using wrench furnished with machine. To loosen collet back off drawbar and if collet does not open immediately give knob on top of drawbar a slight tap. Spindle has non sticking taper and collets should release readily.

SPINDLE BRAKE

Lever can be moved in either direction to stop spindle; however, when locking spindle, lever should be moved to right or left and then raised.

CAUTION: Be certain that the spindle brake is released before starting the motor. This is important as the motor can be damaged if switch is left on with brake in locked position.

REVERSING SWITCH is used to obtain clockwise or counter clockwise rotation of spindle.

Note: Due to back gear construction, when machine is running in low speed range, spindle rotation is opposite to that of high speed range. Therefore forward on your reversing switch becomes reverse switch in low speed range.

HIGH LOW SPEED CLUTCH CONTROL is directly in front of motor. When knob is in position, as shown on picture, clutch is in high speed position. To put clutch into low speed position turn lever to the extreme right. It is necessary to rotate spindle while engaging high speed clutch. This can be accomplished by either turning spindle nose by hand or by turning drawbar knob using wrench, providing drawbar is pulled up tightly.

CAUTION: Do not shift clutch while motor is running.

Back gear control is used in conjunction with the high low speed clutch control above back gear control handle is stamped IN and OUT. When back gear control handle is in OUT position, which is the position furthest from face of machine, then HIGH LOW speed clutch control should be located as illustrated in photograph. With these controls in position as explained, head is set for operation in high speed range (660-2720 RPM). When back gear control lever moved to IN position and HIGH LOW speed clutch control moved to extreme right then the head is ready for operation in the low speed range (80-325 RPM).

POWER FEED TRANSMISSION ENGAGEMENT CRANK engages power feed worm gear. When lever is in position as indicated in photograph, the power feed worm gear is engaged. To disengage worm gear, pull knob out and crank handle in clockwise or down direction and move to opposite position.

Note: Crank cannot be swung around in counter clockwise direction; however no damage will occur if moved in this direction. To engage the worm a counter clockwise movement is required.

CAUTION: Power feed worm gear may be engaged when spindle is rotating, however it should be engaged gently to avoid damage to worm gear. The worm gear may be disengaged at any time.

IMPORTANT: It is recommended that the Power Feed worm gear be disengaged whenever the power feed is not required. This will avoid unnecessary wear on power feed worm gear.

QUILL FEED SELECTOR

This crank is used for selecting the three feeds; 1.5, 3 and 6 thousandths per revolution. It is shifted by pulling knob out and turning from one position to the other. Feeds are stamped on cover below indentation hole. Feed is more readily engaged when spindle is running.

FEED REVERSING KNOB

Position of this handle depends upon direction of spindle rotation. If boring with right hand cutting tools, pull feed handle towards operator until clutch becomes engaged.

Neutral position is between forward and reverse position. It is recommended that the handle be left in neutral position when not in use.

MANUAL FEED

Reversing clutch knob should be in neutral position and feed control lever engaged. Clockwise rotation of handwheel moves quill down. The Manual Feed Handwheel and the quill feed handle may be disengaged by moving outward about 1/8".

Note: Feed control lever must be engaged in order to use manual feed controls. Manual Feed Handle and Handwheel may be taken off when not in use.

FEED CONTROL LEVER

Engages over-load clutch on pinion shaft when thrown to left and will stay engaged until either quill stop comes in contact with micrometer nut, forcing feed control lever to drop out automatically, or released manually by throwing lever to right.

Note: Feed Control Lever is carefully set at plant to throw out automatically when quill stop goes against micrometer nut or against safety pin in top. However, if this should go out of adjustment it may easily be brought back by regulating the screw located at bottom of tripping rod.

CAUTION: When adjusting the screw, check automatic throw off in both directions; that is with micrometer nut against the quill stop for down position and quill stop against throw out pin for up position.

QUILL FEED HANDLE

May be removed by simply pulling handle off end of shaft. It is recommended that handle be disengaged when using power feed.

QUILL STOP is used to disengage automatic feed in either direction as well as the setting point for working to given depths.

MICROMETER ADJUSTING NUT is used for setting of depths. Each graduation on nut indicates one thousand of depth, it reads directly to scale mounted along side of it. Depths may be obtained by setting micrometer nut in conjunction with quill stop.

QUILL LOCK

This is a positive quill lock to be used when quill is in stationary position such as milling operations. It is recommended that this lock be used whenever quill movement is not desired.

INDICATOR MOUNTING ROD is used for the fastening of an indicator.

LUBRICATION

Dot no operate machine until properly lubricated. Lubrication of head is obtained by use of the drip feed method through two oil cups located at right side of belt housing. Oil cup should be filled every 4 hours of running time with light machine oil such as Socony D.T.E. light or equivalent.

POSITION OF OVERARM can be regulated by loosening two bolts on turret and pulling arm in or out to desired position.

CAUTION: Care should be taken to lock overarm securely after setting.

Note: It is recommended that on heavy milling work, head should be kept as close to face of turret as possible, as maximum rigidity is then obtained.

OPERATION

To operate in high speed range, move high low speed clutch control handle to extreme left then put back gear control in OUT position.

Then, if power feed is desired, crank power feed transmission engagement to IN position, (refer back to explanation of controls) and feed reversing knob should be pushed in for down feed and pulled out for up feed.

The next step is to throw feed control lever to left. Power feed is now in operation in high speed range. Feeds can be selected by cranking quill feed selector to desired feeds.

BACK GEAR OR LOW SPEED RANGE

Stop spindle, then move high low speed clutch control to extreme right and also back gear control handle over to IN position.

RECOMMENDATIONS

Use 2, 3, or 4 flute end mills. 8 flute end mills are usually not as satisfactory. When using shell or face mills standard cutter practice should be observed.

Power feed can be used for drilling up to 3/8" diameter drills. Use manual feed for drills larger than 3/8".

Overload clutch is set at factory to hold up to 200 lbs. DOWN pressure on quill, which will accommodate drills up to 3/8" diameter in mild tool steel.

CAUTION: This clutch should not be tampered with in the field.

GENERAL SPEED RECOMMENDATIONS

Material to be Cut	Feet Per Minute		
	Rough Cut	Rough and Finish	Light and Finish Cut
Cast Iron-Soft-(Under 200 Brinnell)	70	80-90	120
Cast Iron-Med.-(200-300 Brinnell)	55	60-70	90
Cast Iron-Hard-(Over 200 Brinnell)	40	50-60	70
Steel (Chrome Nickel 40-45 Shore)	30	40	50
Steel (Stainless)	60	80	90
Steel (Low Carbon)	80	90	140
Steel (High Carbon)	40	50	70
Bronze (Medium)	90	120	150
Bronze (Hard)	65	90	130
Brass (Hard)	100	150	200
Copper	150	200	300
Duraluminum	400	----	600
Aluminum	600	----	1000

TABLE OF CUTTING SPEEDS AND FEEDS

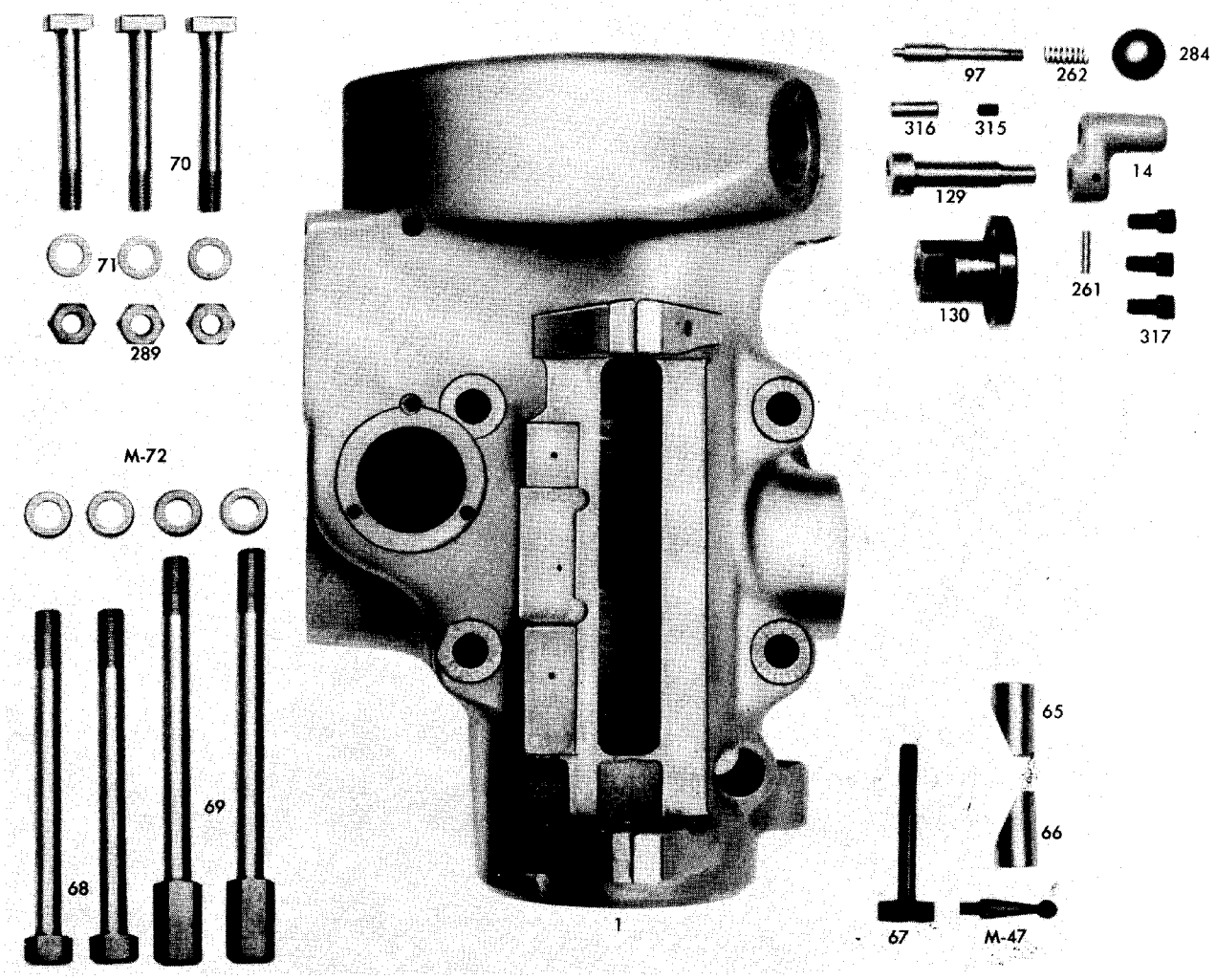
Feet Per Minute	15	20	25	30	40	50	60	70	80	90	100
Diameter, Inches	Revolutions Per Minute										
1/16"	917	1222	1528	1833	2445	3056	3667	4278	4889	5500	6112
1/8"	458	611	764	917	1222	1528	1833	2139	2445	2750	3056
3/16"	306	407	509	611	815	1019	1222	1426	1630	1833	2037
1/4"	229	306	382	458	611	764	917	1070	1375	1375	1528
5/16"	183	244	306	367	489	611	733	856	978	1100	1222
3/8"	153	204	255	306	407	509	611	713	815	917	1019
7/16"	131	175	218	262	349	437	524	611	698	786	873
1/2"	115	153	191	229	306	382	458	535	611	688	764
5/8"	91	122	153	183	244	306	367	428	489	550	611
3/4"	76	102	127	153	204	255	306	357	407	458	509
7/8"	65	87	109	131	175	218	262	306	349	393	437
1"	57	76	95	115	153	191	229	267	306	344	382
1 1/8"	50	67	84	102	136	170	204	238	272	306	340
1 1/4"	45	61	76	91	122	153	183	214	244	275	306
1 3/8"	41	55	69	83	111	139	167	194	222	250	278
1 1/2"	38	50	63	76	102	127	153	178	204	229	255
1 5/8"	35	47	58	70	94	118	141	165	188	212	235
1 3/4"	32	43	54	65	87	109	131	153	175	196	218
1 7/8"	30	40	50	61	81	102	122	143	163	183	204
2"	28	38	47	57	76	95	115	134	153	172	191

J-1 QUILL HOUSING
J-2 GEAR HOUSING
J-3 GEAR HOUSING COVER
J-4 BELT HOUSING
J-5 SPINDLE PULLEY
J-6 MOTOR PULLEY
J-7 TIMING BELT PULLEY
J-8 TIMING BELT PULLEY FLANGE
J-9 WORM GEAR CRADLE
J-10 OVERLOAD CLUTCH TRIP LEVER
J-11 FEED GEAR SHIFTER FORK
J-12 BACK GEAR SHIFTER FORK
J-13 SPINDLE PULLEY BEARING SLEEVE
J-14 SHIFT CRANK
J-15 CLUSTER GEAR COVER
J-16 SPRING COVER
J-17 FEED TRIP BRACKET
J-18 CLUTCH ARM COVER
J-19 FLANGED HEAVY-DUTY OVERARM
J-20 MOTOR SWITCH BRACKET
J-21 HANDWHEEL
M-24 MICRO SCREW JAM NUT
J-25 SPINDLE FOR J-100 to J-100 TO J-1199 ONLY
J-26 SPINDLE DIRT SHIELD FOR J-100 TO J-1199 ONLY
J-27 TIMKEN BEARING SPACER FOR J-100 TO J-1199 ONLY
J-28 SPINDLE BEARING LOCKNUT FOR J-100 TO J-1199 ONLY
J-29 SPINDLE LOCKNUT BINDING
J-30 BEARING SHOULDER RING FOR J-100 TO J-1199 ONLY
J-31 DRAWBAR FOR R-8 COLLET
J-32 DRAWBAR KNOB
J-33 QUILL FOR J-100 TO J-1199 ONLY
M-33 PINION SHAFT HUB SLEEVE
J-34 QUILL NOSEPIECE FOR J-100 TO J-1199 ONLY
J-35 QUILL SKIRT
J-36 QUILL STOP KNOB
J-37 QUILL STOP MICRO SCREW
J-38 MICROMETER NUT
J-39 REVERSE TRIP BALL LEVER
J-40 FEED REVERSE TRIP PLUNGER
J-41 REVERSE TRIP BALL LEVER SCREW
J-42 FEED TRIP LEVER
J-43 FEED TRIP PLUNGER
M-43 HANDWHEEL HANDLE
J-44 TRIP PLUNGER BUSHING
J-45 TRIP PLUNGER
J-46 FEED TRIP PLUNGER BUSHING
J-47 CAM ROD SLEEVE ASSEMBLY
M-47 LOCK HANDLE
J-48 CAM ROD
J-49 TRIP HANDLE
J-50 LOCKNUT BINDING PLUG FOR J-100 to J-1199 ONLY
J-51 OVERLOAD CLUTCH LEVER SPRING PLUNGER
M-51 INDICATOR ROD SCREW
J-52 OVERLOAD CLUTCH WASHER
M-52 INDICATOR ROD
J-53 CLUTCH RING
M-53 PINION SHAFT HUB
J-54 OVERLOAD CLUTCH SLEEVE
M-54 PINION SHAFT HUB HANDLE
J-57 OVERLOAD CLUTCH SLEEVE KEY
J-58 OVERLOAD CLUTCH
J-59 OVERLOAD CLUTCH RING
J-60 OVERLOAD CLUTCH WORM GEAR
J-61 PINION SHAFT WORM GEAR SPACER
F-61 OVERLOAD CLUTCH LOCKNUT
J-62 QUILL PINION SHAFT BUSHING .
J-63 QUILL PINION SHAFT
J-64 QUILL PINION
J-65 QUILL LOCK SLEEVE
J-66 QUILL LOCK SLEEVE
J-67 QUILL LOCK BOLT
J-68 QUILL HOUSING LOCKBOLT (SHORT) BEFORE J 9536 1/2-20 THREAD, AFTER J 9536 1/2-13 THREA
J-69 QUILL HOUSING LOCKBOLT (LONG) BEFORE J 9536 1/2-20 THREAD, AFTER J 9536 1/2-13 THREA
J-70 VERTICAL TEE BOLT
J-71 VERTICAL TEE BOLT WASHER
J-72 SPLINED GEAR HUB
J-73 BULL GEAR KEY
J-74 SPINDLE BULL GEAR
J-75 SPINDLE PULLEY HUB
J-76 PULLEY COLLAR
J-77 OILER TUBE
J-78 OIL PLUG
J-79 SPINDLE PULLEY KEY
J-80 UPPER BEARING SPACER (LARGE)
J-81 UPPER BEARING SPACER (SMALL)
J-82 BEARING SLEEVE LOCKNUT
J-83 UPPER BEARING LOCKNUT
J-84 CAM RING
J-85 SPINDLE CLUTCH LEVER
J-86 SPINDLE CLUTCH CAM RING PIN
J-87 BRAKE BLOCK

J-89 BRAKE LOCK STUD
M-89 CLOCKSPRING STUD
J-91 BRAKE LOCK WASHER
J-92 BRAKE LOCK & HANDLE
M-92 3/16 x 3/4 LG. DOWEL
J-93 BRAKE LOCK PIN
J-95 COUNTERSHAFT
J-96 COUNTERSHAFT GEAR
J-97 GEARSHIFT PLUNGER
J-98 CLUSTER GEAR SHIFT CRANK
J-99 FEED DRIVE CLUSTER GEAR
J-100 FEED DRIVE CLUSTER GEAR (CENTER)
J-101 FEED DRIVE CLUSTER GEAR (UPPER)
J-103 FEED DRIVE GEAR
J-104 CLUSTER GEAR INPUT SHAFT
J-105 FEED DRIVING GEAR
J-106 CLUSTER GEAR SHAFT
J-107 CLUSTER GEAR KEY
J-108 BEVEL GEAR BEARING
J-109 BEVEL GEAR THRUST SPACER
J-110 FEED REVERSE BEVEL GEAR
J-111 FEED WORM SHAFT THRUST WASHER
J-112 FEED REVERSE CLUTCH
J-113 HANDWHEEL CLUTCH SPRING SCREW
J-114 FEED WORM SHAFT BUSHING
J-115 FEED WORM SHAFT FOR J-100 TO J-5499 ONLY. SUPERCEDED BY PART #J-188
J-116 REVERSE CLUTCH ROD
J-117 REVERSE KNOB
J-118 HANDWHEEL CLUTCH
J-119 HANDWHEEL BUSHING
J-121 WORM SHAFT KEY
J-122 FEED DRIVING GEAR KEY
J-123 BEVEL PINION WASHER
J-124 FEED WORM GEAR SHAFT SLEEVE
J-125 WORM GEAR SPACER
J-126 FEED DRIVE WORM GEAR
J-127 FEED DRIVE WORM GEAR SHAFT
J-128 FEED ENGAGE PIN
J-129 WORM GEAR CRADLE THROW-OUT
J-130 SHIFT SLEEVE
J-131 MOTOR LOCKNUT
J-132 MOTOR LOCKNUT HANDLE
J-133 MOTOR MOUNTING STUDS
J-134 MOTOR MOUNTING STUD WASHERS
J-135 CLUSTER GEAR KEY
J-137 CLUSTER GEAR KEY
J-139 COLLET ALIGNING SCREW
J-140 WORM GEAR
J-141 NUT
J-142 KEY
J-143 1/4 20 x 3/8 SOCKET SET SCREW
J-144 GEAR
J-145 FEED SHIFT ROD
J-146 FEED REVERSE BEVEL PINION
J-147 CLUSTER GEAR SHAFT UPPER BEARING
J-148 PINION SHAFT HUB SCREW
J-149 DRAWBAR WASHER
J-150 OUTSIDE CLOCKSPRING PIN
J-151 TRIP LEVER PIN
J-152 BACKGEAR SHIFT BUSHING
J-153 BACKGEAR SHIFT CRANK
J-154 CLUTCH RING PIN
J-156 FEED REVERSE KNOB STUD
J-157 QUILL MICRO STOP NUT
J-159 KEY FOR #30 STD TAPER SPINDLE
J-166 SPINDLE (SERIAL J-1200 AND UP)
J-167 QUILL (SERIAL J-1200 AND UP)
J-169 SPINDLE DIRT SHIELD
J-170 BEARING SPACER - LARGE FROM J - 1750
J-171 BEARING SPACER - SMALL
J-172 NOSEPIECE
J-173 MOTOR SWITCH BRACKET
J-176 SLEEVE FROM SER. J-1750
J-188 FEED WORM SHAFT STARTED WITH SER. NO. 5500
J-190 1/2 - 13 SPECIAL HEX NUT OPTIONAL EQUIP.
J-192 WASHER FOR J-104 SHAFT OPTIONAL EQUIP.
J-193 PLUG FOR 5/8 HOLE
J-250 1/4 - 20 x 1/2 LG. SOCKET SET SCREW KP
J-251 5/16 - 18 x 5/16 SOCKET SET SCREW
J-252 5/16 - 18 x 5/8 LG. SOCKET CAP SCREWS
J-253 KOHINOOR #5000 - 315 SNAP RING
J-254 3/16 x 1/2 LG. DOWEL PINS
J-255 #10-24 x 3/8 LG. R. HEAD SCREW
J-256 COMPRESSION SPRING
J-257 5/16 - 18 x 1/2 LG. K.P. SOCKET SET SCREWS
J-258 GILMER 4LS 345 V-BELT
J-259 #6 - 32 x 3/8 LG. FLAT HEAD SCREWS
J-260 3/16 x 3/4 LG. DOWEL PIN
J-261 1/8 x 7/8 LG. ROLL PIN

J-262 COMPRESSION SPRING
J-263 10-32 x 1/4 LG. K.P. SET SCREW
J-264 #10-24 x 1/2 LG. CAP SCREW
J-265 1/4 - 20 x 1 LG. CAP SCREW
J-267 #10 - 24 x 1 1/2 LG. CAP SCREW
J-268 1/4 - 20 x 1/2 SOCKET SET SCREWS
J-269 1/4 - 20 x 3/8 LG. SOCKET HEAD CAP SCREW
J-270 #14137A CONE 14277 #0 PREC. ROLLER BRG. FOR J-100 to J-1199 ONLY
J-271 N.D. #5206 BALL BEARING #5 PRECISION FOR J-100 TO J-1749 ONLY
J-272 N-06 LOCK NUT
J-273 W-06 LOCKWASHER
J-274 5/16 - 18 x 5/16 SOCKET SET SCREW K.P.
J-275 1/4 - 20 x 1/4 LG. SOCKET SET SCREW
J-276 10-32 x 5/16 LG. RD. HD. SCREW
J-277 1/8 ALLEN PIPE PLUG FOR J-100 TO J-1199 ONLY
J-278 3/8 - 24 x 5/8 SCREW
J-279 #6 - 32 x 3/8 SOCKET SET SCREW
J-280 1/8 x 7/16 LG. ROLL PIN
J-281 3/16 x 5/8 LG. DOWEL PIN
J-282 1/8 x 9/16 LG. ROLL PIN
J-283 COMPRESSION SPRING
J-284 BLACK PLASTIC BALL HANDLES 1" DIM.
J-285 8-32 x 5/8 LG. RD. HD. SCREW
J-286 #3 WOODRUFF KEY
J-287 #7 WOODRUFF KEY
J-288 #5108 - 59 KOHINOOR SNAP RING
J-289 7/16 - 14 HEX NUT HARDENED (AMERICAN STD. REGULAR)
J-290 N-08 SPECIAL 5/16 THICK BEARING LOCKNUT
J-291 W-08 LOCKWASHER
J-292 FAFNIR MM208 KDB - DF OR NORMA HOFFMAN 208 S-455 BEARINGS
J-293 FAFNIR RMM207 KD OR NORMA HOFFMAN 207 P S-456 BEARINGS
J-294 WICK 1/8 O.D.
J-295 GITS OIL CUP #1207
J-296 3/32 x 5/8 LG. ROLL PIN
J-297 W. B. JONES #167 - A EXT. SPRING (LINDQUIST)
J-298 10-32 x 1/4 LG. SOCKET SET SCREWS
J-299 #9 WOODRUFF KEY
J-300 5/8 - 18 HEX JAM NUT
J-301 ND #99503 DOUBLE SEAL BEARING ABEC 3
J-303 B-66 TORRINGTON NEEDLE BEARING
J-304 3/8 - 24 HEX JAM NUT
J-305 A-672-4 OILITE BEARING
J-306 3/32 x 5/16 LG. PIN
J-307 BOSTON WORM #HLVH
J-308 .110 DIA. x 7/16 LG. PIN
J-309 3/32 x 3/4 LG. ROLL PIN
J-310 3/16 STEEL BALL
J-311 COMPRESSION SPRING
J-312 1/4 - 20 x 5/16 LG. SET SCREW
J-313 USE J-287
J-315 #10-24 x 3/8 LG. K.P. SET SCREW
J-316 5/16 x 7/8 LG. DOWEL PIN
J-317 USE J-264
J-318 3/8 LOCKWASHER
J-319 5108 - 62 WALDES SNAP RING
J-321 SAFETY CLUTCH SPRING
J-322 MICROMETER SCALE
J-323 6-32 x 1/4 LG. RD. HD. SCREW
J-324 FEED REVERSE BEVEL GEAR
J-326 BILLING #1166 WRENCH
J-327 STEEL PINION
J-328 CLOCK SPRING 1" x .020" x 42"
J-329 TIMING BELTS 1 1/4" WIDE
J-330 COMPRESSION SPRING
J-331 5108-37 KOHINOOR SNAP RING
J-332 3/8 STAR WASHER
J-333 BLACK PLASTIC BALL HANDLES 13/8 DIM. SAME AS M-54
J-334 5/16 x 2" LG. DOWEL PIN
J-335 #8 SPLIT LOCKWASHER
J-336 SNAP RING 5100-25
J-337 1/8x 1/2 LG. ROLL PIN
J-338 #2002 GITS OIL CUP
J-339 SPINDLE SPEED PLATE
J-340 OPERATING INSTRUCTION PLATE
J-345 10-32 x 3/8 SOCKET SET SCREWS
J-348 FAFNIR MM 207 WI-CR-DB. SPEC. E5227. START AT J-1200
J-349 FAFNIR M206 K SPEC. E 6578 OR NORMA HOFFMAN 206 S-685 A START AT SER. #J
J-350 1/4 - 20 MOCK-IT LOCKSCREW
J-351 5/16-18 MOCK-IT LOCKSCREW
J-352 1/8 x 3/4 LG. DOWEL PINS
J-353 BUSHING
J-354 OPERATING INSTRUCTION PLATE
J-356 3/8 - 24 FLOPLOC STOP & LOCKNUT
J-358 6-32 x 1/4 SOCKET SET SCREW K.P. STARTED WITH SER. #J-8300
J-359 1/4-20 JAM - NUT
J-362 5/16 - 18 JAM NUT
J-363 5/16 EXTERNAL LOCK WASHER
J-364 TRUST BEARING (DISCONTINUED)
J-365 1/4 x 3/4 ROLL PINS

Quill Housing Unit - PARTS LIST

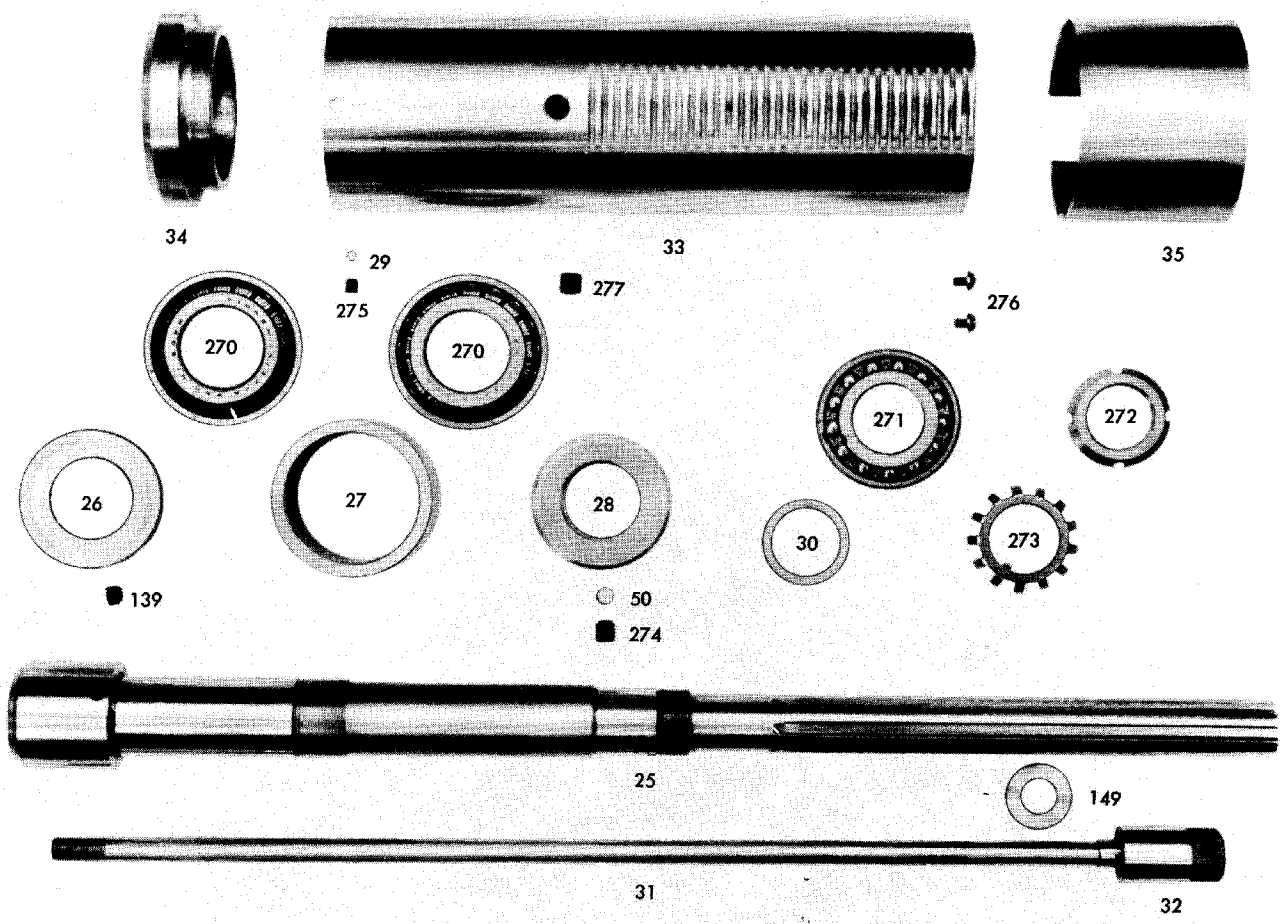


Photograph 2

1	Quill Housing
14	Shift Crank
M-47	Lock Handle
65	Quill Lock Sleeve (Tapped)
66	Quill Lock Sleeve
67	Quill Lock Bolt
68	Quill Housing Lockbolt
69	Quill Housing Lockbolt (Long)
70	Vertical Tee Bolt
71	Vertical Tee Bolt Washer
M-72	Quill Housing Lock Bolt Washer
97	Gearshift Plunger
129	Worm Gear Cradle Throw-out
130	Shift Sleeve
261	1/8 x 7/8 lg. Roll Pin
262	Compression Spring
284	1/4-20 Bakelite Ball Handle
289	7/16-14 Hex Nut Hardened (American Std. regular)
315	#10-24 x 3/8 lg. K. P. Set Screw
316	5/16 x 7/8 lg. Dowel Pin
317	#10-24 x 1/2 lg. Cap Screws (use 264)

Quill Unit - PARTS LIST

UP TO SERIAL NO. J1200

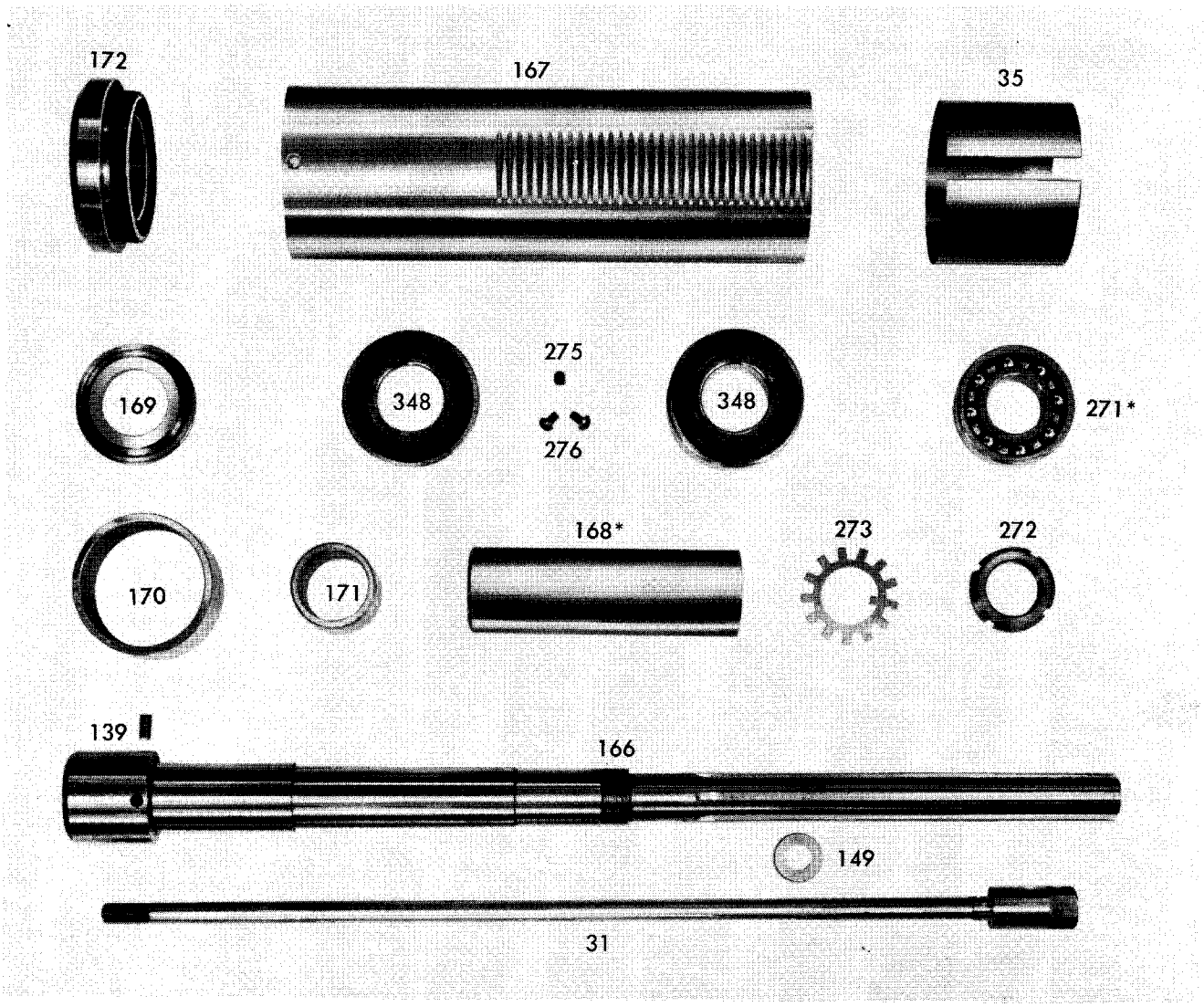


Photograph 3

25	Spindle	50	Locknut Binding Plug
26	Spindle Dirt Shield	139	Collet Aligning Screw
27	Timken Brg. Spacer	149	Drawbar Washer
28	Spindle Br. Locknut	270	#0 Precision Brg.
29	Spindle Locknut Binding Plug	271	N.D. #5206 Ball Brg. #5 Precision
30	Brg. Shoulder Ring	272	N-06 Locknut
31	Drawbar for R-8 collet	273	W-06 Lockwasher
32	Drawbar Knob	274	3/8-16 x 3/8 K.P. Set Screw
33	Quill	275	1/4-20 x 1/4 lg. Set Screw
34	Quill Nosepiece	276	10-32 x 5/16 lg. Rd. Hd. Screw
35	Quill Skirt	277	1/8 Allen Pip Plug

Quill Unit - PARTS LIST

SERIAL No. J1200 AND UP

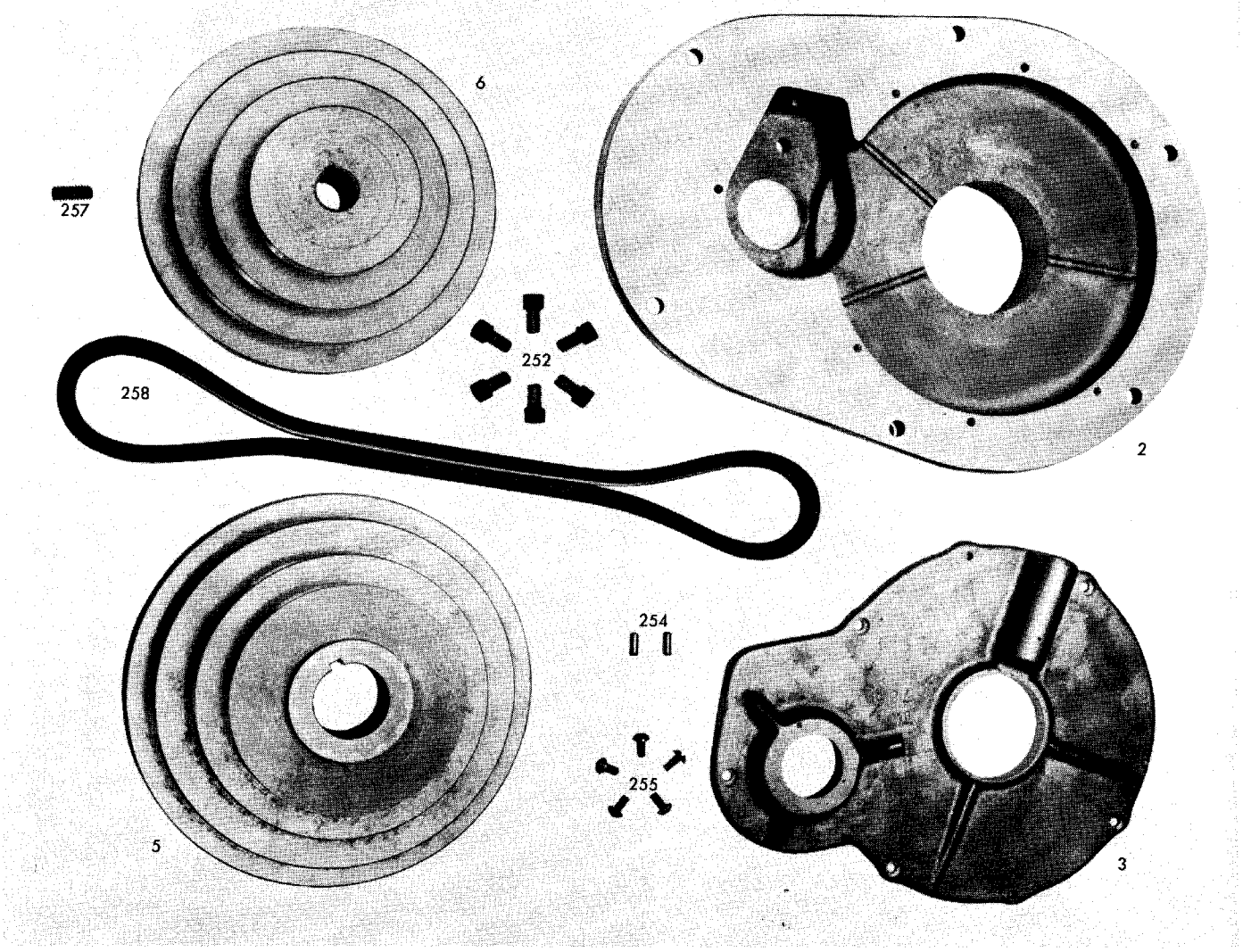


Photograph 4

166	Spindle	139	Collet Aligning Screw
169	Spindle Dirt Shield	149	Drawbar Washer
170, 171, 168*	Brg. Spacer	348*	MM-207 WI #5 Precision
31	Drawbar for R-8 collet	271*	N.D. #5206 Ball Brg. #5 Precision
32	Drawbar Knob	272	N-06 Locknut
167	Quill	273	W-06 Lockwasher
172	Quill Nosepiece	275	1/4-20 x 1/4 lg. Set Screw
35	Quill Skirt	276	10-32 x 5/16 lg. Rd. Hd. Screw

*For Serial No. 1750 and up
#349 replaces #271 and
#176 replaces #168

V Belt Unit - PARTS LIST

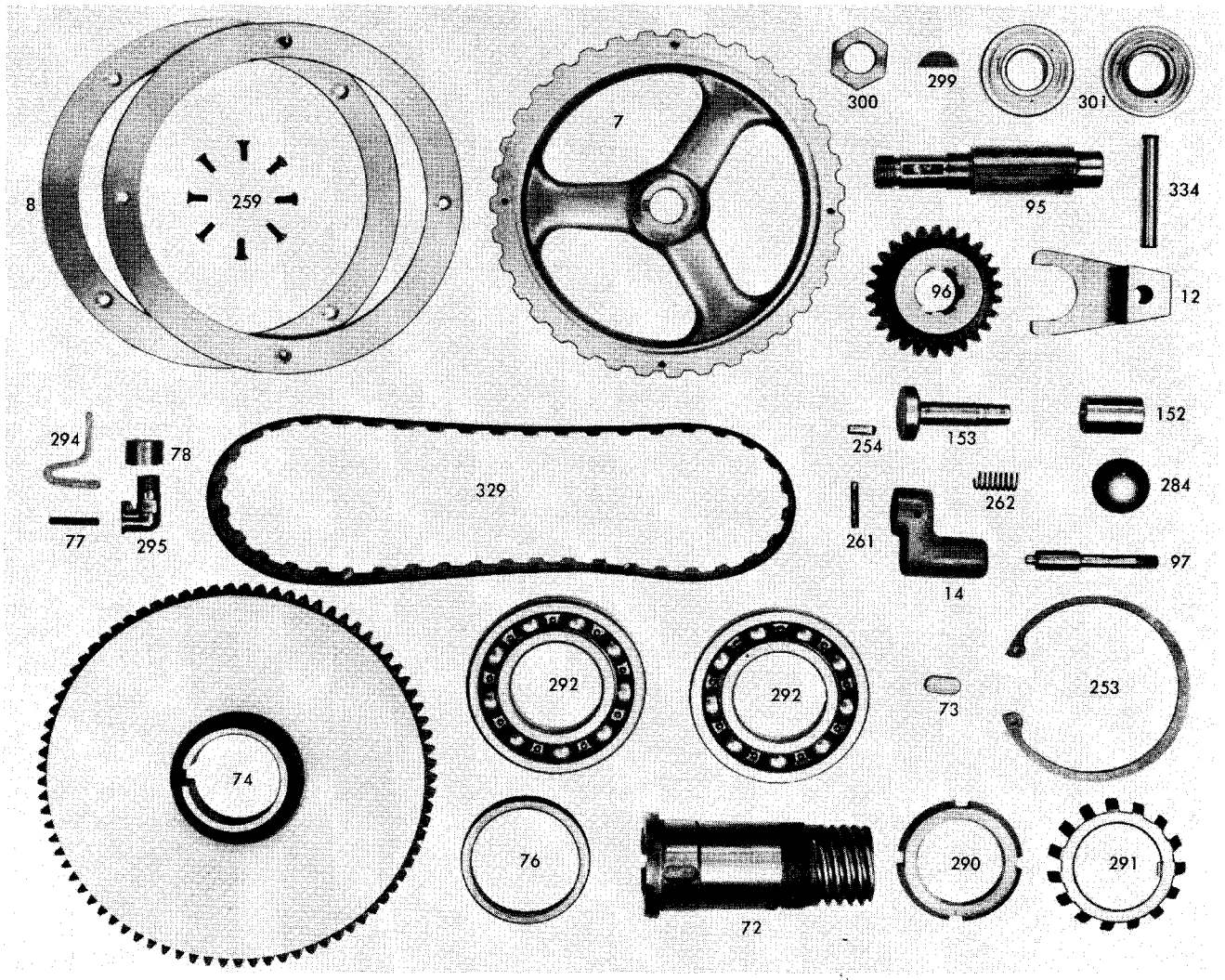


Photograph 5

2	Gear Housing	254	3/16 x 1/2 lg. Dowel Pins
3	Gear Housing Cover	255	#10-24 x 3/8 lg. Rd. Head Screws
5	Spindle Pulley	257	5/16-18 x 1/2 lg. K.P. Set Screw
6	Motor Pulley	258	Gilmer #3345 Vee Belt
252	5/16-18 x 5/8 lg. Socket Cap Screws		

Back Gear Transmission Unit

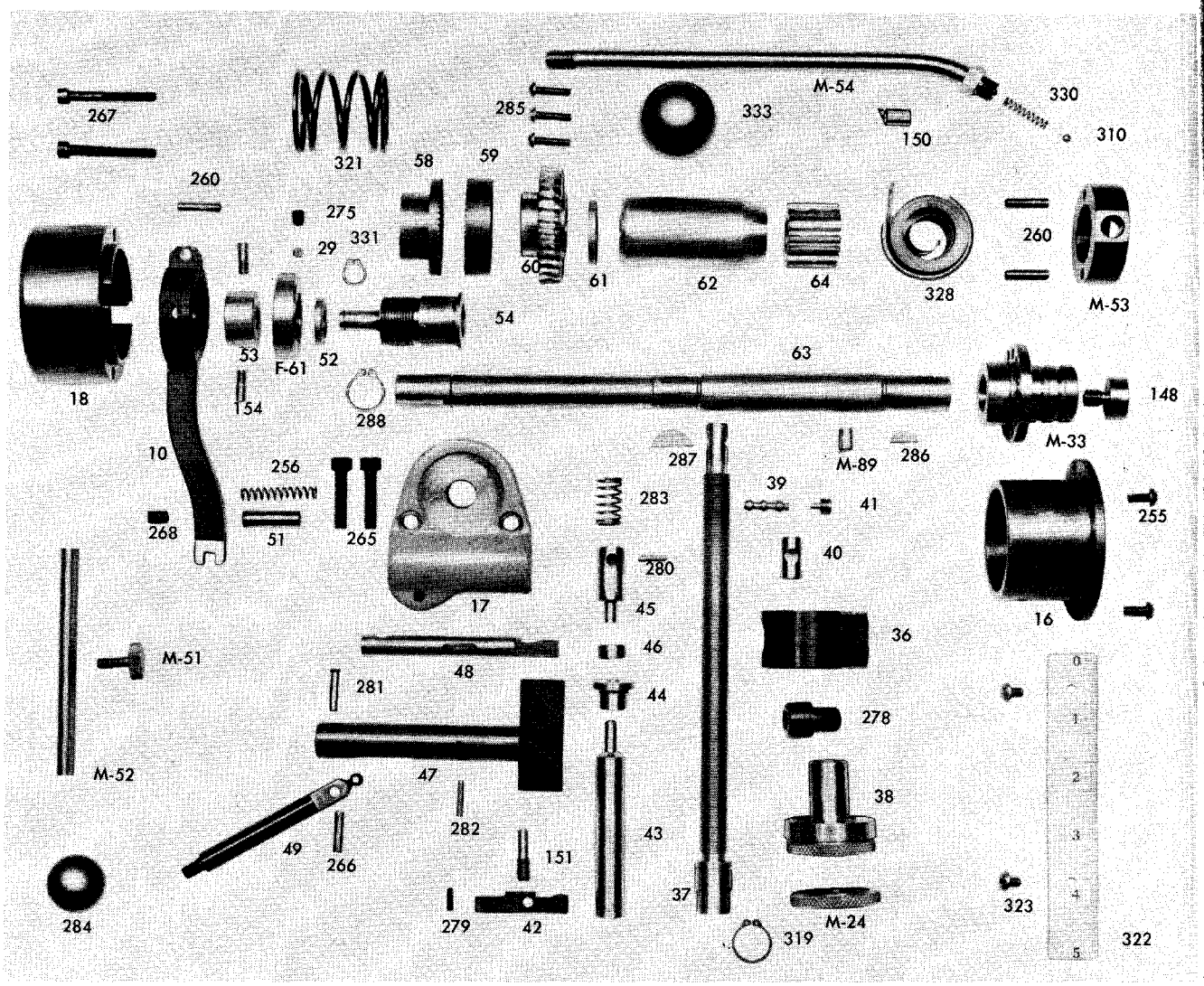
PARTS LIST



Photograph 6

7	Timing Belt Pulley
8	Timing Belt Pulley Flange
12	Back Gear Shifter Fork
14	Shift Crank
72	Splined Gear Hub
73	Bull Gear Key
74	Spindle Bull Gear
76	Pulley Collar
77	Oiler Tube
78	Oil Plug
95	Countershaft
96	Countershaft Gear
97	Gearshift Plunger
152	Backgear Shift Bushing
153	Backgear Shift Crank
253	Kohinoor #5008-315 Snap Ring
254	$3/16$ x $1/2$ lg. Dowel Pins
259	#6-32 x $3/8$ lg. Flat Head Screws
261	$1/8$ x $7/8$ lg. Roll Pin
262	Compression Spring
284	$1/4$-20 Bakelite Ball Handle
290	N-08 Special $5/16$ thick Brg. Locknut
291	W-08 Lockwasher
292	ND #3208 Ball Brgs. #3 Precision
294	Wick $1/8$ O.D.
295	#1249 Gits Oil Cup
299	#9 Woodruff Key
300	$5/8$-18 Hex Jam Nut
301	ND #99503 Double Seal Brg. #3 Precision
329	E-2 Construction Spec. TB 4B
334	$5/16$ x 2" lg. Dowel Pin

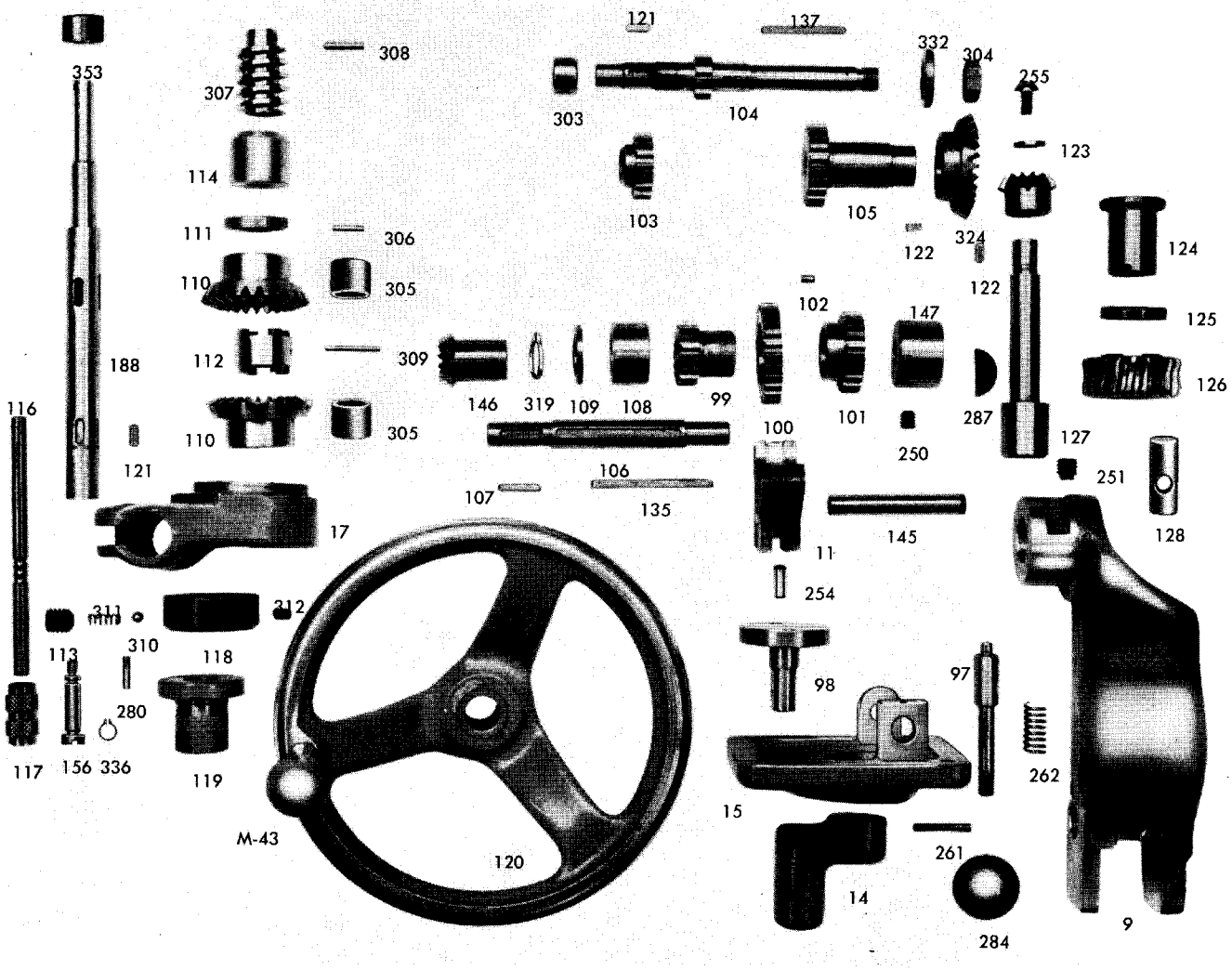
Quill Pinion and Overload Clutch Assembly - PARTS LIS



Photograph 7

10	Overload Clutch Trip Lever	M-52	Indicator Rod	268	1/4-20 x 1/4 lg. S.L. Set Screw
16	Spring Cover	53	Clutch Ring	275	1/4-20 x 1/4 lg. Set Screw
17	Feed Trip Bracket	M-53	Pinion Shaft Hub	278	3/8-24 x 5/8 Cap Screw
18	Clutch Arm Cover	54	Overload Clutch Sleeve	279	#6-32 x 3/8 Set Screw
M-24	Micro Screw Jam Nut	M-54	Pinion Shaft Hub Handle	280	1/8 x 7/16 lg. Dowel Pin
29	Spindle Locknut Binding Plug	58	Overload Clutch	281	3/16 x 5/8 lg. Dowel Pin
M-33	Pinion Shaft Hub Sleeve	59	Overload Clutch Ring	282	1/8 x 9/16 lg. Roll Pin
36	Quill Stop Knob	60	Overload Clutch Worm Gear	283	Compression Spring
37	Quill Stop Micro. Screw	61	Pinion Shaft Worm Gear Spacer	284	1/4-20 Bakelite Ball Handle
38	Micrometer Nut	F-61	Gear Sleeve Nut	285	8-32 x 5/8 lg. Rd. Hd. Screw
39	Reverse Trip Ball Lever	62	Quill Pinion Shaft Bushing	286	#3 Woodruff Key
40	Feed Reverse Trip Plunger	63	Quill Pinion Shaft	287	#7 Woodruff Key
41	Reverse Trip Ball Lever Screw	64	Quill Pinion	288	#5108-59 Kohinoor Snap Ring
42	Feed Trip Lever	M-89	Clockspring Stud	310	3/16 Steel Ball
43	Feed Trip Plunger	148	Pinion Shaft Hub Screw	319	5108-62 Waldes Snap Ring
44	Trip Plunger Bushing	150	Outside Clockspring Pin	321	Safety Clutch Spring
45	Trip Plunger	151	Trip Lever Pin	322	Micrometer Scale
46	Feed Trip Plunger Bushing	154	Clutch Ring Pin	323	6-32 x 1/4 lg. Rd. Hd. Screw
47	Cam Rod Sleeve Assembly	255	#10-24 x 3/8 lg. Rd. Head Screws	328	5/8 x .020 x 42 lg. Clock Spring
48	Cam Rod	256	Compression Spring	330	Compression Spring
49	Trip Handle	260	3/16 x 3/4 lg. Dowel Pin	331	5108-37 Kohinoor Snap Ring
51	Overload Clutch Lever Spring Plunger	265	1/4-20 x 1 lg. Cap Screw	333	Black Ball for M-54
M-51	Indicator Rod Screw	266	3/16 x 3/4 lg. Dowel Pin		
52	Overload Clutch Washer	267	#10-24 x 1 1/2 lg. Cap Screw		

Feed Transmission Unit - PARTS LIST



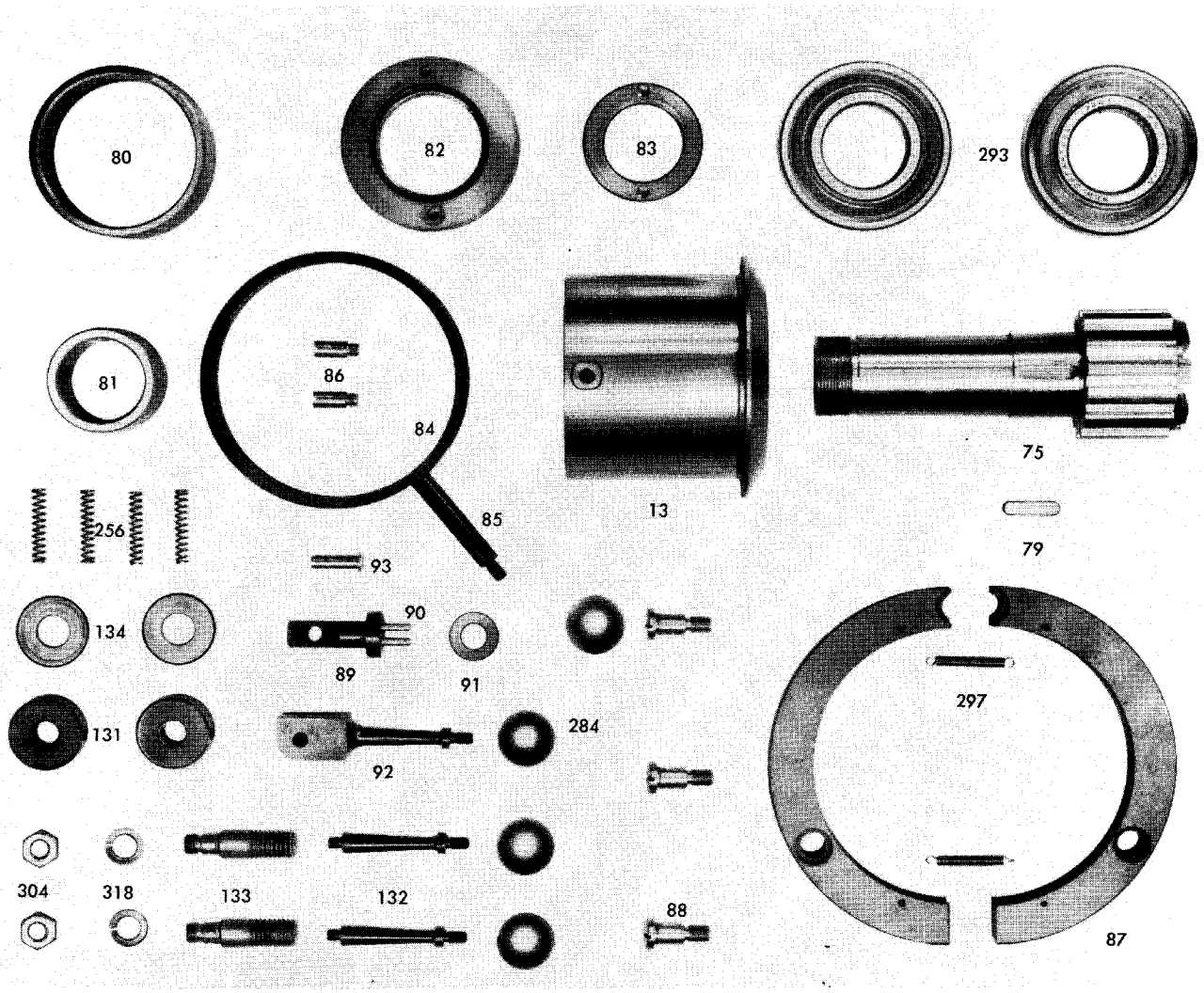
Photograph 8

9	Worm Gear Cradle
11	Feed Gear Shifter Fork
14	Shift Crank
15	Cluster Gear Cover
17	Feed Trip Bracket
M-43	Handwheel Handle
97	Gearshift Plunger
98	Cluster Gear Shift Crank
99	Feed Drive Cluster Gear
100	Feed Drive Cluster Gear (Center)
101	Feed Drive Cluster Gear (Upper)
102	Cluster Gear Key
103	Feed Drive Gear
104	Cluster Gear Input Shaft
105	Feed Driving Gear
106	Cluster Gear Shaft
107	Cluster Gear Key
108	Bevel Gear Bearing
109	Bevel Gear Thrust Spacer
110	Feed Reverse Bevel Gear (Boston L 148)
111	Feed Worm Shaft Thrust Washer
112	Feed Reverse Clutch
113	Handwheel Clutch Spring Screw
114	Feed Worm Shaft Bushing
116	Reverse Clutch Rod
117	Feed Reverse Knob
118	Handwheel Clutch
119	Handwheel Bushing
120	Handwheel (use M 42 Casting)
121	Worm Shaft Key
122	Feed Driving Gear Key
123	Bevel Pinion Washer
124	Feed Worm Gear Shaft Sleeve
125	Worm Gear Spacer
126	Feed Drive Worm Gear
127	Feed Drive Worm Gear Shaft
128	Feed Engage Pin
135	Cluster Gear Key
137	Cluster Gear Key
145	Feed Shift Rod
146	Feed Reverse Bevel Pinion
147	Cluster Gear Shaft Upper Brg.
156	Feed Reverse Knob Stud
188	Feed Worm Shaft
250	1/4-20 x 3/8 lg. K.P. Set Screw
	5/16-18 x 5/16 lg. half dog pt.
251	Set Screw
254	3/16 x 1/2 lg. Dowel Pins
255	#10-24 x 3/8 lg. rd. Head Screws
261	1/8 x 7/8 lg. Roll Pin
262	Compression Spring
280	1/8 x 7/16 lg. Dowel Pin
284	1/4-20 Bakelite Ball Handle
287	#7 Woodruff Key
303	B-66 Torrington Needle Brg.
304	3/8-24 Hex Jam Nut
305	A-672-4 Oilite Bearing
306	3/32 x 5/16 lg. Pin
307	Boston Worm #HLVH
308	.110 Dia. x 7/16 lg. Pin
309	3/32 x 3/4 lg. Roll Pin
310	3/16 Steel Ball
311	Compression Spring
312	1/4-28 x 5/16 lg. Set Screw
319	319-5108-62 Waldes Snap Ring
324	Feed Reverse Bevel Gear
332	3/8 Star Washer
336	Snap Ring 5100-25
353	Bushing

No. 4 Belt Housing

Photograph 9

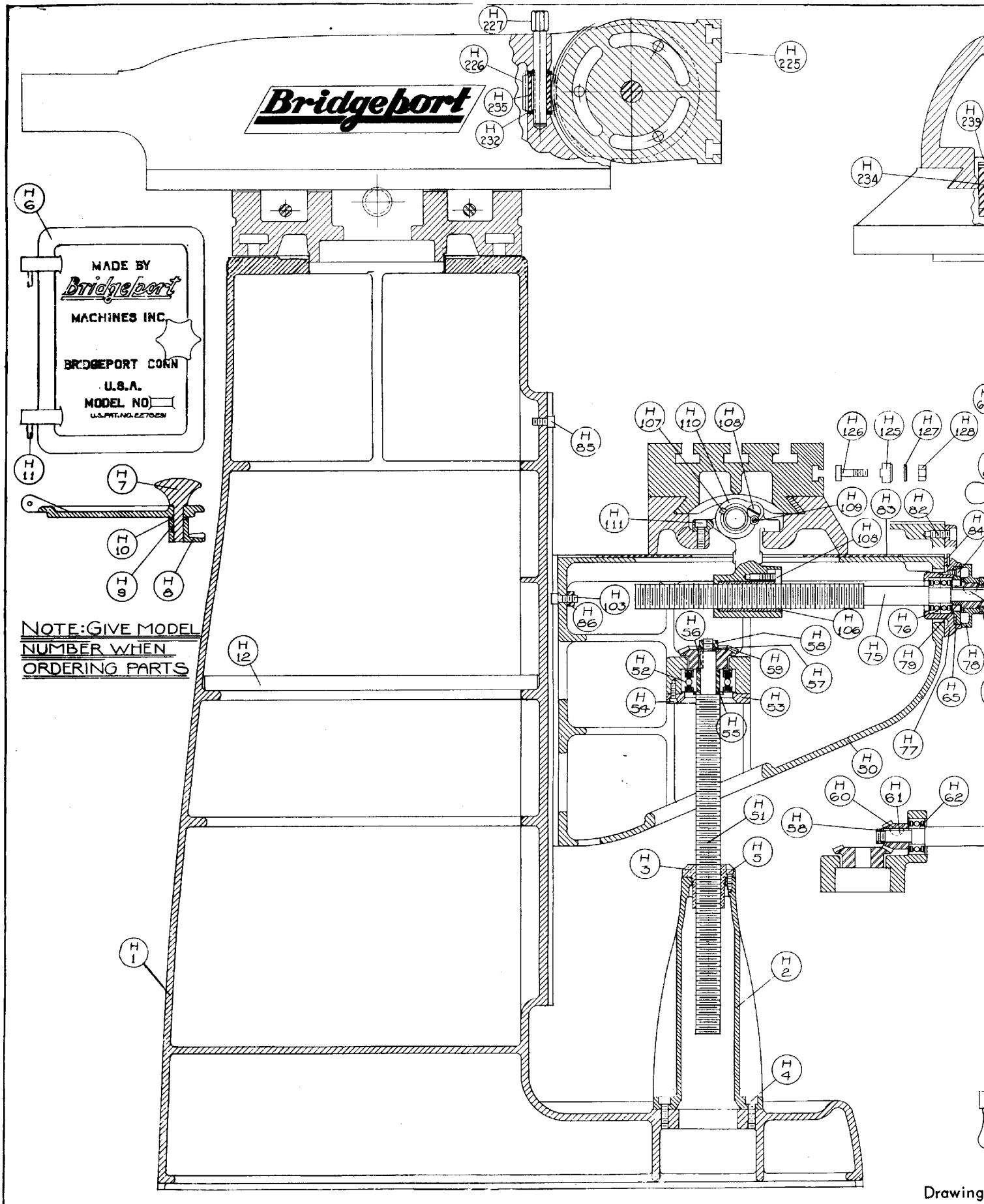
Brake & Clutch Unit - PARTS LIST



Photograph 10

13	Spindle Pulley Brg. Sleeve
75	Spindle Pulley Hub
79	Spindle Pulley Key
80	Upper Brg. Spacer (Large)
81	Upper Brg. Spacer (Small)
82	Brg. Sleeve Locknut
83	Upper Brg. Locknut
84	Cam Ring
85	Spindle Clutch Lever
86	Spindle Clutch Cam Ring Pin
87	Brake Block
88	Brake Ring Screw
89	Brake Lock Stud
90	Brake Pins
91	Brake Lock Washer
92	Brake Lock & Handle
93	Brake Lock Pin
131	Motor Locknut
132	Motor Locknut Handle
133	Motor Mounting Studs
134	Motor Mounting Stud Washers
256	Compression Spring
284	1/4-20 Bakelite Ball Handle
293	ND #9507 Single Plate Ball Brg.
297	W.B. Jones #167-A Ext. Spring (Lindquist)
304	3/8-24 Hex Jam Nut
318	3/8 Lockwasher

H-1	COLUMN AND BASE
H-2	ELEVATING SCREW HOUSING
H-3	ELEVATING SCREW NUT
H-4	3/8 - 16 x 1 HOLLOW HEAD CAP SCREW (2 REQUIRED)
H-5	1/4 - 20 x 3/4 HOLLOW HEAD CAP SCREW (3 REQUIRED)
H-6	DOOR
H-7	DOORKNOB
H-8	DOOR LOCKING CAM
H-9	1/4 - 20 x 1/4 SET SCREW
H-10	17/32 x 1 SPACER
H-11	3/16 x 1-1/2 HINGE PIN (2 REQUIRED)
H-12	WOODEN SHELF (2 HALVES)
H-13	TURRET
H-14	OVERARM
H-15	WORM GEAR
H-16	WORM GEAR HOUSING
H-17	5/8 x 5/8 x 4 KEY
H-18	3/16 x 1 PIN
H-19	WORM
H-20	WORM SHAFT
H-21	NO. 9 WOODRUFF KEY
H-22	SPACER
H-23	NO. 203 PP BALL BEARINGS (2 REQUIRED)
H-24	NO. N-03 BEARING LOCKNUT (2 REQUIRED)
H-25	NO. N-03 BEARING LOCK WASHER (2 REQUIRED)
H-26	BEARING COVER (2 REQUIRED)
H-27	HAND WHEEL
H-28	HANDLE (2 REQUIRED)
H-29	3/8 x 16 x 1-1/2 HOLLOW HEAD CAP SCREW (2 REQUIRED)
H-30	OVERARM LOCKING BOLT (2 REQUIRED)
H-31	21/32 x 1-3/16 x 3/16 WASHER
H-32	OVERARM LOCKING BOLT HANDLE (2 REQUIRED)
H-33	BALL VALVE OILER
H-34	TURRET T-BOLT (4 REQUIRED)
H-35	21/32 x 1-3/16 x 3/16 HARDENED, CHAMFERED WASHER (4 REQUIRED)
H-36	5/8 - 11 HARDENED HEXAGON NUT (4 REQUIRED)
H-37	OVERARM ADAPTER
H-38	ADAPTER LOCKING BOLT
H-39	29/32 x 2 x 1/4 WASHER
H-40	ADAPTER LOCK NUT
H-41	3/16 x 1/2 PIN
H-42	ADAPTER INDEXING PLUNGER
H-43	5/16 x 1-1/4 COIL SPRING
H-44	ADAPTER INDEXING PLUNGER SPRING NUT
H-45	KNURLED PLUNGER NUT
H-46	#10 - 32 JAM NUT
H-50	KNEE
H-51	ELEVATING SCREW
H-52	NO. 3606 - J GREASE-SEALED BALL BEARING
H-53	BEARING RETAINER RING
H-54	1/4 x 20 x 1/2 HOLLOW HEAD CAP SCREW (3 REQUIRED)
H-55	BEARING BUSHING
H-56	3/16 x 3/16 x 7/8 KEY
H-57	33/64 x 1 x 0.100 WASHER
H-58	1/2 - 20 JAM NUT (2 REQUIRED)
H-59	BEVEL GEAR
H-60	BEVEL PINION
H-61	NO. 7 WOODRUFF KEY
H-62	NO. 77020 GREASE-SEALED BALL BEARINGS (3 REQUIRED)
H-63	GEAR SHAFT
H-64	BEARING CUP
H-65	BEARING RETAINER RING (3 REQUIRED)
H-66	1/4 - 20 x 1/2 HOLLOW HEAD CAP SCREW (9 REQUIRED)
H-67	DIAL WITH 100 GRADUATIONS
H-68	DIAL HOLDER
H-69	DIAL LOCK NUT (4 REQUIRED)
H-70	GEARSHAFT CLUTCH INSERT
H-71	ELEVATING CRANK
H-75	CROSS FEED SCREW
H-76	NO. XF-12 GREASE-SEALED BALL BEARINGS (2 PAIRS REQUIRED)
H-77	CROSS FEED BEARING BRACKET
H-78	DIAL WITH 200 GRADUATIONS (3 REQUIRED)
H-79	DIAL HOLDER (3 REQUIRED)
H-80	BALL CRANK HANDLE (3 REQUIRED)
H-81	1/2 - 20 JAM NUT (3 REQUIRED)


Bridgeport
MADE BY
Bridgeport
MACHINES INC.
BRIDGEPORT CONN
U.S.A.
MODEL NO
U.S.PAT.NO.2276251
NOTE: GIVE MODEL NUMBER WHEN ORDERING PARTS
H 1
H 2
H 3
H 4
H 5
H 6
H 7
H 8
H 9
H 10
H 11
H 12
H 50
H 51
H 52
H 53
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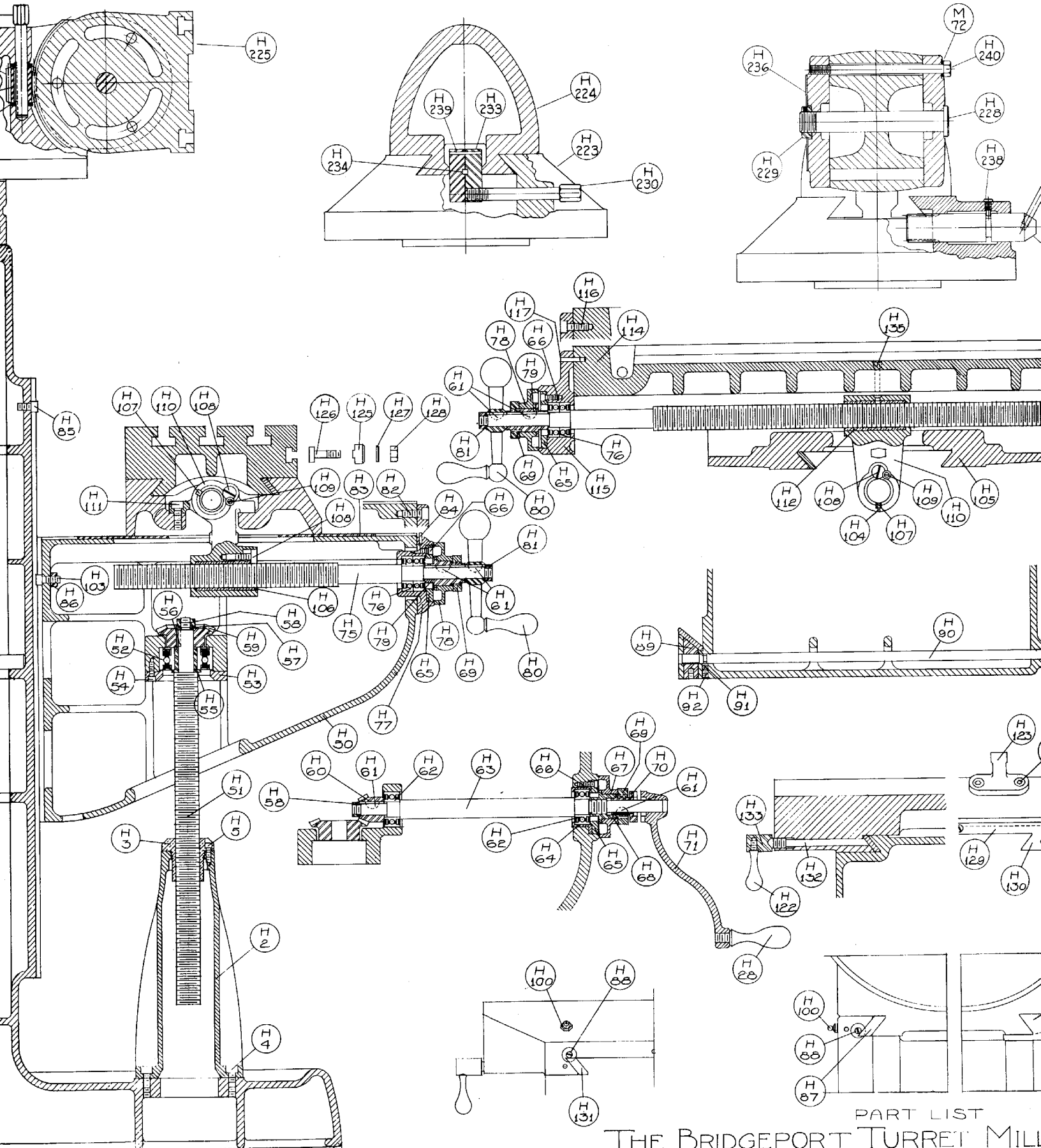
H 239

Drawing



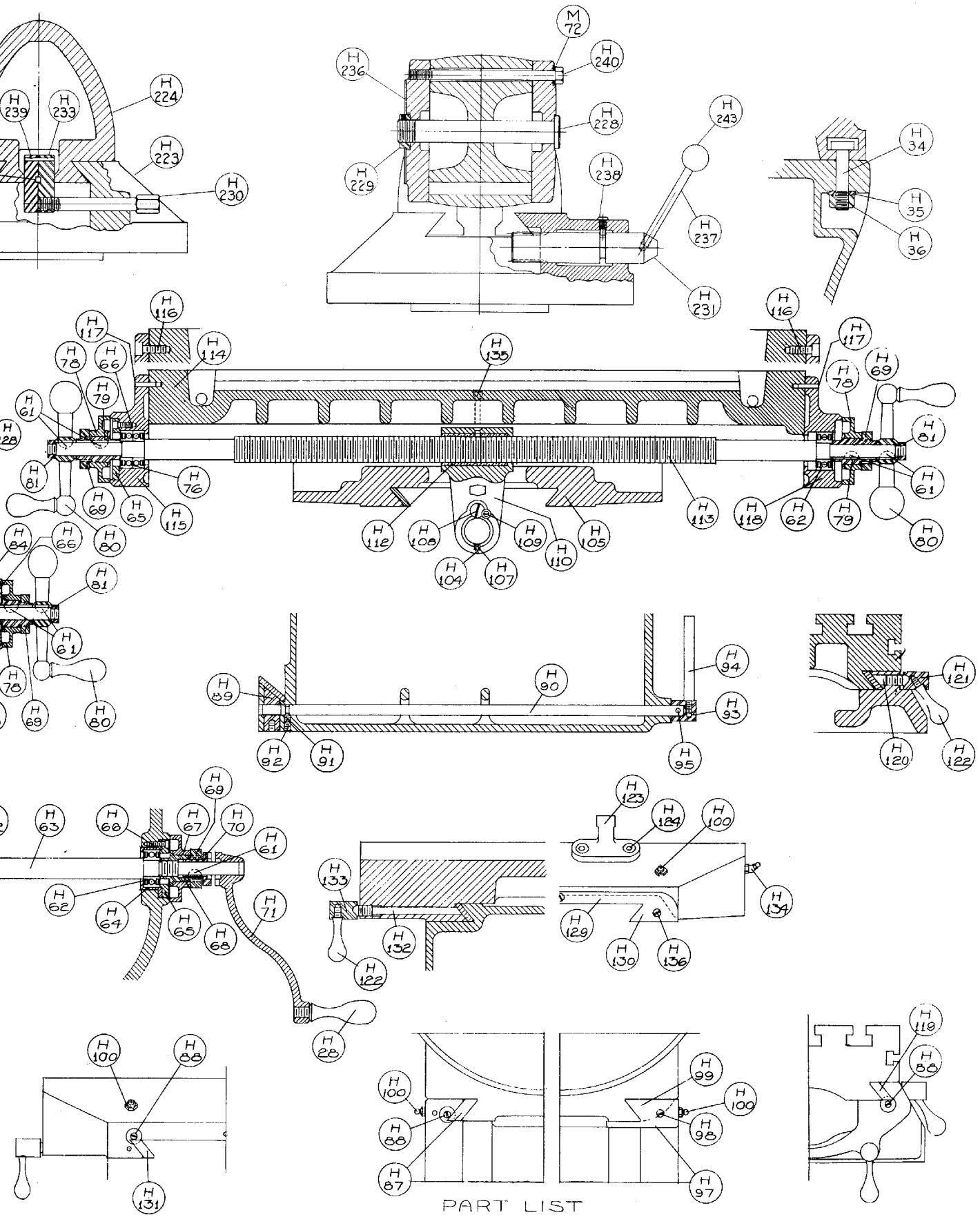
PART LIST

THE BRIDGEPORT TURRET MILL

BRIDGEPORT MACHINES, INC

BRIDGEPORT, CONN.

Drawing 9



PART LIST

THE BRIDGEPORT TURRET MILLING MACHINE

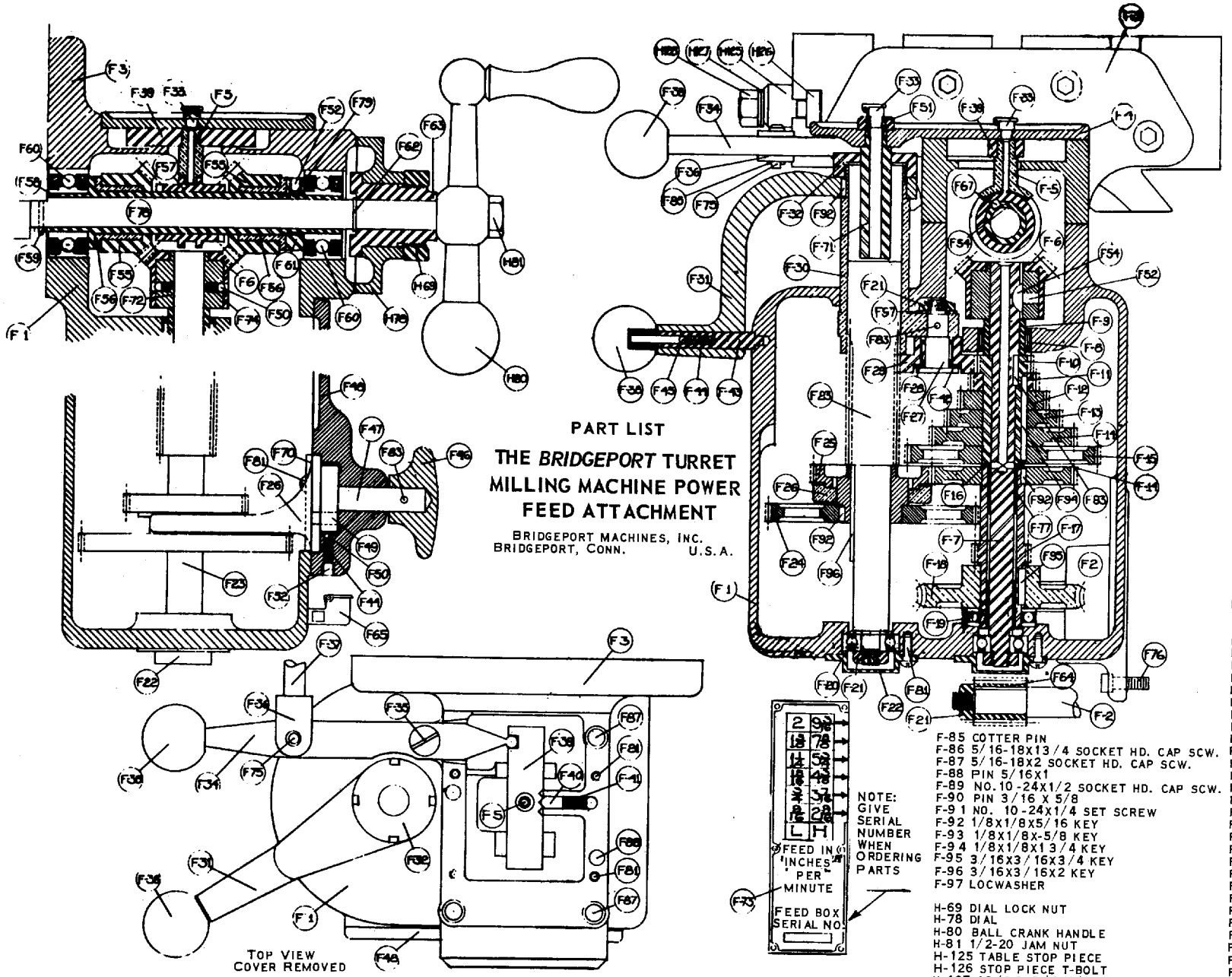
BRIDGEPORT MACHINES, INC.

BRIDGEPORT, CONN. U. S. A.

ing 9

0 –

H-82 3/8 - 16 x 1 HOLLOW HEAD CAP SCREW (4 REQUIRED)
H-83 CHIP GUARD
H-84 NO. 10 - 32 x 5/8 STOP SCREW
H-85 3/8 - 16 x 3/4 MACHINE SCREW
H-86 3/8 - 16 HEXAGON NUT
H-87 KNEE COLUMN GIB
H-88 GIB SCREW (3 REQUIRED)
H-89 KNEE LOCKING PLUNGER
H-90 KNEE LOCKING CAMSHAFT
H-91 5/16 - 18 x 5/16 DOG POINT SET SCREW
H-92 5/16 - 18 x 5/16 SET SCREW
H-93 CAM SHAFT HUB
H-94 CAM SHAFT HANDLE
H-95 NO. 1 x 1" TAPER PIN
H-96 LEFT HAND KNEE-COLUMN WIPER HOLDER
H-97 RIGHT HAND KNEE-COLUMN WIPER HOLDER
H-98 1/4 - 20 x 1 HOLLOW HEAD CAP SCREW (2 REQUIRED)
H-99 FELT WIPER (2 REQUIRED)
H-100 NO. 1610 ALEMITE FITTING (4 REQUIRED)
H-103 3/8 - 16 x 1 MACHINE SCREW
H-104 3/32 x 3/8 PIN
H-105 SADDLE
H-106 CROSS FEED NUT
H-107 3/16 x 3/16 x 2-1/2 KEY (2 REQUIRED)
H-108 CROSS FEED NUT RETAINING SCREW (2 REQUIRED)
H-109 NO. 8 - 32 x 3/8 WASHER HEAD SCREW (2 REQUIRED)
H-110 FEED NUT BRACKET
H-111 3/8 - 16 x 1 HOLLOW HEAD CAP SCREW (4 REQUIRED)
H-112 LONGITUDINAL FEED NUT
H-113 LONGITUDINAL FEED SCREW
H-114 TABLE
H-115 LEFT BEARING BRACKET
H-116 3/8 - 16 x 1 HOLLOW HEAD CAP SCREW (8 REQUIRED)
H-117 3/16 x 1 DOWEL PINS (6 REQUIRED)
H-118 RIGHT BEARING BRACKET
H-119 SADDLE-TABLE GIB
H-120 TABLE LOCK PLUNGER
H-121 TABLE LOCK BOLT
H-122 TABLE LOCK BOLT HANDLE (2 REQUIRED)
H-123 TABLE STOP BRACKET
H-124 3/8 - 16 x 1/2 HOLLOW HEAD CAP SCREW (2 REQUIRED)
H-125 TABLE STOP PIECE (2 REQUIRED)
H-126 STOP PIECE T-BOLT (2 REQUIRED)
H-127 13/32 x 3/4 x 1/8 HARDENED CHAMFERED WASHER (2 REQUIRED)
H-128 3/8 - 16 HEXAGON NUT (2 REQUIRED)
H-129 SADDLE-KNEE WIPER PLATE (2 REQUIRED)
H-130 FELT WIPER (4 REQUIRED)
H-131 SADDLE-KNEE GIB
H-132 SADDLE LOCK PLUNGER
H-133 SADDLE LOCK BOLT
H-134 NO. 1611 ALEMITE FITTING (2 REQUIRED)
H-135 5/16 - 18 x 5/16 SET SCREW
H-136 NO. 10 - 32 x 1/2 OVAL HEAD SCREW (6 REQUIRED)
H-140 1-1/4 OPEN END AND 1-1/16 BOX END WRENCH
H-141 GREASE GUN
H-223 TURRET
H-224 RAM
H-225 RAM ADAPTER
H-226 VERTICAL ADJUSTING WORM
H-227 VERTICAL ADJUSTING WORM SHAFT
H-228 ADAPTER PIVOT STUD
H-229 ADAPTER PIVOT STUD LOCKNUT
H-230 RAM LOCK STUD
H-231 RAM PINION
H-232 WORM THRUST WASHER
H-233 RAM CLAMP
H-234 RAM CLAMP BAR
H-235 WORM KEY
H-236 ANGLE PLATE
H-237 RAM PINION HANDLE
H-238 RAM PINION SCREW
H-239 RAM CLAMP
H-240 ADAPTER LOCKING BOLT (2 REQUIRED)
H-243 3/8 x 16 BALL
J-19 OVERARM
M-72 WASHER



PART LIST

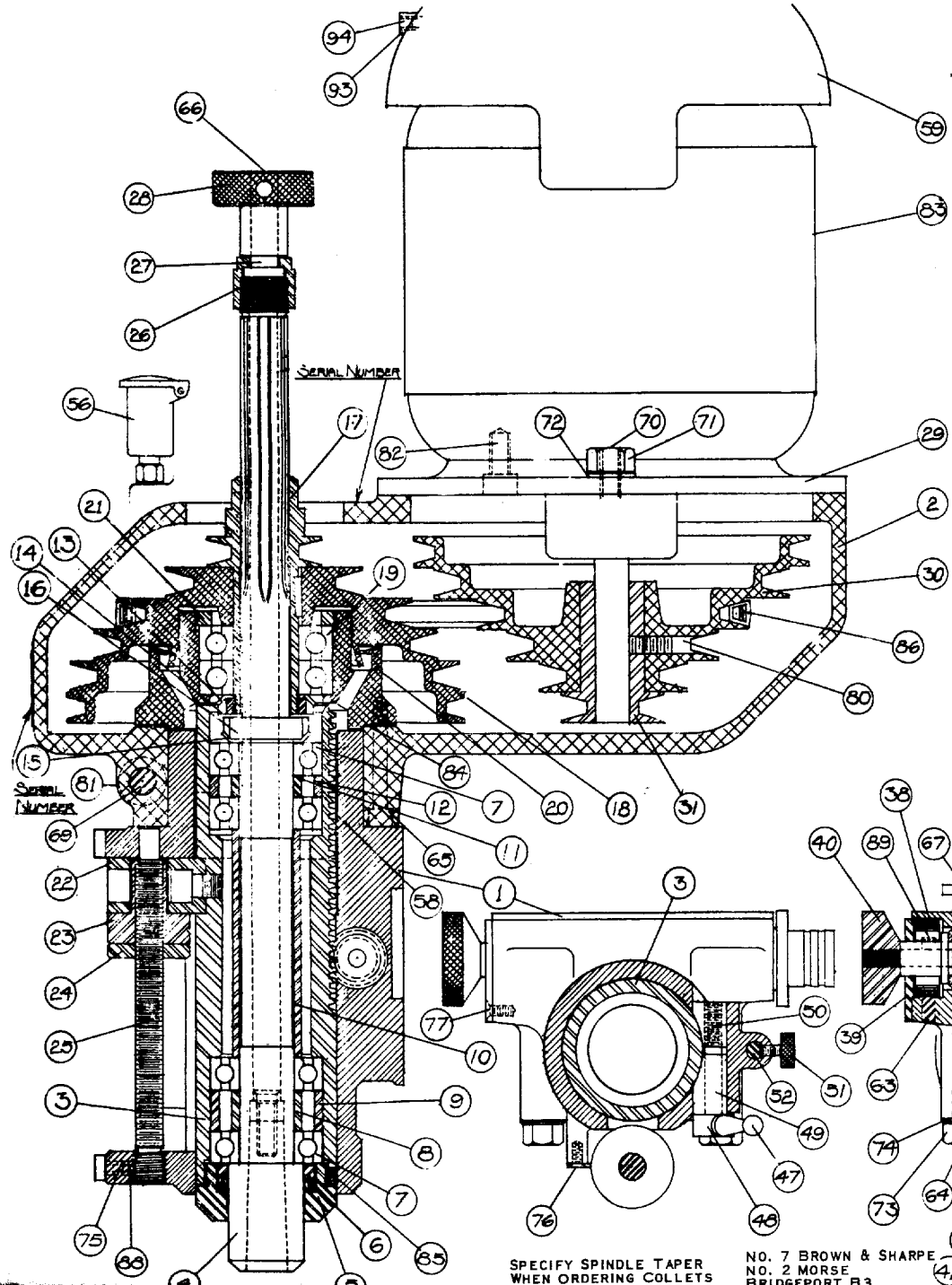
THE *BRIDGEPORT* TURRET MILLING MACHINE POWER FEED ATTACHMENT

BRIDGEPORT MACHINES, INC.
BRIDGEPORT, CONN. U.S.A.

F-1 HOUSING
F-2 MOTOR: 1/8 H.P., 1723 R.P.M.
F-3 BRACKET
F-4 COVER PLATE
F-5 REVERSING FORK
F-6 MITER GEAR
F-7 GEAR SHAFT
F-8 NEEDLE BEARING
F-9 BEARING INNER RACE
F-10 18 TOOTH GEAR WITH HUB
F-11 22 TOOTH GEAR
F-12 29 TOOTH GEAR
F-13 38 TOOTH GEAR
F-14 48 TOOTH GEAR
F-15 64 TOOTH GEAR
F-16 FIBER WASHER
F-17 18 TOOTH SLEEVE GEAR
F-18 WORM GEAR
F-19 THRUST BEARING
F-20 S.A.E. NO. 200 BALL BEARIN
F-21 3/8-24 HEX. JAM NUT
F-22 BEARING COVER
F-23 16 TOOTH PINION WITH SHAFT
F-24 70 TOOTH GEAR
F-25 40 TOOTH GEAR WITH HUB
F-26 GEAR SHIFTING FORK
F-27 IDLER STUD
F-28 NEEDLE BEARING
F-29 27 TOOTH IDLER GEAR
F-30 GEAR SHIFTING SLEEVE
F-31 GEAR SHIFTING HANDLE
F-32 SHIFTING SLEEVE CAP
F-33 OILER
F-34 REVERSING HANDLE
F-35 PIVOT SCREW
F-36 REVERSING STOP ROD FORK
F-37 REVERSING STOP ROD
F-38 BALL HANDLE
F-39 REVERSING SLIDE
F-40 LOCK PIN
F-41 SPRING 1/4X3/4
F-42 THRUST WASHER
F-43 LOCK PIN
F-44 SPRING 13/4X13/16
F-45 PIN
F-46 SPEED CHANGE KNOB
F-47 SPEED CHANGE CRANK
F-48 DOOR
F-49 PIN
F-50 BALL
F-51 7/16-20 HEX. JAM NUT
F-52 1/2-20 X1/4 SET SCREW
F-53 SWITCH
F-54 NO. 7 WOODRUFF KEY
F-55 MITER GEAR WITH CLUTCH FACE
F-56 MOLDED BRONZE BEARING
F-57 CLUTCH
F-58 GEAR SLEEVE
F-59 COTTER (SHEAR) PIN
F-60 GREASE-SEALED BALL BEARING
F-61 GEAR SLEEVE NUT
F-62 SPLIT WASHER
F-63 DIAL HOLDER
F-64 WORM
F-65 OIL CUP
F-66 CORD SET
F-67 3/16X3/16X1 1/2 KEY
F-68 STOP ROD CLAMP
F-69 STOP ROD COLLAR
F-70 SHIFTING FORK HOLD-DOWN
F-71 SLEEVE GUIDE PIN
F-72 SAFETY RELEASE INSERT
F-73 NAMEPLATE
F-74 SPRING 3/16X1/2
F-75 STOP ROD FORK PIN
F-76 1/4-20 X3/4 SOCKET HD. CAP SC
F-77 MOLDED BRONZE BEARING
F-78 FEED SCREW
F-79 BRASS PLUG 3/16X1/16
F-80 NO.10-24X3/16 RD. HD. SCREW
F-81 NO.10-24X1/2 RD. HD. SCREW
F-82 PIN 1/4X1/16
F-83 NO.00 X1 TAPER PIN
F-84 NO.00 X3/8 TAPER PIN
F-85 COTTER PIN
F-86 5/16-18X13/4 SOCKET HD. CAP SCW.
F-87 5/16-18X2 SOCKET HD. CAP SCW.
F-88 PIN 5/16X1
F-89 NO.10-24X1/2 SOCKET HD. CAP SCW.
F-90 PIN 3/16 X 5/8
F-91 NO. 10-24X1/4 SET SCREW
F-92 1/8X1/8X5/16 KEY
F-93 1/8X1/8X-5/8 KEY
F-94 1/8X1/8X1 3/4 KEY
F-95 3/16X3/16X3/4 KEY
F-96 3/16X3/16X2 KEY
F-97 LOCWASHER

H-69 DIAL LOCK NUT
H-78 DIAL
H-80 BALL CRANK HANDLE
H-81 1/2-20 JAM NUT
H-125 TABLE STOP PIECE
H-126 STOP PIECE T-BOLT
H-127 13/32X3/4X1/8 HARDENED WASHER
H-128 3/8-16 HEXAGON NUT

Drawing 10



M78 3/16-IN. DIA. STEEL BALL
M79 3/16-IN. DIA. SPRING
M80 5/16X18X3/4 SET SCREW WASHER
M81 1/2X1/8X7/8 CHAMFERED & HARDENED
M82 3/8X16X3/4 MOUNT. RING CAP SCW, 4 REQ'D
*M83 1/2 H.P. MOTOR
M84 PAPER GASKET
M85 1/4X20 X 1/4 SET SCREW
M86 F.H.P. BELT, DAYTON NO. 1029
M87 1/8X1 STRAIGHT PIN
M88 3/16X3/16 BRASS PLUG
M89 PINION SPRING PIN
M90 MOTOR CORD
M91 COLLET KEY SCW WITH B3 SPINDLE
M92 3/16X3/4 STRAIGHT PIN, 2 REQ'D.
M93 MOTOR OIL PIPE
M94 1/4X20 X1/4 OIL PIPE SCREW
M95 NO. 8X32X3/8 ROUND HEAD SCW, 4 REQ'D.
M96 NO.10 X32X7/16 OVAL HEAD SCW, 4 REQ'D.
M97 1/8X1 STRAIGHT PIN

BRIDGEPORT MACHINES, INC.

BRIDGEPORT, CONN. U.S.A.

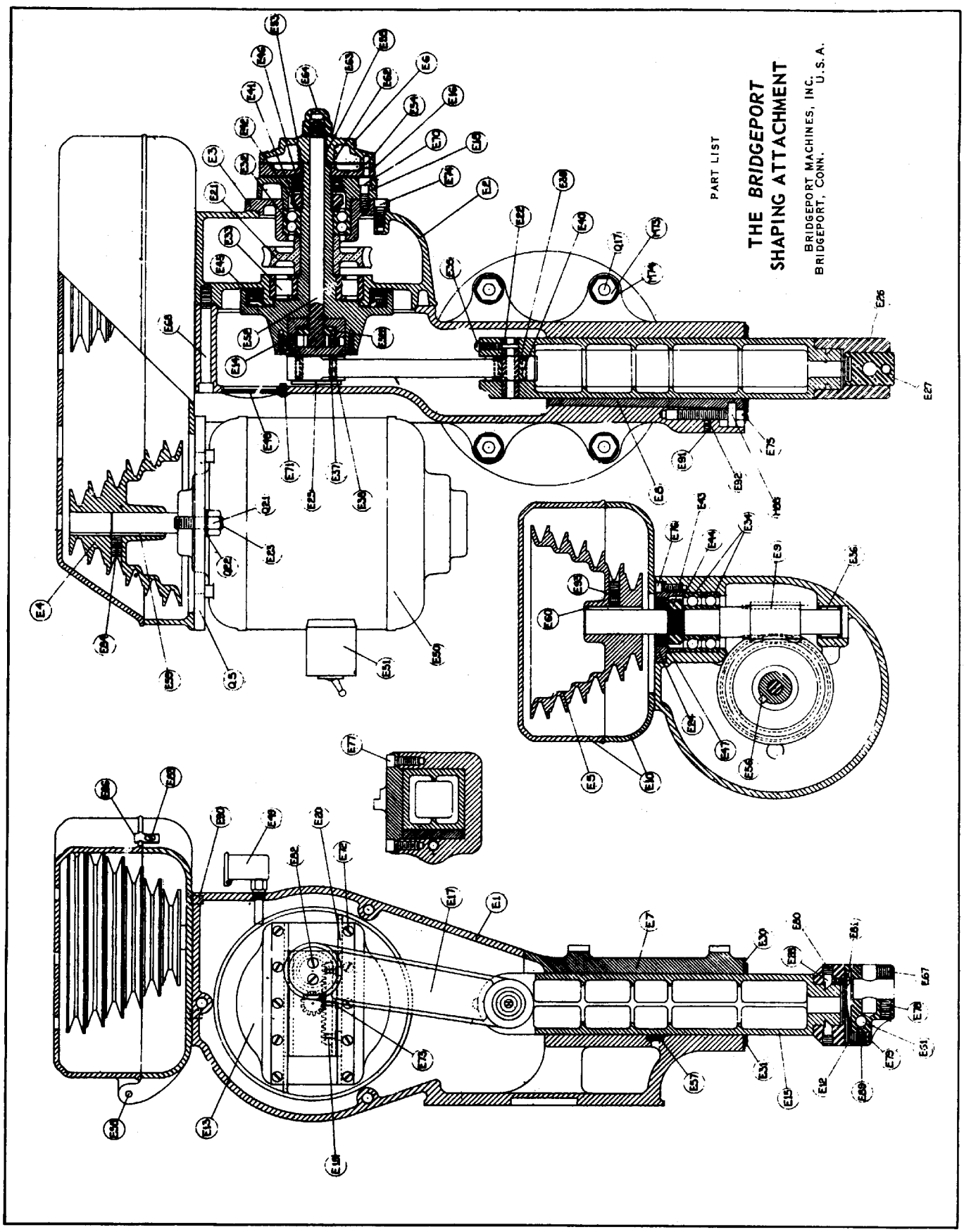
PART LIST

MASTER' MILLING ATTACHMENT

NOTE: ALWAYS GIVE SERIAL NUMBER OF ATTACHMENT WHEN ORDERING PARTS. SPECIFY MAKE OF MOTOR FOR ITEMS MARKED *

M1 QUILL HOUSING
M2A BELT HOUSING, SINGLE BELT DRIVE, 60
M2B BELT HOUSING, DOUBLE BELT DRIVE 60
M2C BELT HOUSING, SINGLE BELT DRIVE, 25
M2D BELT HOUSING, DOUBLE BELT DRIVE, 25
M3 QUILL
M4A SPINDLE, SINGLE BELT NO.2 MORSE TAPER
M4B SPINDLE, SINGLE BELT, NO.7 B&S TAPER
M4C SPINDLE, SINGLE BELT, NO.B3 TAPER
M4D SPINDLE, DOUBLE BELT, NO.2 MORSE TAPE
M4E SPINDLE, DOUBLE BELT, NO7 B&S TAPER
M4F SPINDLE, DOUBLE BELT, NO.B3 TAPER
M5 NOSEPIECE
M6 OIL SLINGER
M7 S.A.E. NO. 205 BALL BEARING, 4 REQ' D.
M8 0.750 INSIDE BEARING SPACER
M9 0.750 OUTSIDE BEARING SPACER
M10 LONG SPACER
M11 0.375 INSIDE BEARING SPACER
M12 0.375 OUTSIDE BEARING SPACER
M13 NO. W-05 BEARING LOCK WASHER
M14 NO. N-05 BEARING LOCK NUT
M15 NO. W-06 BEARING LOCK WASHER
M16 NO.N-06 BEARING LOCK NUT
M17A SPINDLE PULLEY HUB, SINGLE BELT DRIVE
M17B SPINDLE PULLEY HUB, DOUBLE BELT DRIVE
M18A SPINDLE PULLEY, SINGLE BELT DRIVE
M18B SPINDLE PULLEY, DOUBLE BELT DRIVE
M19 S.A.E. NO. 206 BALL BEARING, 2 REQ' D.
M20 BEARING HOUSING
M21 BEARING RETAINER RING
M22 MICROMETER STOP
M23 MICROMETER NUT
M24 MICROMETER LOCK NUT
M25 MICROMETER SCREW
M26 DRAWBAR NUT (LEFT HAND THREAD)
M27A DRAWBAR, DOUBLE BELT, NO.7 OR NO.2 SPIN
M27B DRAWBAR, DOUBLE BELT, NO.B3 SPINDLE
M27C DRAWBAR, SINGLE BELT, NO.7 OR NO.2 SPI
M27D DRAWBAR, SINGLE BELT, NO. B3 SPINDLE
M28 DRAWBAR KNOB
*M29 MOTOR MOUNTING RING
M30 A MOTOR PULLEY, SINGLE BELT DRIVE
M30 B MOTOR PULLEY, DOUBLE BELT DRIVE
*M31 MOTOR PULLEY HUB
M32 QUILL FEED CLUTCH BOLT
M33 QUILL FEED CLUTCH HUB
M34 QUILL FEED PINION
M35 QUILL FEED WORM WHEEL
M36 FIBRE WASHER, 2 REQ'D
M37 SPLIT BUSHING
M38 CLOCK SPRING
M39 SPRING COVER
M40 QUILL FEED CLUTCH KNOB
M41 MICROMETER SCALE
M42 QUILL WORM FEED HAND WHEEL
M43 QUILL WORM FEED HAND WHEEL HANDLE
M44 QUILL WORM FEED HAND WHEEL HUB
M45 QUILL FEED WORM HUB
M46 QUILL FEED WORM
M47 QUILL LOCK BOLT HANDLE
M48 QUILL LOCK BOLT
M49 QUILL LOCK SLEEVE DRILLED
M50 QUILL LOCK SLEEVE, TAPPED
M51 INDICATOR ROD CLAMP SCREW
M52 INDICATOR ROD
M53 RACK FEED HANDLE HUB
M54 RACK FEED HANDLE
M55 BRONZE WORM BUSHING
M56 GITS NO. 2551 OIL CUP
M57 PINION KEY
M58 BRASS QUILL SKIRT
*M59 MOTOR DOME
*M60 MOTOR SWITCH
M61 NO. 00X1/2 TAPER PIN
M62 3/16X1 1/8 STRAIGHT PIN
M63 OUTSIDE SPRING PIN
M64 T-BOLT, 4 REQ' D.
M65 1/4X20 CAP SCREW, 6 REQ' D.
M66 1/4X20 X3/8 SET SCREW, 2 REQ'D.
M67 5/16X18X3/8 SET SCREW
M68 7/16X20 X1/2, CAP SCREW
M69 1/2X13X3 1/4 HEX. HEAD SCREW
M70 MOTOR MOUNTING RING STUD, 2 REQ'D.
M71 1/2X20 HEX. NUT, 2 REQ'D.
M72 1/2X1/8X1 CHAMFERED & HARDENED WASH
M73 3/8X16 HEX. NUT, 4 REQ'D.
M74 3/8X1/8X3/4 CHAMFERED & HARDENED WA
M75 1/4X20 X1/4 SET SCREW

SPECIFY SPINDLE TAPER WHEN ORDERING COLLETS
NO. 7 BROWN & SHARPE
NO. 2 MORSE
BRIDGEPORT B3

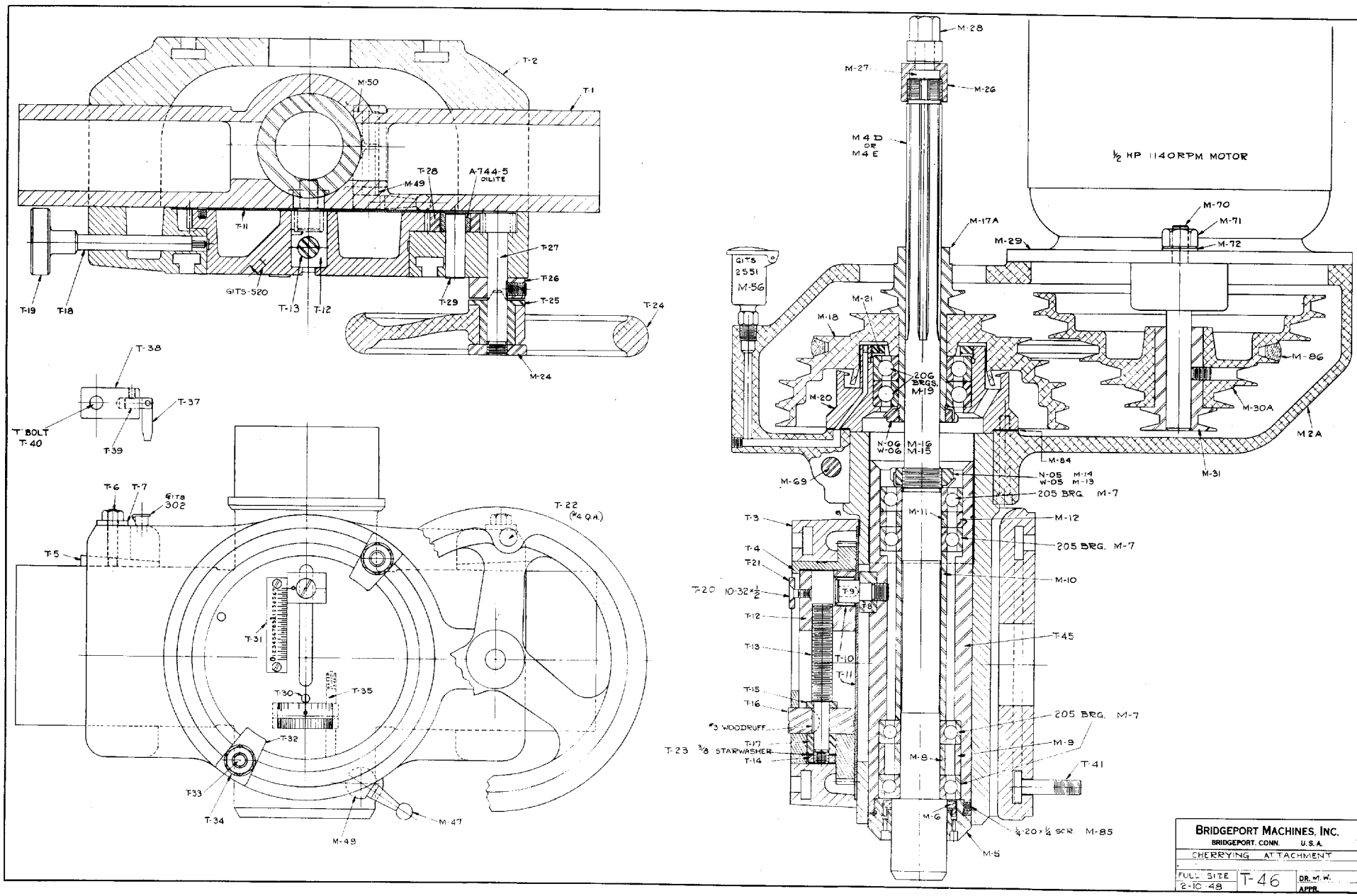

PART LIST
THE BRIDGEPORT
SHAPING ATTACHMENT
BRIDGEPORT MACHINES, INC.
BRIDGEPORT, CONN. U.S.A.

Drawing 12

PART LIST -- THE BRIDGEPORT SHAPING ATTACHMENT

E-1	RAM HOUSING
E-2	GEAR HOUSING
E-3	GEAR HOUSING COVER
E-4*	MOTOR PULLEY
E-5	WORM SHAFT PULLEY
E-6	STROKE ADJUSTMENT DIAL
E-7	RAM COVER
E-8	GIB
E-9	WORM AND SHAFT
E-10*	BELT HOUSING
E-12	CALPPER SPRING
E-13	CRANK AND SHAFT
E-14	CRANKPIN BLOCK
E-15	RAM
E-16	STROKE ADJUSTMENT PLATE
E-17	CONNECTING ROD
E-18	CRANK BEARING COVER
E-19	RACK
E-20	CRANKPIN BLOCK HOLD-DOWN--2 REQUIRED
E-21	WORM GEAR
E-22	RAM CRANKPIN
E-23	MOTOR MOUNTING RING STUD--2 REQUIRED
E-24	WORM BEARING COVER
E-25	BEARING RETAINING WASHER
E-26	CLAPPER BOX
E-27	CLAPPER
E-28	CLAPPER BOX CLAMP SHOE--2 REQUIRED
E-29*	BELT
E-30	WIPER PLATE
E-31	WIPER--FELT
E-32	NO. 5205 BEARING
E-33	NO. R330 BEARING
E-34	NO. 204 BEARING--1 PAIR
E-35	RAM CRANKPIN LOCKSCREW
E-36	NO. B-1212X BEARING
E-37	NO. IS-1312 INNER RACE
E-38	NO. GB-1612X BEARING
E-39	NO. IS-812 OSC. INNER RACE
E-40	NO. GB-1212X BEARING
E-41	N-05 LOCKNUT
E-42	NO. W-05 LOCKWASHER
E-43	NO. N-04 LOCKNUT
E-44	NO. W-04 LOCKWASHER
E-45	3 1/4 x 4 1/4 x1/2 OILSEAL
E-46	7/8 x 1 1/2 x 3/8 OILSEAL
E-47	3/4 x 1 1/2 x 5/16 OILSEAL
E-48	AIR VENT COVER
E-49	OIL CUP
E-50*	MOTOR
E-51*	SWITCH
E-52	LOCKING BOLT AND GEAR
E-52B	LOCKING BOLT COLLAR
E-53	1/8 x 1/8 x 3/8 KEY
E-54	3/16 x 3/8 PIN
E-55	1/8 x 1/8 x 3/4 KEY
E-56	3/16 x 3/16 x 1 3/16 KEY
E-57	FELT PLUG
E-58	1/8 x 1 1/4 PIN--2 REQUIRED
E-59	3/16 x 3/16 x 1 3/4 KEY
E-60	3/16 x 3/16 x 1 3/4 KEY
E-61	5/16 x 1 7/8 PIN
E-62	DIAL SPRING
E-63	7/16 x 7/8 WASHER
E-64	7/16 - 20 ACORN NUT
E-65	NAMEPLATE
E-66	BELT COVER CLIP
E-67	5/16 - 18 x 1/2 SET SCREW
E-68	5/16 - 18 x 2 3/4 CAP SCREW
E-69	5/16 - 18 x 3 1/2 CAP SCREW--2 REQUIRED
E-70	1/4 - 20 x 3/4 CAP SCREW--3 REQUIRED
E-71	NO. 8-32 x 3/8 WASHER HEAD SCREW--2 REQUIRED
E-72	NO. 10-24 x 3/8 FLAT HEAD SCREW--10 REQUIRED
E-73	NO. 8-32 x 3/8 ROUND HEAD SCREW--3 REQUIRED
E-74	1/4 - 20 x 1/2 CAP SCREW--3 REQUIRED
E-75	NO. 5-40 x 1/4 ROUND HEAD SCREW--4 REQUIRED
E-76	NO. 10-24 x 3/8 CAP SCREW--3 REQUIRED
E-77	1/4 - 20 x 1/2 CAP SCREW--6 REQUIRED
E-78	5/16 - 18 x 5/8 SET SCREW
E-79	5/16 - 18 x 5/8 SET SCREW
E-80	5/16 - 18 x 5/16 SET SCREW--2 REQUIRED
E-81	NO. 8-32 x 3/8 ROUND HEAD SCREW
E-82	NO. 5-40 x 1/4 FLAT HEAD SCREW--2 REQUIRED
E-83	NO. 8-32 x 3/8 WASHER HEAD SCREW
E-84	5/16 - 18 x 5/8 SET SCREW
E-85	OVERARM MARKER
E-86	NO. 10-24 x 3/8 ROUND HEAD SCREW
E-87	1/8 PIPE PLUG
E-88	1/8 PIPE PLUG, DRILLED AND TAPPED
E-89	NO. 10-24 x 1/4 SET SCREW
E-90	1/4 - 20 x 1/2 FLAT HEAD SCREW--4 REQUIRED
E-91	1/4 - 20 x 1/4 SET SCREW
E-92	BRASS PLUG
E-93	5/16 - 18 x 3/4 SET SCREW
M-73	T-BOLT NUT--4 REQUIRED
M-74	T-BOLT WASHER--4 REQUIRED
Q-17	T-BOLT--4 REQUIRED
Q-5	MOTOR MOUNTING RING
Q-21	MOTOR MOUNTING RING STUD NUT--2 REQUIRED
Q-22	MOTOR MOUNTING RING STUD WASHER--2 REQUIRED
H-88	GIB SCREW
E-94	11/16 x 3/4 OPEN END WRENCH

* GIVE MOTOR SPECIFICATIONS INCLUDING MAKE OF MOTOR WHEN ORDERING THESE PARTS. ALWAYS GIVE SERIAL NUMBER OF ATTACHMENT.



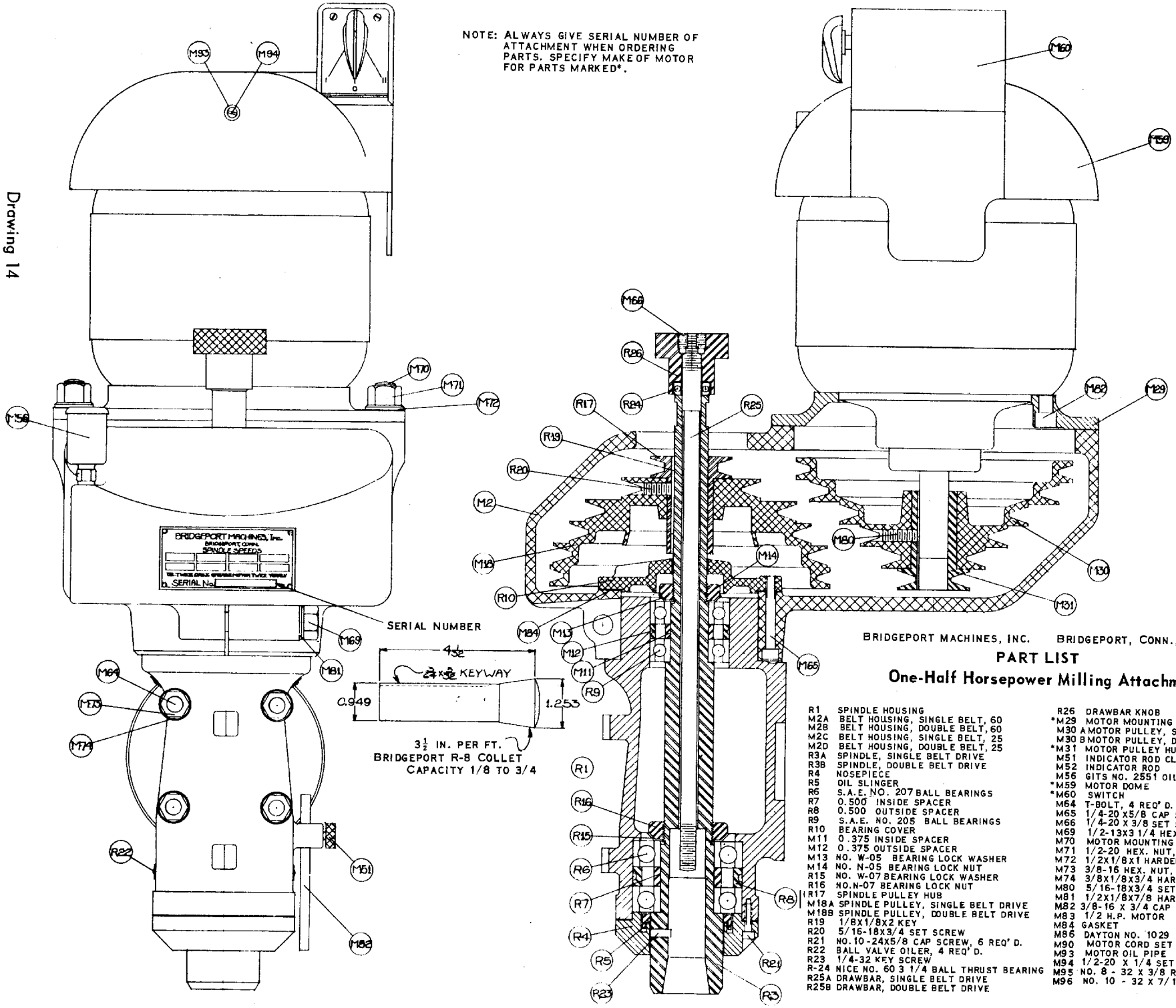
BRIDGEPORT MACHINES, INC.
BRIDGEPORT, CONN. U.S.A.
CHERRYING ATTACHMENT
FULL SIZE 2-10-48 T-46 DR. M.W. APPR.

Drawing 13

CHERRYING ATTACHMENT PARTS LIST

M2A	Belt Housing, single belt drive, 60 cycle
M4D	Spindle, Double belt, #2 Morse Taper
M4E	Spindle, Double belt, #7 B&S Taper
M5	Nosepiece
M6	Oil Slinger
M7	SAE # 205 Ball Bearing (4 Req'd)
M8	0.750 Inside Bearing Spacer
M9	0.750 Outside Bearing Spacer
M10	Long Spacer
M11	0.375 Inside Bearing Spacer
M12	0.375 Outside Bearing Spacer
M13	No. W-05 Bearing Lock Washer
M14	No. N-05 Bearing Lock Nut
M15	No. W-06 Bearing Lock Washer
M16	No. N-06 Bearing Lock Nut
M17A	Spindle Pulley Hub, Single Belt Drive
M18A	Spindle Pulley, Single Belt Drive
M19	SAE #206 Ball Bearings (2 Req'd)
M20	Bearing Housing
M21	Bearing Retainer Ring
M26	Drawbar Nut (Left Hand Thread)
M27A	Drawbar, double drive, #7 or #2 spindle
M28	Drawbar Knob
M29	Motor Mounting Ring
M30A	Motor pulley, single belt drive with Hub Part M31
M31	Motor Pulley Hub
M47	Quill Lock Bolt Handle
M48	Quill Lock Bolt
M49	Quill Lock Sleeve, Drilled
M50	Quill Lock Sleeve, Tapped
M56	Gits No. 2551 Oil Cup
M60	Motor Switch 9441 H31D Cutler Hammer
M64	T Bolts (4 Req'd)
M65	1/4 x 20 x 1-3/4 lg. Cap Screw (6 Req'd)
M69	1/2 x 13 x 3-1/4 Hex. Head Screw
M70	Motor Mounting Ring Stud (2 Req'd)
M71	1/2 x 20 Hex. Nut (2 Req'd)
M72	1/2 x 1/8 x 1 Chamfered & Hardened Washer
M83	1/2 HP Motor
M84	Paper Gasket
M85	1/4 x 20 x 1/4 Set Screw
M86	Gilmer 5607 Belt F.H.P.
M90	Motor Cord
T1	Quill Housing
T2	Quill Housing Saddle
T3	Gear Housing
T4	Drum Gear
T5	Gib (2 Req'd)
T6	Gib Screw (2 Req'd)
T7	Gib Screw Washer (2 Req'd)
T8	Cherry
T9	Pivot Stud
T10	Torr. Brg. GB-98
T11	Drum Gear Plate
T12	Pivot Offset Block
T13	Lead Screw
T14	Lead Screw Locknut
T15	Lead Screw Washer
T16	Lead Screw Dial
T17	Lead Screw Spacer
T18	Allen Wrench Stud
T19	Wrench Knob
T20	10 - 32 x 1/2 lg. Flat Head Screw
T21	Zero Block
T22	Handwheel Handle
T23	3/8" Star Washer
T24	Hand Wheel
T25	Hand Wheel Dog
T26	Hand Wheel Gear Clutch
T27	Hand Wheel Pinion
T28	Idler Gear
T29	Idler Gear Post
T30	Lead Screw Zero Pin
T31	Scale (Purchased)
T32	Stop Dog (2 Req'd)
T33	T Bolt (3 Req'd)
T34	T Bolt Washer (3 Req'd)
T35	Dial Binder Plug
T36	Fork Adapter (See Misc. Price List)
T37	Finger Ratchet Spring
T38	Feed Ratchet Dog
T39	Ratchet Stud
T40	Ratchet Dog Tee Bolt
T41	Adapter Tee Bolt
T45	Quill

NOTE: ALWAYS GIVE SERIAL NUMBER OF ATTACHMENT WHEN ORDERING PARTS. SPECIFY MAKE OF MOTOR FOR PARTS MARKED*.

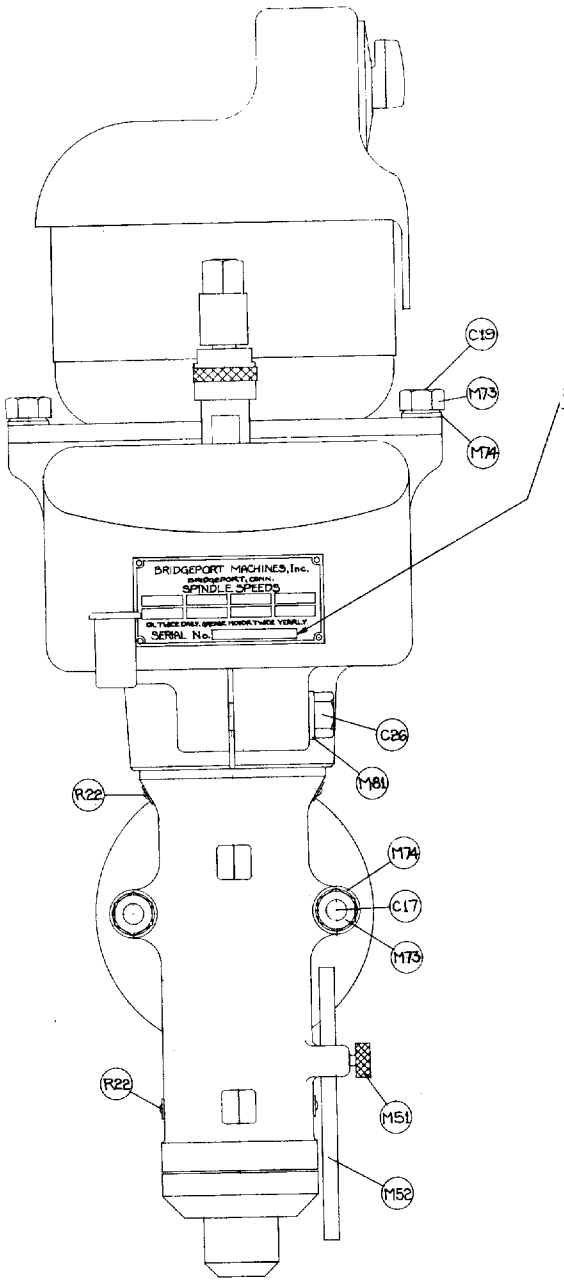


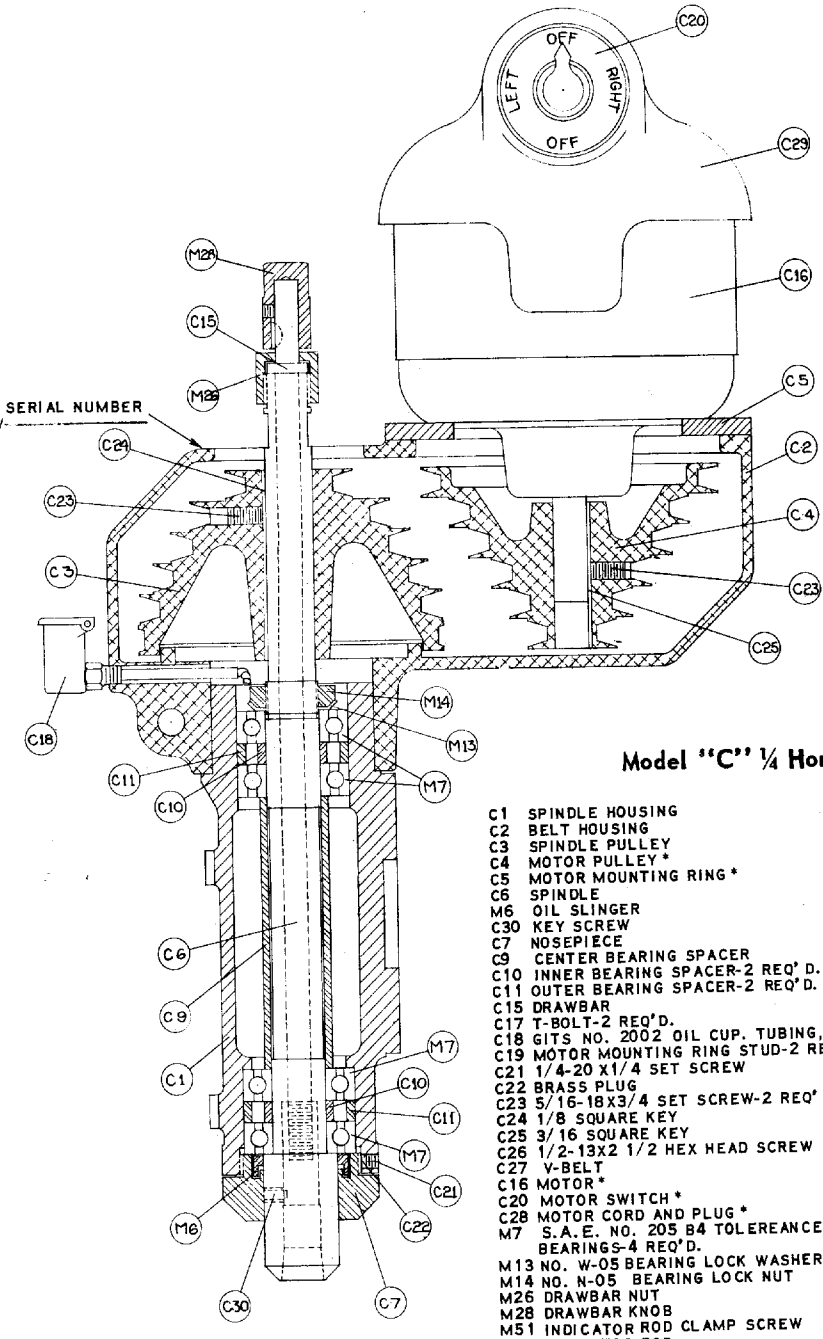
BRIDGEPORT MACHINES, INC. BRIDGEPORT, CONN., U.S.A.

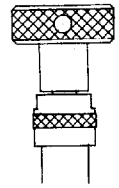
PART LIST

One-Half Horsepower Milling Attachment

R1	SPINDLE HOUSING
M2A	BELT HOUSING, SINGLE BELT, 60
M2B	BELT HOUSING, DOUBLE BELT, 60
M2C	BELT HOUSING, SINGLE BELT, 25
M2D	BELT HOUSING, DOUBLE BELT, 25
R3A	SPINDLE, SINGLE BELT DRIVE
R3B	SPINDLE, DOUBLE BELT DRIVE
R4	NOSEPIECE
R5	OIL SLINGER
R6	S.A.E. NO. 207 BALL BEARINGS
R7	0.500 INSIDE SPACER
R8	0.500 OUTSIDE SPACER
R9	S.A.E. NO. 205 BALL BEARINGS
R10	BEARING COVER
M11	0.375 INSIDE SPACER
M12	0.375 OUTSIDE SPACER
M13	NO. W-05 BEARING LOCK WASHER
M14	NO. N-05 BEARING LOCK NUT
R15	NO. W-07 BEARING LOCK WASHER
R16	NO.N-07 BEARING LOCK NUT
R17	SPINDLE PULLEY HUB
M18A	SPINDLE PULLEY, SINGLE BELT DRIVE
M18B	SPINDLE PULLEY, DOUBLE BELT DRIVE
R19	1/8X1/8X2 KEY
R20	5/16-18X3/4 SET SCREW
R21	NO.10-24X5/8 CAP SCREW, 6 REQ'D.
R22	BALL VALVE OILER, 4 REQ'D.
R23	1/4-32 KEY SCREW
R-24	NICE NO. 60 3 1/4 BALL THRUST BEARING
R25A	DRAWBAR, SINGLE BELT DRIVE
R25B	DRAWBAR, DOUBLE BELT DRIVE
R26	DRAWBAR KNOB
*M29	MOTOR MOUNTING RING
M30 A	MOTOR PULLEY, SINGLE BELT DRIVE
M30 B	MOTOR PULLEY, DOUBLE BELT DRIVE
*M31	MOTOR PULLEY HUB
M51	INDICATOR ROD CLAMP SCREW
M52	INDICATOR ROD
M56	GITS NO. 2551 OIL CUP
*M59	MOTOR DOME
*M60	SWITCH
M64	T-BOLT, 4 REQ'D.
M65	1/4-20 X5/8 CAP SCREW, 3 REQ'D.
M66	1/4-20 X 3/8 SET SCREW, 4 REQ'D.
M69	1/2-13X3 1/4 HEX. HEAD SCREW
M70	MOTOR MOUNTING RING STUD, 2 REQ'D.
M71	1/2-20 HEX. NUT, 2 REQ'D.
M72	1/2X1/8X1 HARDENED, CHAMFERED W/A
M73	3/8-16 HEX. NUT, 4 REQ'D.
M74	3/8X1/8X3/4 HARDENED, CHAMFERED
M80	5/16-18X3/4 SET SCREW
M81	1/2X1/8X7/8 HARDENED, CHAMFERED
M82	3/8-16 X 3/4 CAP SCREW, 4 REQ'D.
M83	1/2 H.P. MOTOR
M84	GASKET
M86	DAYTON NO. 1029 F.H.P. V-BELT
M90	MOTOR CORD SET
M93	MOTOR OIL PIPE
M94	1/2-20 X 1/4 SET SCREW
M95	NO. 8 - 32 X 3/8 ROUND HEAD SCREW,
M96	NO. 10 - 32 X 7/16 OVAL HEAD SCRE







NOTE: KNURLED TYPE DRAWBAR KNOB (M28). KNURLED KNOB TYPE DRAWBAR (C15), OR COMPLETE DRAWBAR ASSEMBLY (C15, M26, AND M28) WILL BE REPLACED BY COMPLETE HEX KNOB DRAWBAR ASSEMBLY.

PART LIST

Model "C" ¼ Horsepower Milling Attachment

C1 SPINDLE HOUSING
C2 BELT HOUSING
C3 SPINDLE PULLEY
C4 MOTOR PULLEY *
C5 MOTOR MOUNTING RING *
C6 SPINDLE
M6 OIL SLINGER
C30 KEY SCREW
C7 NOSEPIECE
C9 CENTER BEARING SPACER
C10 INNER BEARING SPACER-2 REQ'D.
C11 OUTER BEARING SPACER-2 REQ'D.
C15 DRAWBAR
C17 T-BOLT-2 REQ'D.
C18 GITS NO. 2002 OIL CUP. TUBING, WICK
C19 MOTOR MOUNTING RING STUD-2 REQ'D.
C21 1/4-20 X1/4 SET SCREW
C22 BRASS PLUG
C23 5/16-18X3/4 SET SCREW-2 REQ'D.
C24 1/8 SQUARE KEY
C25 3/16 SQUARE KEY
C26 1/2-13X2 1/2 HEX HEAD SCREW
C27 V-BELT
C16 MOTOR *
C20 MOTOR SWITCH *
C28 MOTOR CORD AND PLUG *
M7 S.A.E. NO. 205 B4 TOLEREANCE BALL BEARINGS-4 REQ'D.
M13 NO. W-05 BEARING LOCK WASHER
M14 NO. N-05 BEARING LOCK NUT
M26 DRAWBAR NUT
M28 DRAWBAR KNOB
M51 INDICATOR ROD CLAMP SCREW
M52 INDICATOR ROD
M73 3/8-16 HARDENED HEX NUT-4 REQ'D.
M74 3/8X1/8X3/4 CHAMFERED AND HARDEN WASHER-4 REQ'D.
M81 1/2X1/8X7/8 CHAMFERED AND HARDEN WASHER
R22 BALL VALVE OILER-4 REQ'D.
C29 MOTOR DOME AND SWITCH HOUSING

ALWAYS GIVE SERIAL NUMBER OF ATTACHMENT WHEN ORDERING PAR GIVE MAKE AND SPECIFICATIONS OF MOTOR FOR PARTS MARKED *

SPECIAL PARTS REQUIRED FOR MODEL "B" ATTACHMENT WITH 4-STEP PULLEY DRIVE

B2 BELT HOUSING
B3 SPINDLE PULLEY
B4 MOTOR PULLEY *
B6 SPINDLE
B15 DRAWBAR
B17 T-BOLT-2 REQ'D.

ALL OTHER PARTS INTERCHANGEABLE

612 & 618 HAND FEED SURFACE GRINDER

INSTRUCTION MANUAL

HARIG® PRODUCTS, INC.
1875 Big Timber Road
Elgin, Illinois 60120 U.S.A.
312-695-1000
TWX 910-251-3363

HARIG®

612&618 HAND FEED SURFACE GRINDER

INDEX

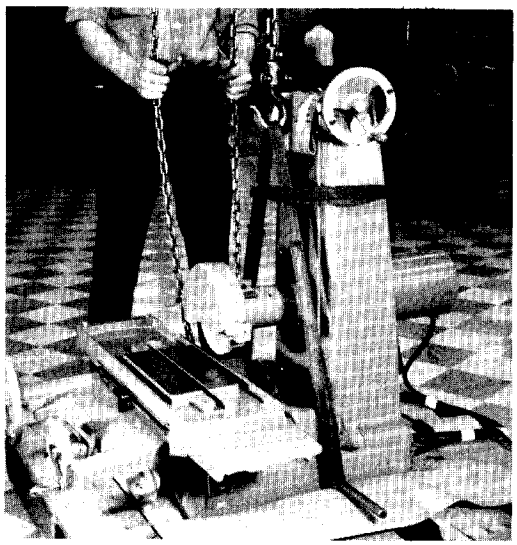


Figure 1

Figure 2

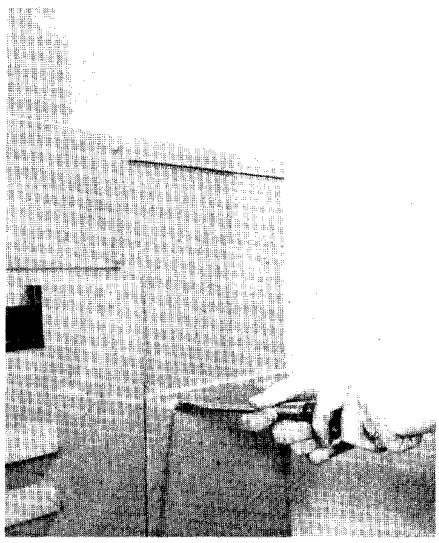


Figure 3

STEP 1. DO NOT REMOVE SKIDS until machine has been moved adjacent to its installation site.

STEP 2. LIFT BASE CABINET from skid and adjust leveling legs to project 5/8" below bottom edge of cabinet.

STEP 3. POSITION BASE CABINET where desired. No special pad, floor reinforcement or drip pans are needed.

STEP 4. TO LIFT GRINDER FROM SKID AND POSITION:

4.1 Place ¾" steel bar through holes near bottom of grinder base. *(Fig. 1)*

4.2 Attach chain or rope to ends of bar and join near top of column. Strap to top of column. Pad machine adequately to prevent damage to finish. *(Fig. 1)*

4.3 Lift slightly from skid. Balance machine by turning crossfeed handwheel. (Loosen locking thumb screw, *A, Fig. 10,* page 6.)

4.4 Lift and position grinder over base. Set into well on cushions. Allow no metal to metal contact.

CAUTION: Do not lift by motor, spindle, table or saddle.

STEP 5. CLEAN MACHINE. Remove grease from table, handwheels and exterior surfaces with clean rag. It is not necessary to disassemble anything as all interior surfaces are factory prepared. Do not use solvents or abrasives that may damage machine's finish.

STEP 6. LEVEL MACHINE.

6.1 Crank table all the way to the right.

6.2 Raise left front leveling leg ¼" off floor.

6.3 Place level on table platen and adjust the three remaining legs to level the table in both directions.

6.4 Lower left front leg to floor and give it an additional ¼ turn.

STEP 7. ASSEMBLY

7.1 Use three round head screws (furnished) to fasten Elevating Screw Guard to Column Cap. *(Fig. 2)*

7.2 Attach Spark Guard to left side of table with two hex screws.

STEP 8. If **WET COOLANT ATTACHMENT** has been purchased with a 618, loosen the three ¼ turn coolant compartment screws *(Fig. 3)* and assemble as per instructions packed with the system. A wet coolant system purchased with a 612 is placed along side the machine. *(Fig. 4)*

STEP 9. LUBRICATION.

Ways and feed screws are automatically lubricated.

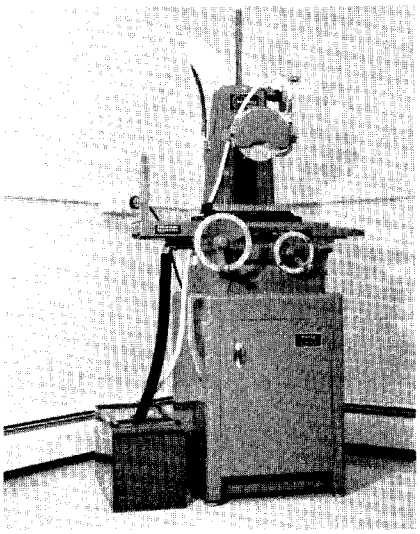


Figure 4

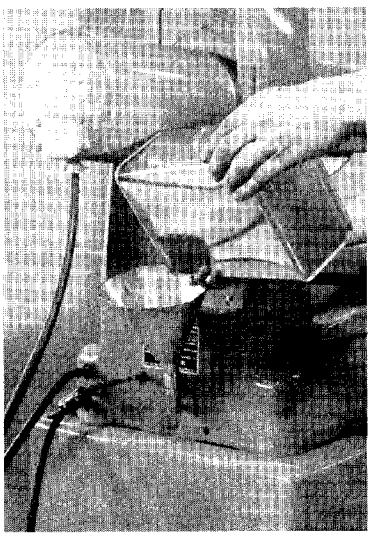


Figure 5

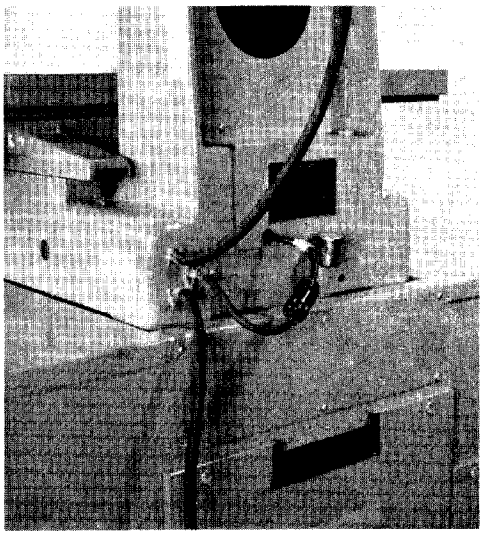


Figure 6

The Spindle and motor bearings are permanently lubricated.

If machine has a rack and pinion type longitudinal table travel, this assembly was greased at the factory. A small amount of grease should be added to the rack each month.

NOTE: Check oil reservoir level (see cup at rear of machine.) If needed, add way oil to bring level just above half way. *(Fig. 5)*

STEP 10. ELECTRICAL CONNECTIONS.

CAUTION: To preclude personal injury or extensive machine damage, all electrical work should be done by a qualified electrician.

10.1 Compare rating label on the back of the spindle motor with house current to make certain they correspond.

10.2 Connect three main line wires to house current system.

10.3 Stand in front of machine. Turn Spindle Motor on. It should ROTATE CLOCKWISE. If not, switch any two of the three live wire connections.

10.4 Ground machine by connecting the green wire to a steam or water pipe. CAUTION: Do NOT ground the machine to a gas pipe.

OPERATION

1. SAFETY FIRST

We, like most American manufacturers, go to great lengths to make our products as safe as possible. But operators still get hurt. In virtually every case the injury is the result of:

1) Not knowing how to operate the machine properly.
2) Not following proper operating and safety procedures.
3) Carelessness or inattentiveness.
4) Trying to "take a short cut".
5) Poor maintenance.

For your own personal safety as well as getting maximum efficiency out of this precision machine, read and follow these operation instructions carefully. Remember --- "accidents almost never are".

Standard Safety Precautions for Operating the HARIG® 612 and 618 Hand Feed Grinders.

1. NEVER operate machine without safety glasses.
2. NEVER operate machine without wheel guard in place.
3. Do NOT wear tie, scarf, ID bracelet, neck chain or other object that could become entangled in the machine or work piece.
4. Always wait for wheel to STOP before bringing your hands to the table or work piece.
5. Make certain work piece is SECURELY held in place.
6. NEVER attempt to hand hold or hand feed a work piece.
7. NEVER exceed machine's capacity.
8. Use proper grade grinding wheels and keep them dressed.
9. Stop machine and correct any malfunction IMMEDIATELY (see trouble-shooting section)
10. Inspect and maintain machine by schedule- not by chance.
11. Keep hands (and clothing) away from table when operating.
12. If you're not a qualified electrician, do NOT tamper with electrical connections or wiring. Report any suspected electrical malfunction immediately.

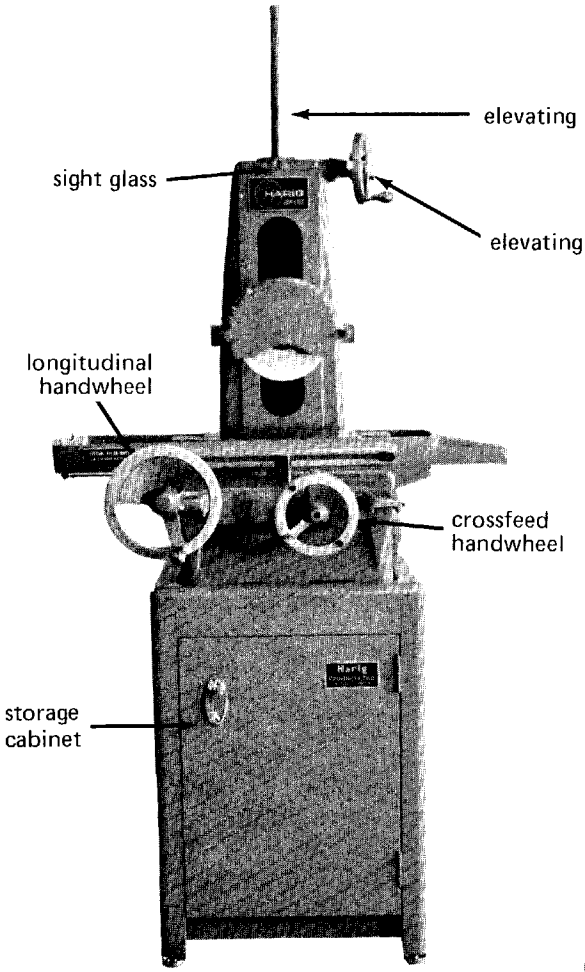


Figure 7

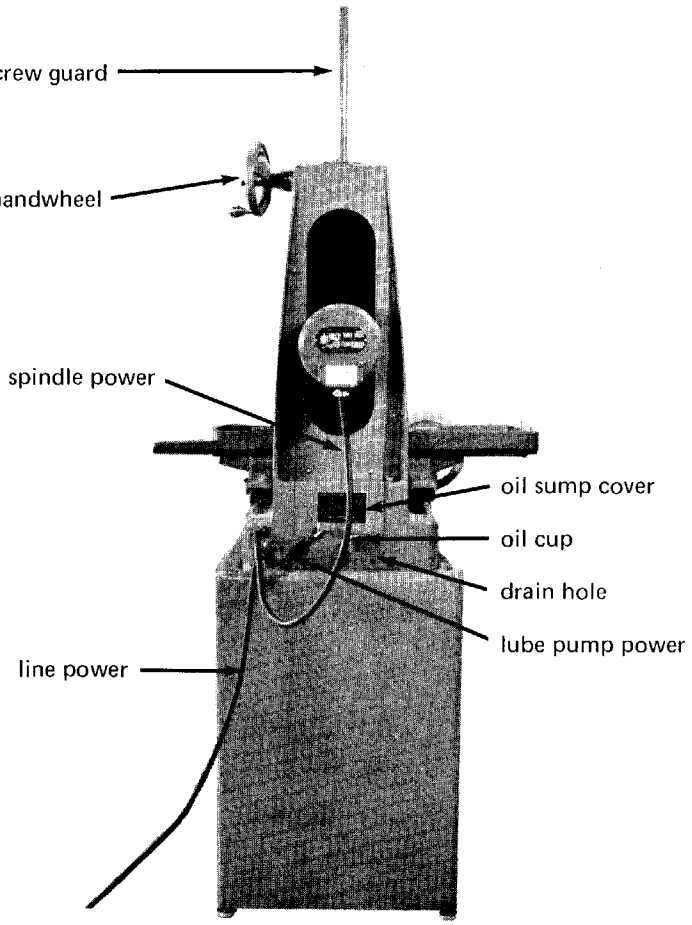


Figure 8

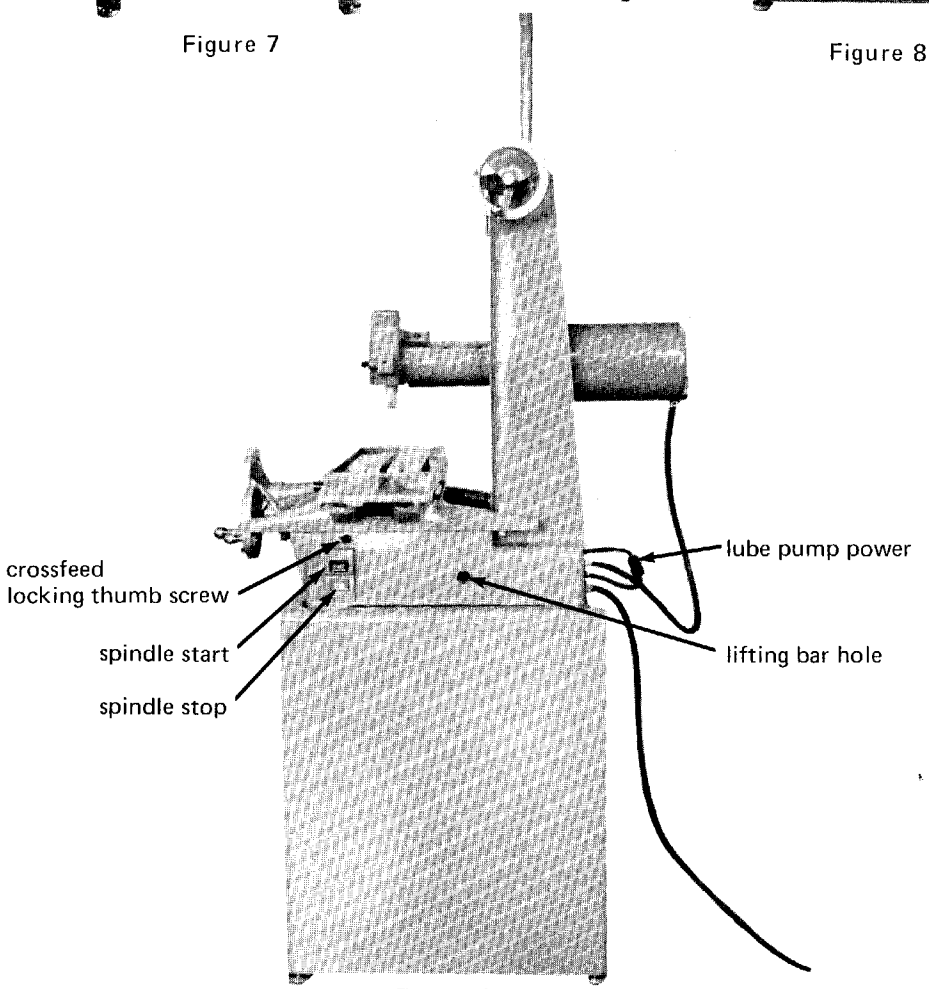


Figure 9

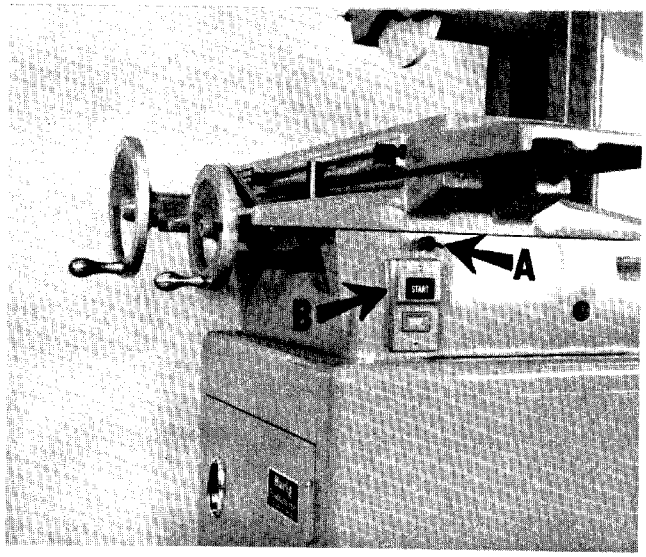


Figure 10

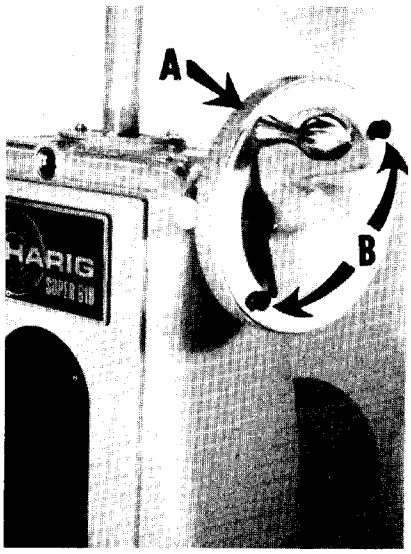


Figure 11

Figure 12

POWER ON

To turn spindle motor on, depress "start" button located under the table *(B, Fig. 10)*. This also starts the lubricating system oil pump. After ½ minute the oil level should rise to the mid-point of the sight glass in the column cap of the machine. This shows that the machine is ready for operation.

The 1HP motor furnished as standard with this machine has enough power to take as heavy a cut as you will normally wish, when crossfeeding and grinding without coolant. If either plunge grinding or grinding with coolant, it is relatively easy to overload the motor. Make certain motor temperature does not exceed a 55°C (99°F) temperature rise or permanent damage may result. If you anticipate heavy grinding use, we recommend installing spindle motor overload protection.

LONGITUDINAL FEED

Feed the table by operating the large handwheel. If your grinder has a cable drive *(rather than a rack and pinion drive)* you can readjust the position of the handle on the wheel by cranking the table to the end of its travel and continuing to turn the wheel *(slipping the cable)* to the desired position.

It is a good practice to distribute oil evenly over entire length of ways before using grinder. Simply turn on spindle and run table back and forth a few times. (Spindle switch activates oil pump.)

CROSSFEED

Achieve manual crossfeed by loosening the crossfeed travel locking thumb screw *(A, Fig. 10)* on the right side of the base under the table ¼ turn, and operating the crossfeed handwheel.

ELEVATING MECHANISM

Raise or lower grinding head assembly by turning handwheel *(A, Fig. 11)* on the right side of top of column.

To change zero setting, loosen two knurled screws, *(B, Fig. 11)* projecting from face of wheel, slide calibrated slip ring to desired position and retighten screws.

To engage "fine feed" (optional equipment), tighten large knurled screw. *(A, Fig. 12)* One revolution of the "fine feed" knob will change the elevating screw setting by .001 inches. To disengage "fine feed" loosen knurled screw ½ turn.

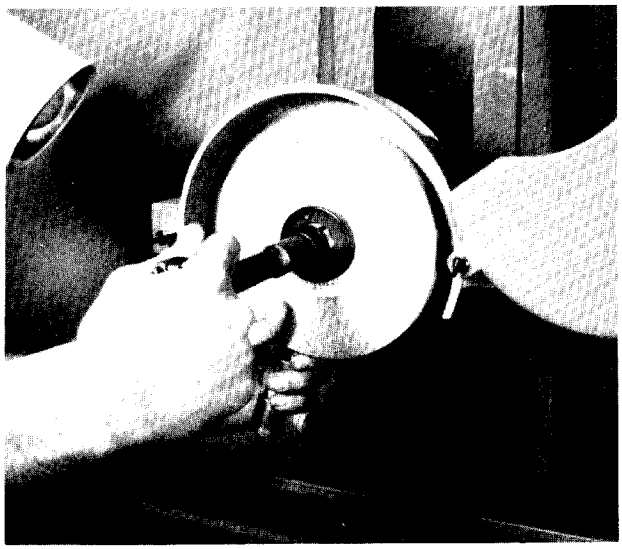


Figure 13

GRINDING WHEEL MOUNTING

The grinding wheel furnished with your machine was chosen to satisfy average shop work requirements. It is a balanced wheel, dressed on both sides and cutting face. Before removing this wheel from the grinder, dress the bottom face and grind a piece of soft tool steel to check the machine set-up and performance.

Use only balanced wheels to ensure getting the maximum quality this precision machine is capable of producing. When specific problems regarding wheel selection are encountered, contact a grinding wheel manufacturer or his local representative for recommendations.

The spanner wrench (furnished) fits the wheel nut which holds the grinding wheel on the adaptor. Unless a right hand thread has been especially ordered, the wheel nut has a left hand thread (letters LH stamped on face of nut) so that the wheel will tend to tighten under starting torque. When changing wheel, be sure adaptor is retightened. If left loose, wheel may shift and cause chatter marks.

The socket on the spanner wrench fits the nut holding the adaptor on the spindle. To remove adaptor, unscrew nut completely (left hand thread) and screw in the "puller" (furnished) until the center screw hits the spindle end. Tighten center screw until adaptor is free. *(Fig. 13)*

GRINDING MAGNETIC CHUCKS

A magnetic chuck with an untrue bottom can distort a surface grinder table to which it is clamped. For this reason, the bottom should be wiped dry, placed on a surface plate and checked for bow. If the chuck rocks or pivots rather than having an even drag, it should be placed face down on the platen and the bottom ground flat. If a surface plate is not available, use the grinder's platen.

(CAUTION: *Never* grind the platen, as this can impair accuracy.)

Grinding the chuck surface requires special technique and great care. The "lead" filling between the magnetic poles tends to load the wheel and will cause the unsupported areas of the chuck over the magnet to move with any temperature difference created by grinding. Follow these instructions carefully:

1. Use a relatively coarse grit wheel of medium grade and open structure with a vitrified bond. The 32A46-I8VBE wheel furnished with the machine works well if used with a mist or wet coolant and can be used dry if care is used to prevent heat build-up. If difficulty is experienced, use a still softer and more open wheel such as a 32A46-G12VBEP.

2. Dress wheel rather coarsely with a sharp diamond. Crossfeed the diamond at a fairly rapid rate and do not pass under wheel unless downfed at least .0005 inches. Tighten screws holding chuck to table with minimum force needed to keep chuck in place. Overtightening may cause warping.

3. Chuck must be in "on position" while being ground.

4. Set depth of each cut to .0002".

5. Turn crossfeed handwheel at least 1/16 for each pass, and move table rapidly while grinding.

6. Dress wheel after each cut across chuck to remove any "lead".

7. A loaded wheel, whether caused by heavy cuts, improper dressing or wrong type of wheel can create heat build-up sufficient to warp center of chuck up into the wheel and seriously affect grinder accuracy.

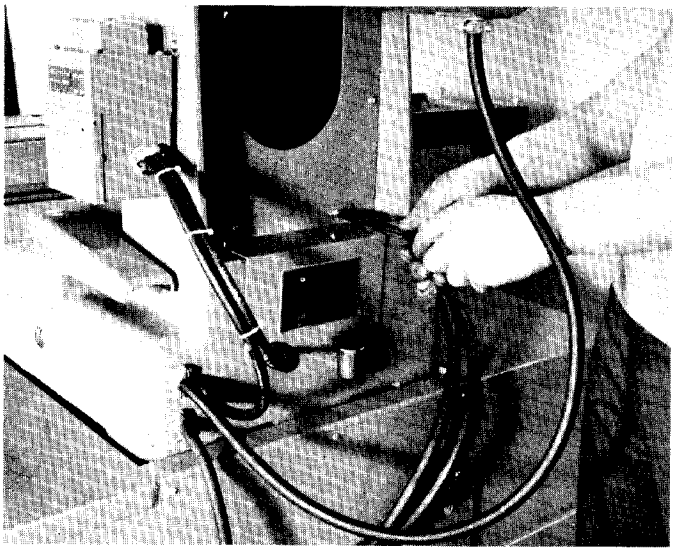


Figure 14

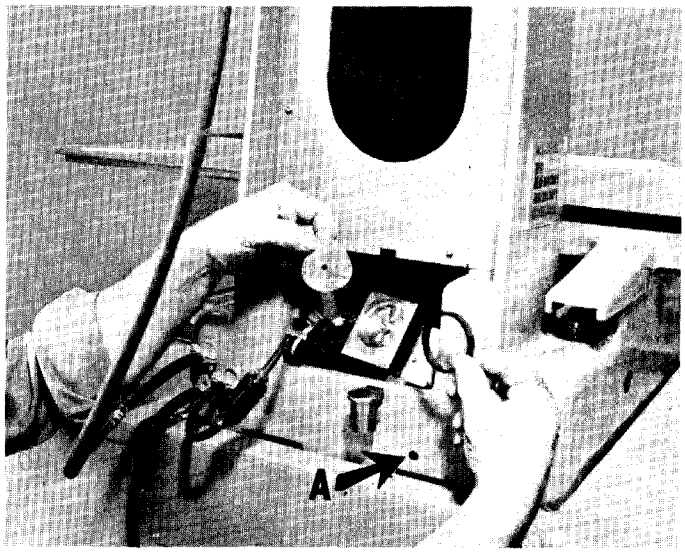


Figure 15

MAINTENANCE

This precision surface grinder is equipped with an automatic "Flo-clean" oil system. Unlike other grinders, this completely separate system circulates, filters and recirculates the cleaning/lubricating oil. All moving mechanical and wear surfaces are automatically and continuously flushed with filtered oil whenever the spindle is running.

CLEANING

This machine requires only surface cleaning. All internal parts are cleaned automatically by the built-in flow system mentioned above. When cleaning the external surface:

1. Center table to prevent dirt and grit from being brushed onto ways.

2. *Never* use an air blast to clean machine. Use a vacuum and/or treated dusting cloth. Remove dirt--don't just move it.

3. Make certain that exhaust from vacuum or dust collector is not directed toward grinder and particularly not at underside of table.

4. If solvents must be used to clean surface, use caution not to drip on ways. Do *not* use a lacquer base or other solvent which may damage machine's baked enamel finish.

NOTE: We recommend centering the table when machine is not in use to provide a dust cover for table ways.

LUBRICATION

Since moving mechanical parts of this machine are automatically lubricated, and the motor and drive are permanently lubricated and sealed, the only lubrication maintenance required are the following periodic checks:

EVERY 100 HOURS OF OPERATION:

Check the large oil cup in rear of machine. If less than half full, add enough Harig Way Oil (No. 612-245, furnished with machine) to bring level slightly over half full. *(Fig. 4, page 3)* A standard 150 to 225 SUS viscosity way oil may be used in place of Harig's 612-245, but it will have 10% less "stick-slip" efficiency.

EVERY 1000 HOURS OF OPERATION:

Clean the oil pump filter. Unscrew dust guard retaining screws one turn. *(Fig. 14)* Lift dust-guard up to permit screw heads to pass through keyholes and remove. Tip pump unit as shown and unscrew 10-32 cap screw. Move filter cover assembly to one side. Remove rubber gasket and filter screen. *(Fig. 15)* Clean screen and check sludge in bottom of sump. If there is 1/8 inch or more, remove drain plug and flush. A 1/8 inch pipe screwed into hole *(A, Fig. 15)* will facilitate cleaning.

OPERATIONAL PROBLEMS - ADJUSTMENTS

Your HARIG® surface grinder has been designed and manufactured to give a long life of accurate finish surface grinding. It has been thoroughly checked during manufacture and final assembly, and has been run in and given a performance test. A final inspection report showing the actual deviations found in six of the many checks performed on this machine, is included with this manual.

The following section is set up to assist you in getting maximum performance from the machine. Each trouble or malfunction is listed followed by possible causes, together with suggested adjustments or changes you can make.

CAUTION: Electrical tests with the current on should be made only by a qualified electrician.

ORDERING REPLACEMENT PARTS

When repair parts are ordered, be sure to include serial number of the machine as well as the part number shown in the following drawings. The machine serial number is stamped into the column cap casting next to the elevating handwheel.

1. CHATTER OR VIBRATION MARKS IN FINISH

A. **Wheel loose on sleeve.** Put additional tension on wheel adaptor nut. Even if this nut is not loose, motor starting torque may be causing wheel to shift slightly. Re-dress after adding tension to the wheel nut.

B. **Wheel out of balance.** Unbalanced wheels cause vibration in the spindle assembly, resulting in a chatter in the work. Dressing sides of the wheel may bring it into balance. Balancing the wheel on the grinder with a dynamic balancer, if available, should correct situation. Balancing wheel and adaptor assembly with a static balance arrangement will usually correct the problem. Replace wheel with one balanced by the manufacturer. Check whether wheel balance is the cause of vibration by holding projecting part of the spindle housing while grinder is running. Compare this to the feel when the grinder is run with the wheel, wheel nut and washer removed.

C. **Wheel in need of dressing.** If chatter appears after the wheel has been used for a time, it is probably due to the fact that most grinding wheels vary in hardness around the periphery. Since this chatter appearance is usually only a few millionths of an inch high, weigh the economics of more frequent wheel dressing against the slight loss of appearance.

D. **Grade of wheel too hard.** Loading up of the wheel, particularly if grinding without coolant can cause chatter. Replace wheel with one of a softer grade.

E. **Taper of adaptor sleeve in error.** If the taper in the wheel adaptor sleeve is not the same as that on the spindle nose, or if a piece of dirt or grit has been assembled on the taper, a chatter can appear on the work. Check the adaptor sleeve by putting a thin film of Prussian blue inside the sleeve and press it on the spindle. The spindle taper should show contact all around the circumference on two separate rings.

F. **Single phase motor.** If a single phase, rather than the regular 3 phase motor has been purchased for the spindle, a poorer finish may result. Because of its design, a 3 phase motor runs more smoothly than a single phase motor. The six poles of the 3 phase motor give a smoother pull than the two poles of the single phase motor. The moving part of the switch for cutting out the starting circuit of of the single phase motor does not always move to exactly the same position, slightly changing the balance of the motor.

G. **Ball bearing failure.** The super precision bearings used in the Harig Spindle are sized to give an average life of many years of service. If a failure of either the spindle or motor bearings does occur, a chatter will appear on the work being ground, and an audible noise will be heard when the spindle is running. (Wheel, wheel nut, and washer should be removed to make certain an unbalanced wheel is not causing the noise.) Replacement of all bearings on the spindle assembly, or a new motor, is required. It is recommended that the spindle assembly be returned to the factory for this repair so that dynamic balance of the unit can be checked.

2. LONGITUDINAL LINES - SCRATCHY FINISH

A. **Wheel too soft for material being ground.** The grains in too soft a wheel will pull out before they have really dulled. The dressed surface will be lost too quickly and the few remaining pointed grains will give a scratchy appearance. Replace with a harder wheel.

B. **Wheel dressed too finely, or wheel too hard.** If wheel is not cutting freely, longitudinal lines in the finish, sometimes discolored or burnt, will result. Replace with a softer grade wheel or pass the diamond across the wheel at a faster speed when dressing. Do not dress the wheel without a downfeed before each cut.

C. **"Hard-sheel" sides on wheel.** Break the corners of the grinding wheel with an abrasive stick.

D. **Grinding swarf in coolant.** Clean out coolant tank.

3. INACCURATE GRINDING

A. **Magnetic chuck clamped too tightly or too loosely.** A chuck or fixture clamped too tightly may warp the table, causing it to rock in the saddle ways rather than tracking smoothly. If chuck is not clamped tight enough, it could shift position and lift up and over dirt. Tighten one of the clamps firmly to hold the chuck in position when the table reverses. Then tighten the other clamp only enough to keep the chuck down on the table.

B. **Wheel glazed and not cutting freely.** Re-dress wheel, or replace wheel with a softer grade.

C. **Machine out of level.** Be sure that base cabinet was levelled according to installation instructions. The thickness of the four vibration isolation pads that support the grinder on the base cabinet has been adjusted to support the grinder base so that the plane of the V-ways are exactly parallel with the plane of the flat ways. If grinder base is located on anything other than its own base cabinet and vibration isolation pads, base ways should be checked for twist by laying a small surface plate on two 1.000 inch rolls in the V-ways and two .582 inch parallels on the flat ways of the base. If the two rolls are placed in the ends of the V-ways and one of the parallels put in the center of the flat way, the height of the pads should be adjusted until one gets the same "feel" at either end of the flat way with the other parallel.

D. **Magnetic chuck in need of dressing.** See "Grinding magnetic chucks" in the operating instructions of the manual.

E. **Grinding wheel shifted in adaptor.** If the wheel is not tight enough on the adaptor, it can shift when the grinder is turned on and off, or when a heavy cut is being taken. This could cause the grinder to cut an additional few thousandths, as well as giving a chatter appearance on the surface.

F. **Downfeed inaccurate.** See section "Uneven response in downfeeding" on page 12.

G. **Side grinding not square.** If the cartridge spindle has been replaced in the machine, it may be necessary to realign the spindle in it's housing by adjusting the tension on the five set screws that hold it in place. (The five 5/16" diameter by 5/16" long set screws shown in Fig. 17.) To check the squareness of the spindle to the longitudinal travel of the table, an angle plate can be indicated parallel to the table travel as shown in fig. 5 of our Final Inspection Report, and an indicator fastened to the nose of the spindle can then be swung as shown in this fig. If the indicator had a higher reading for the right hand position shown in Fig. 5, the upper right and lower left set screws on top of the spindle housing would be tightened to shift the spindle slightly.

The angle plate can also be used to check the spindle axis parallelism to the work table as

shown in Fig. 3 of the Final Inspection Report. Varying the tension applied by the bottom set screw, against the tension of the four top set screws, can change this indicator reading slightly.

H. **Work piece not parallel.** If the machine does not grind parallel front to back be sure the crossfeed lock screw (A, Fig. 10) has been loosened enough so the pressure pin is not rubbing on the carriage locking strap.

I. **Long spark out time.** If the grinder does not "spark out" after a reasonable number of passes, make sure that a way oil of less than 225 SUS viscosity is being used. The pressure oiling system floods the ways with so much oil that a higher viscosity lubricant can lift the table a few tenths when light cuts are taken.

4. MOTORS DO NOT RUN

A. **Fuses blown out.** If the spindle motor will not run, or if it is running at a slow speed, one or more fuses may be blown out. Check the line leading to the machine to make sure plant circuit fuses are not blown.

CAUTION: All checks of the electrical system should be made by qualified personnel.

On rare occasions a fuse will blow under normal machine usage. If a fuse blows repeatedly, however, the cause must be found and corrected. NOTE: A stalled motor can blow a fuse. Wiring to the motors should be inspected to make sure there are no loose connections. Check particularly in the connection box to the motor, that insulation has not been worn through, causing grounding out to the machine frame.

B. **Overload relay tripped.** If overload protection for the motors has been added to the machine, or has been special ordered and installed by Harig Products, overload relay may have shut off motor. (If an overload relay has been installed for the lubricating oil pump, it would shut off both spindle motor and oil pump motor.) Reset overload relay after allowing it to cool down, by pushing reset bar projecting from the relay.

If the spindle motor overload is tripping regularly, chances are that too heavy a cut is being taken with the grinding wheel, or that the wheel is loading up and putting extra strain on the motor. A 1 HP motor will have enough power to take as heavy a cut as the operator normally wishes if table is crossfeeding and coolant is not being used. If coolant is used when crossfeeding or if plunge grinding is being done, it is easy to take a cut that will require more than 1 HP. Under these conditions, the current consumption of the spindle motor should be checked to make certain it is not drawing more than the full load motor current shown on the nameplate before higher capacity heater overloads are installed, or motor damage may result.

The oil pump has an automatically resetting thermo overload in the motor housing itself. If way oil level in the sump drops below the pump intake, motor will not be able to pump oil through its self-cooling circuit. The motor will overheat, causing thermo overload to shut off the current until the motor cools back to proper temperature. The only indication that this is happening will be that the oil level in the sight glass at the top of the column will not stay above the middle when the machine is running. If oil is not added to the oil filling cup at the back of the machine, *(see Fig. 5)* motor insulation will deteriorate until it eventually shorts out.

C. **Motor burnt out.** All motors used on your grinder have a design life of many years. The motor most likely to fail is the oil pump motor because it depends on the oil level being maintained to keep it from overheating. A burnt out motor will usually draw an excess of current and trip the motor overloads (if they have been installed), blow fuses, or overheat in one spot. It may, however, overheat an internal connection and cause a wire to

break loose. Checking motor circuits with an ohmmeter should locate any internal breaks. An ammeter check on motor current, on each of the three legs of a three phase motor will show a shorted out section of winding by drawing more than the rated full load current.

CAUTION: All electrical checks should be made by qualified personnel.

The permitted temperature rise that each motor can tolerate when running at full load is shown on the motor nameplate. The 55° C shown on the spindle motor means that the motor could be 99° F hotter than the shop air temperature and still be within the manufacturer's specification. Putting it another way, on a hot summer day, and pulling a load of 1 HP continuously, the motor could reach a temperature of 189° F.

5. OIL DRIPPING

A. **Machine not level.** Oil dripping from the underside of the table ways can be caused by machine being improperly leveled. Re-check leveling and follow installation instructions if machine is not level.

B. **Restricting valve opened too wide.** Check the setting of the restricting valve *(78007 in Figure 16).* Remove dust guard *(part no. 612F072)* by loosening the two screws and sliding the guard up so the screw heads will pass through the key hole slot in the guard. The valve should be reset by closing it down completely and then reopening ½ turn. If dripping from the ways continues, close the valve back to the point where it is opened approximately 1/3 of a turn.

6. UNEVEN DOWNFEEDING RESPONSE

A. **Wheel too loose.** If grinder has been stopped and re-started with the wheel insufficiently tight, the wheel may have shifted slightly when the motor was re-started, cutting an additional amount because of being off center. Re-tighten grinding wheel.

B. **No oil on column ways.** Check oil level in sight glass at the top of the column shortly after spindle motor is turned on. If oil does not appear, make sure that oil cup on the back of machine base is at least half filled. Add oil if necessary.

If oil is at the proper level, see that pump is running and that filter screen is clean. *(see LUBRICATION under MAINTENANCE)* Check that oil lines are intact and on their proper fittings as shown in Figures 16 and 17.

C. **Spindle housing assembly sticking in column ways.** The exceptional rigidity of the HARIG® Grinder is obtained by an extremely close fit on the column ways. Since there is only a few tenths clearance between the spindle housing and column, any dirt, grit, or a very small warping of the back plate, could cause spindle housing to "hang up" in the ways.

Check for this condition by mounting an indicator on the wheel guard or spindle housing to touch a block on the grinder table. Turn the downfeed handwheel and note the response on the indicator. The 100 lb. combined weight of the motor, spindle and housing and guard assembly should keep the bevel gear carrying the elevating screw firmly seated in the thrust ball bearing in the column cap. *(see Figure 18)* . The only slack that should be seen as the column is raised and lowered with the handwheel should be the small amount between the bevel gear and the pinion on the handwheel shaft. If the response between the handwheel readings and the indicator show a slack of several thousandths rather than the normal half thousandth slack between the pinion and bevel gear, the spindle housing assembly is probably "hanging up" in the column ways until the bevel gear is backed up to the pinion and forces the elevating screw down.

To inspect column ways, the grinding wheel should be removed from the spindle. Then remove the wheel guard by loosening its clamping screw and sliding it off the end of the spindle. The five 5/16's set screws holding the spindle cartridge in the housing should be loosened approximately 1/8". The spindle cartridge and motor assembly can now be removed from the back of the machine. The six phillips head screws that hold the back dust guard retainer in place should be taken out and dust slides and retainer removed. Crank the saddle away from the column and remove the six phillips head screws holding the front dust guard retainer. The front dust slides can now be removed. Now alternately crank the spindle housing to the top and then to the bottom of the travel, wipe off the ways with a clean cloth and inspect. Any dirt or grit should be removed. Check to see if a piece of grit has scored the ways. If so, they should be dressed with a fine stone to remove any ridges.

If the column way surfaces are clean and smooth and the spindle assembly is still sticking, either the spindle slide back plate has warped or the column uprights have moved closer together by a few tenths. If the spindle housing is tight in only a small area, the back ways of the column should be scraped to remove the high spot. The high areas of the way can be found by applying a thin layer of red lead to the ways and running the housing assembly up and down.

If the assembly is tight over the entire column, the back plate should be removed from the spindle housing by taking out the 6 5/16's screws holding it in place. Crank the spindle housing to the bottom position and push the housing just far enough away from the column to inspect the 45° ways. If there is no evidence of scoring or a piece of grit lodged in the casting, grind .0003" off the two surfaces of the back plate that ride on the back column ways. Accurately check the step between the way surface of the back plate and the center part that is screwed to the spindle housing before grinding the way surface, so the entire back plate can be reground if found to be warped. Reassemble the back plate to the spindle housing, and if not too tight, remove an additional .0003" from the way surface. If the 45° way of the spindle housing is scored, remove the housing from the column as follows: Mark the elevating screw at the point where it is entering the spindle housing so that it can be turned to the same point when the grinder is reassembled. Loosen the 1/4-20 by 3/4 cap screw that holds the elevating screw in place. *(See Fig. 17)* Unscrew the elevating screw from the housing and run it up to clear by holding the screw with one hand and turning the elevating handwheel with the other. The spindle housing can then be removed from the column and any score marks stoned off smooth.

D. **Spindle housing too loose.** If the error in downfeed response is less than .001", spindle housing assembly may be too loose in the column ways. Remove motor spindle assembly and dust guards as outlined in the previous paragraph. The amount of looseness can then be determined by placing an indicator on the grinder table to read against the part of the spindle housing projecting to the front of the grinder. With the column ways wiped clean of oil, alternately twist the spindle housing from one side to the other. The difference of the indicator reading when the twisting pressure is released should be less than a half a thousandth. Make this check at both the top and bottom positions of the spindle housing, as well as in the middle, and use the lowest reading. Remove the back plate from the spindle housing. Then remove ¾ of the difference between the at rest indicator readings from the center area of the back plate that is clamped against the spindle housing. For example, if .0012" slack is found, .0009" is removed from the center area of the plate.

E. **Spindle assembly creeps down.** Because of the exceptionally smooth action of the downfeed mechanism, it would be possible for the

spindle assembly to creep down or "unwind" itself if a frictional drag were not used. This creep is most likely to occur if a vibration caused by an off balance wheel is occurring.

The wave spring no. 48702 adds a drag to the system by pressing the two nylon washers no. 612F102 against the moving thrust bearing inner race and the stationary top column bridge (See Fig. 18). If extra drag is wanted for an out of the ordinary problem where the wheel balance cannot be corrected, order a 'C' spring no. 612F088 and install by removing the three screws that hold the elevating screw guard in place and lifting the guard off. Drop the open end of the C under the bevel gear. Push the back end of the C down with a screwdriver until the spring is horizontal, and move the spring sideways to snap across the high point of the gear and fit in the angular space between the bearing race and the bevel gear.

7. IMPROPER LONGITUDINAL FEED

A. **Improper longitudinal feed (cable drive machines only)** If table does not move when handwheel is turned, tighten cable. Loosen cable hook locknut *(see Fig. 20)* and tighten the adjusting nut to pull the cable tighter. Do not overtighten, as this may cause cable to break prematurely, or wear a flat surface into the nylon cable covering. Tighten only enough to pull the table without slip.

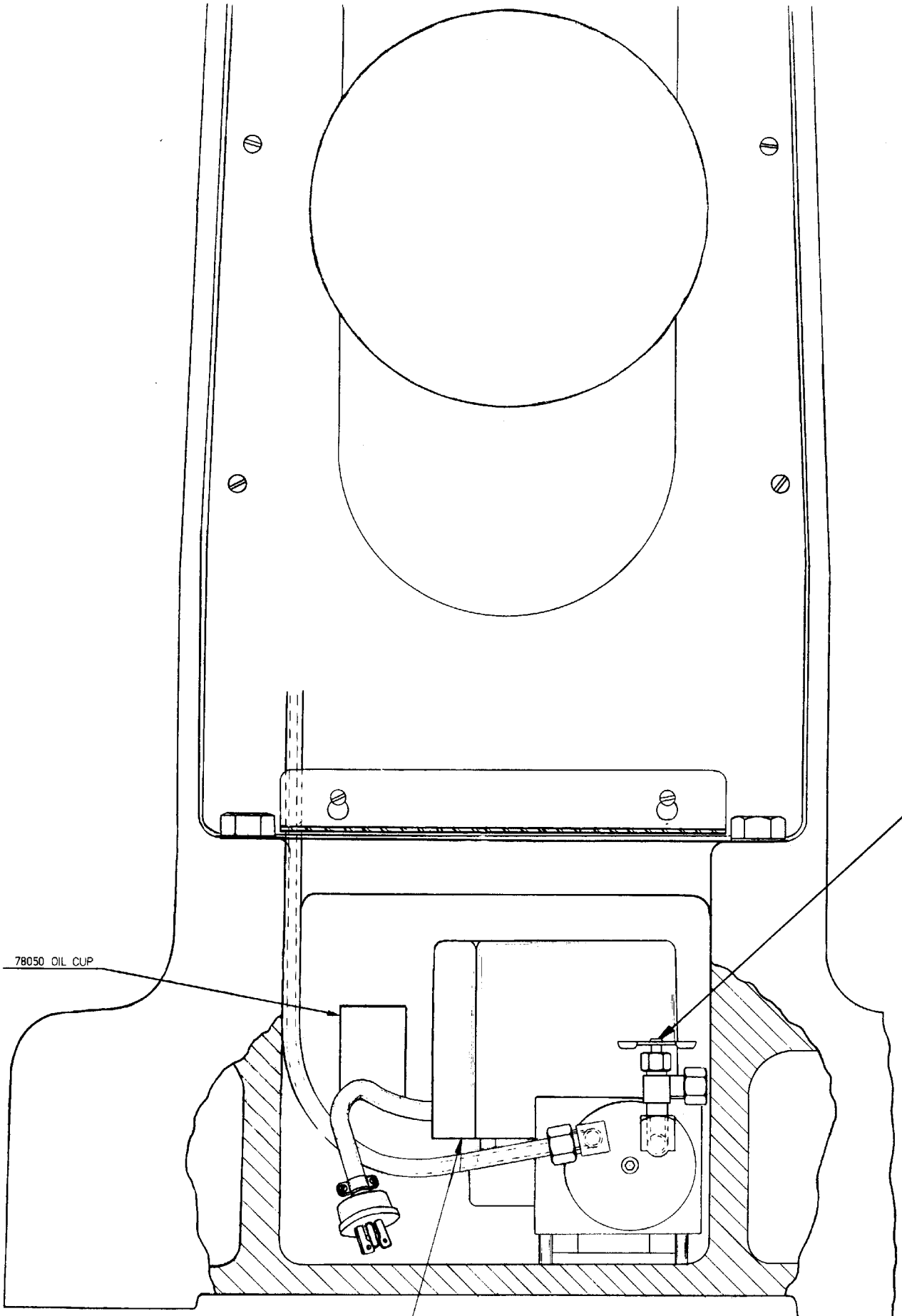
B. **Cable broken or worn.** To replace cable, run table to the right and loosen the nut on the back of the hook until the cable loop can be slipped off. Remove the loop from the post under the left end of the table *(Fig. 20)*. Slip the two coils of cable off the roll of the handwheel shaft and pull the cable out.

To install new cable, pass a stiff soft wire through the cable space from the right side of the machine. Bend over a loop or hook to attach the wire to a loop of the new cable and pull it back through the space. Form two coils in the cable and slip them over the cable roll. *(Be sure the front of the coil leads to the left as shown in Fig. 20)* Put the loop over the post on the left, draw the cable to the right and slip the other cable loop onto the hook. Tighten the nut to put tension on the cable.

Run the table back and forth and observe the cable on the roll. If it runs partly off the back end, when the table is run to the left, grasp the hook with a large adjustable wrench and turn the hook post to angle the hook forward enough to make the cable track properly.

8. CROSSFEED MALFUNCTION

A. **Handfeed wheel turns hard.** Be sure the crossfeed lock thumbscrew has been loosened. *(right side of the base just under the saddle, (A, Fig. 10)*


78050 OIL CUP
46507 230V. OIL PUMP
46506 115V. OIL PUMP

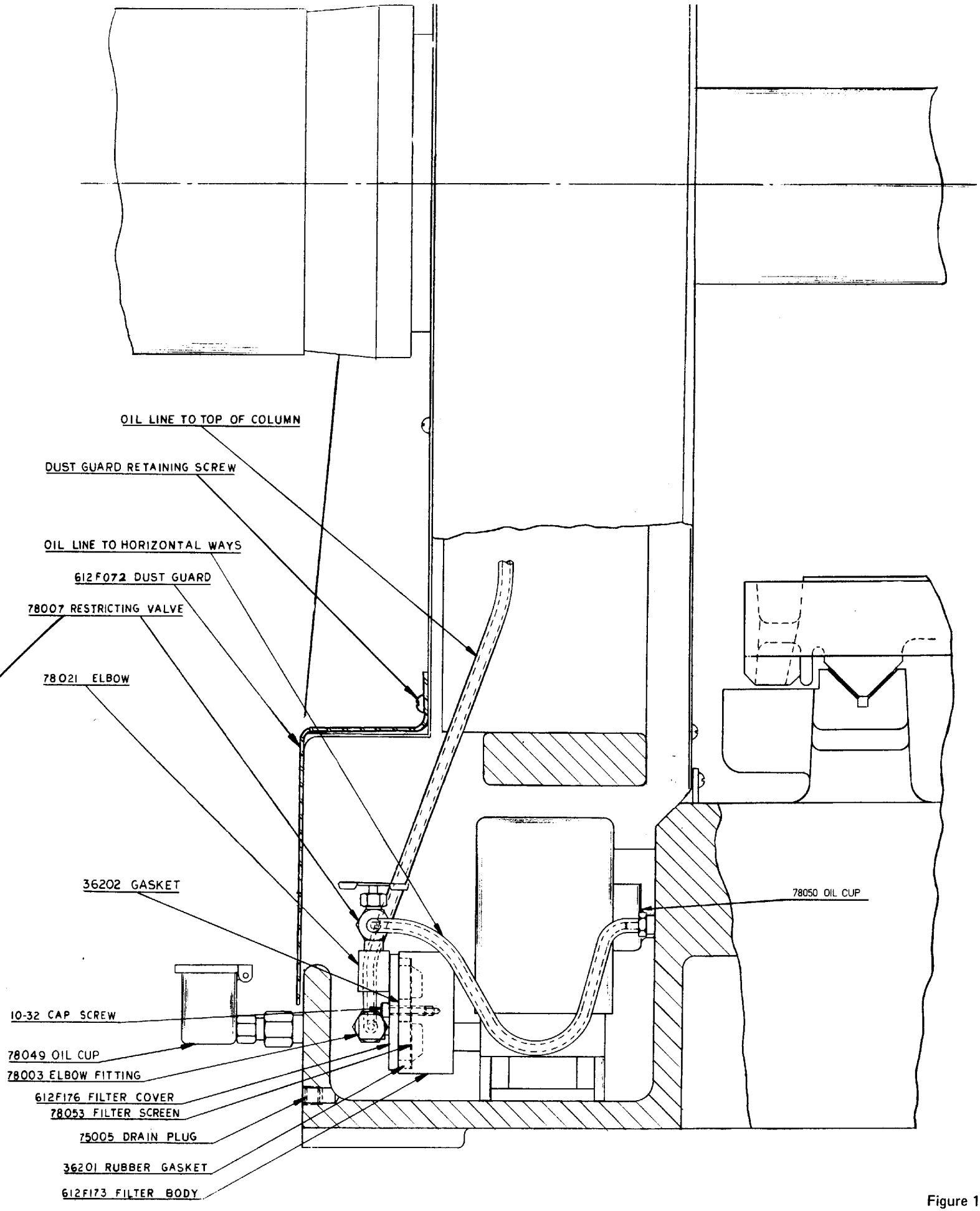
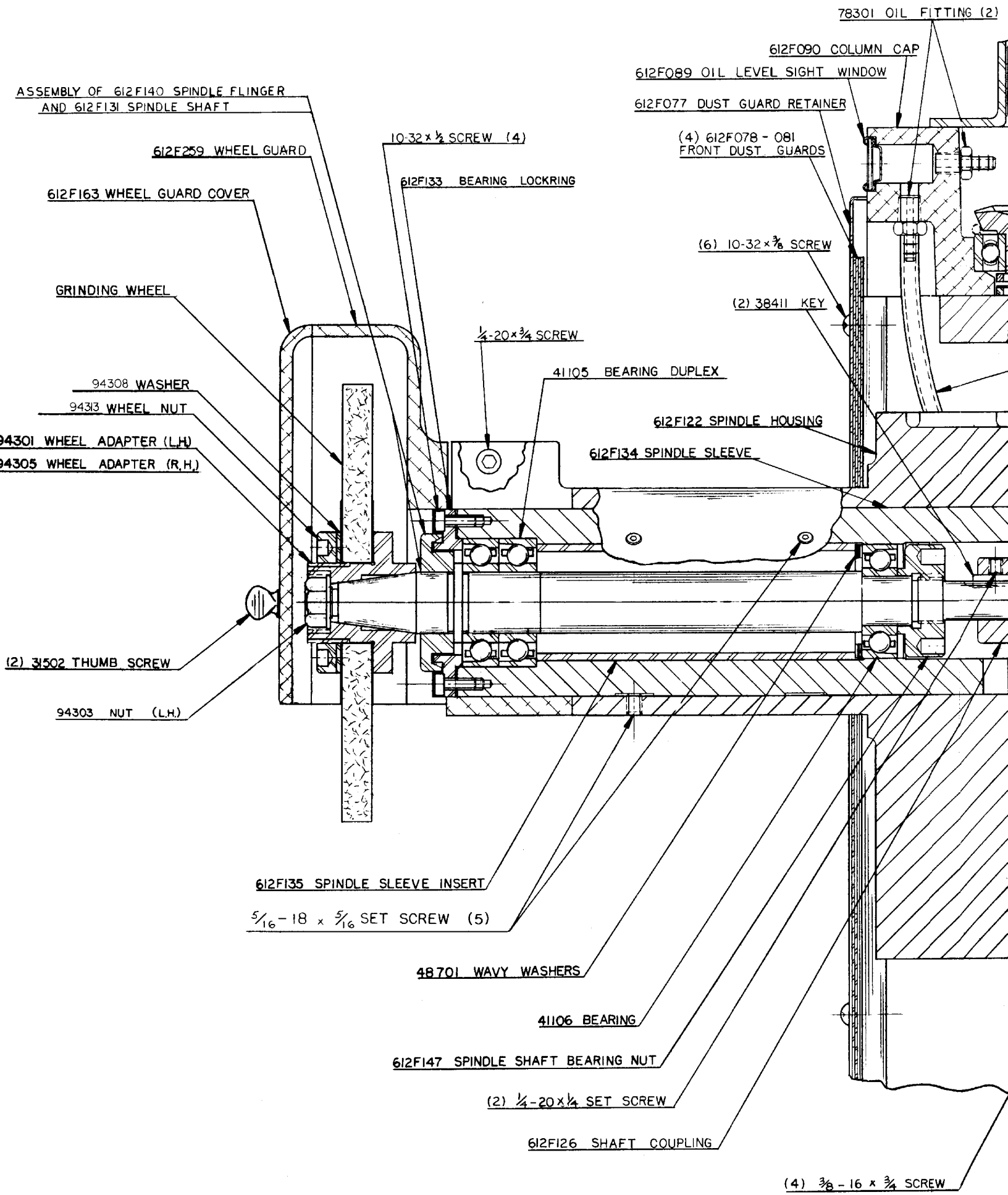


Figure 16
IM-HF-1


78301 OIL FITTING (2)
612F090 COLUMN CAP
612F089 OIL LEVEL SIGHT WINDOW
612F077 DUST GUARD RETAINER
(4) 612F078 - 081 FRONT DUST GUARDS
ASSEMBLY OF 612F140 SPINDLE FLINGER AND 612F131 SPINDLE SHAFT
10-32 x 1/2 SCREW (4)
612F259 WHEEL GUARD
612F133 BEARING LOCKRING
612F163 WHEEL GUARD COVER
(6) 10-32 x 3/8 SCREW
GRINDING WHEEL
(2) 38411 KEY
1/4-20 x 3/4 SCREW
41105 BEARING DUPLEX
94308 WASHER
94313 WHEEL NUT
612F122 SPINDLE HOUSING
94301 WHEEL ADAPTER (L.H.)
94305 WHEEL ADAPTER (R.H.)
612F134 SPINDLE SLEEVE
(2) 31502 THUMB SCREW
94303 NUT (L.H.)
612F135 SPINDLE SLEEVE INSERT
5/16 - 18 x 5/16 SET SCREW (5)
48701 WAVY WASHERS
41106 BEARING
612F147 SPINDLE SHAFT BEARING NUT
(2) 1/4-20 x 1/4 SET SCREW
612F126 SHAFT COUPLING
(4) 3/8 - 16 x 3/4 SCREW

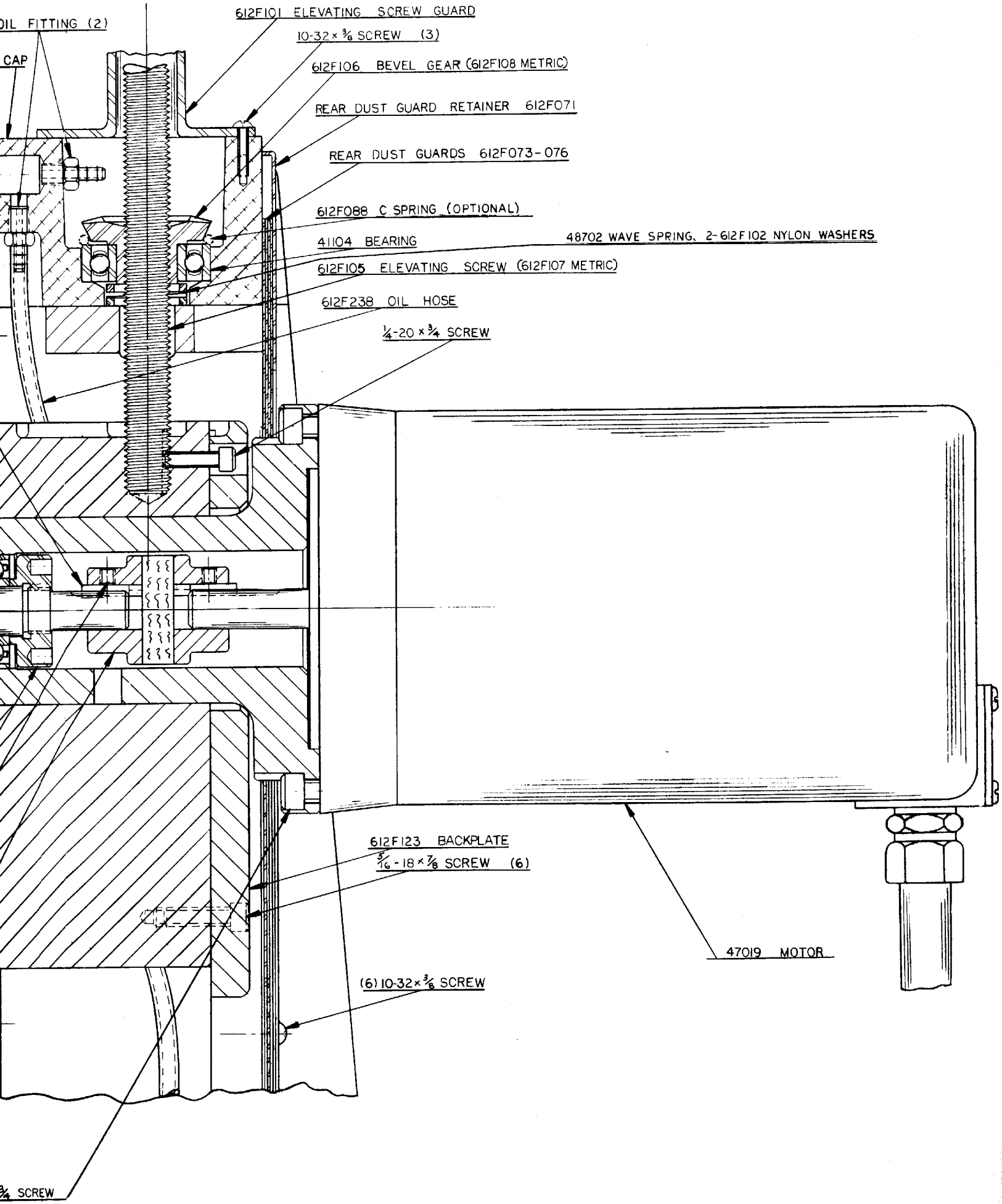


Figure 17
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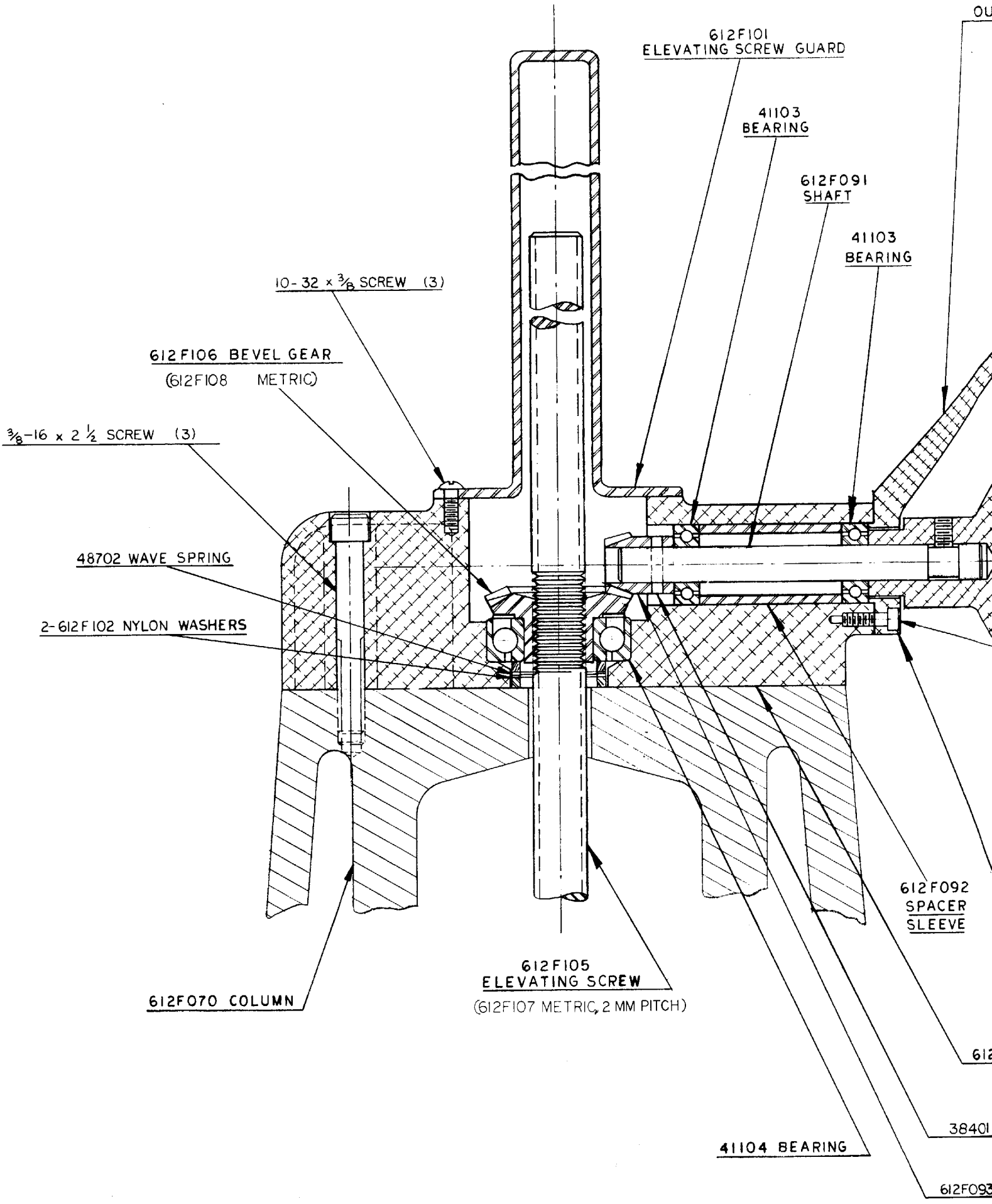

612F101
ELEVATING SCREW GUARD
41103
BEARING
612F091
SHAFT
41103
BEARING
10-32 x 3/8 SCREW (3)
612F106 BEVEL GEAR
(612F108 METRIC)
3/8-16 x 2 1/2 SCREW (3)
48702 WAVE SPRING
2-612F102 NYLON WASHERS
612F092
SPACER
SLEEVE
612F070 COLUMN
612F105
ELEVATING SCREW
(612F107 METRIC, 2 MM PITCH)
41104 BEARING

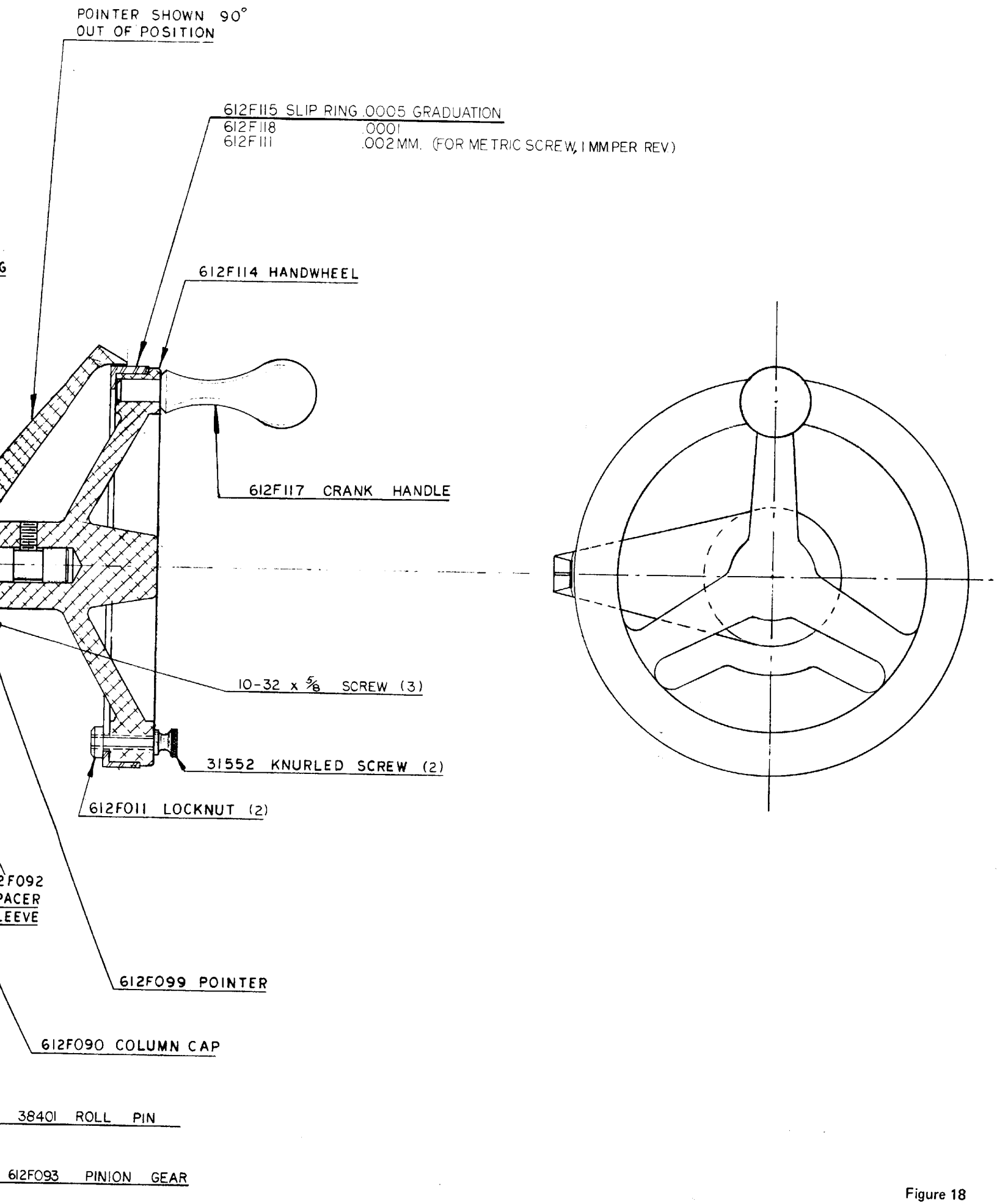


Figure 18
IM-HF-1

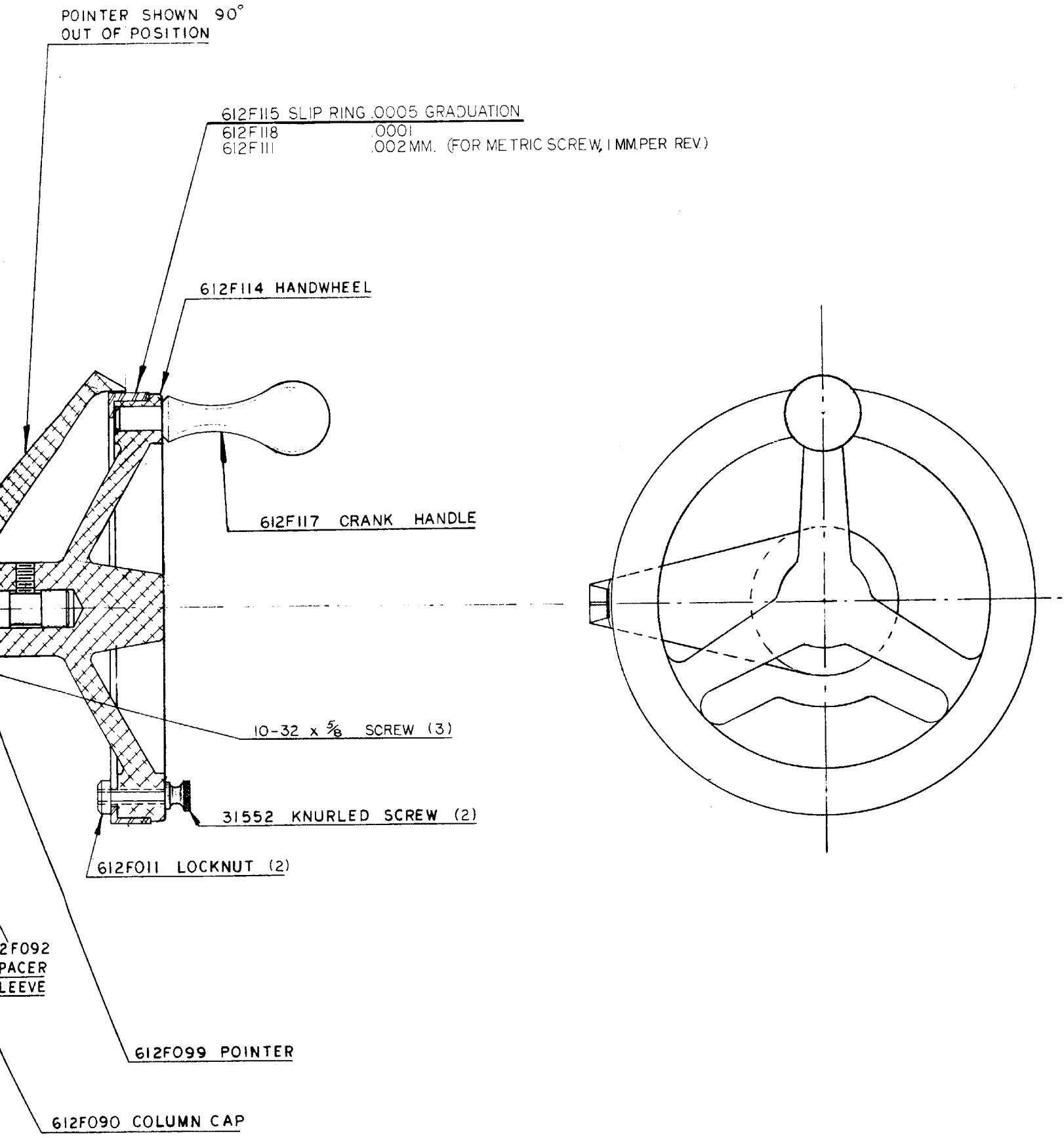
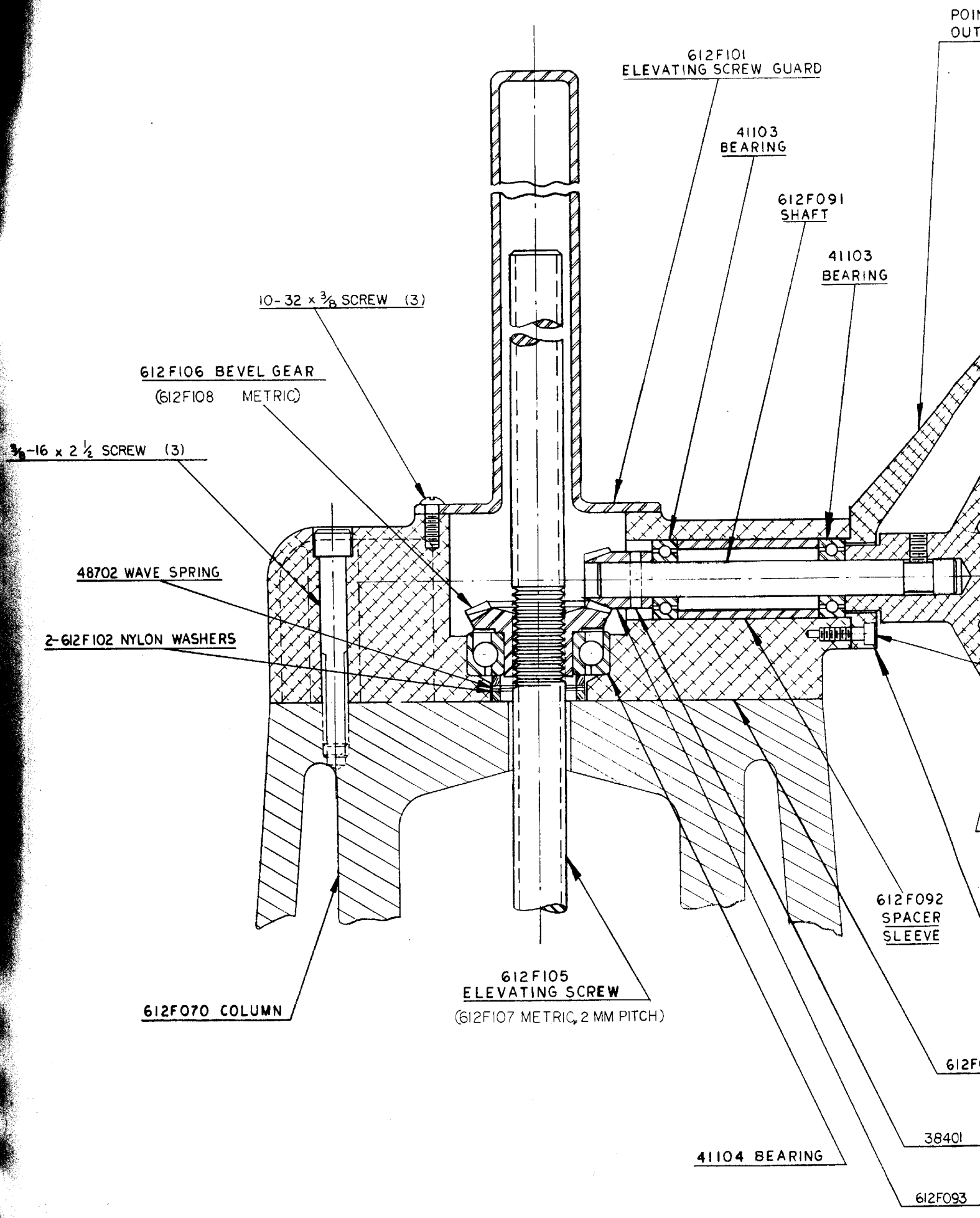
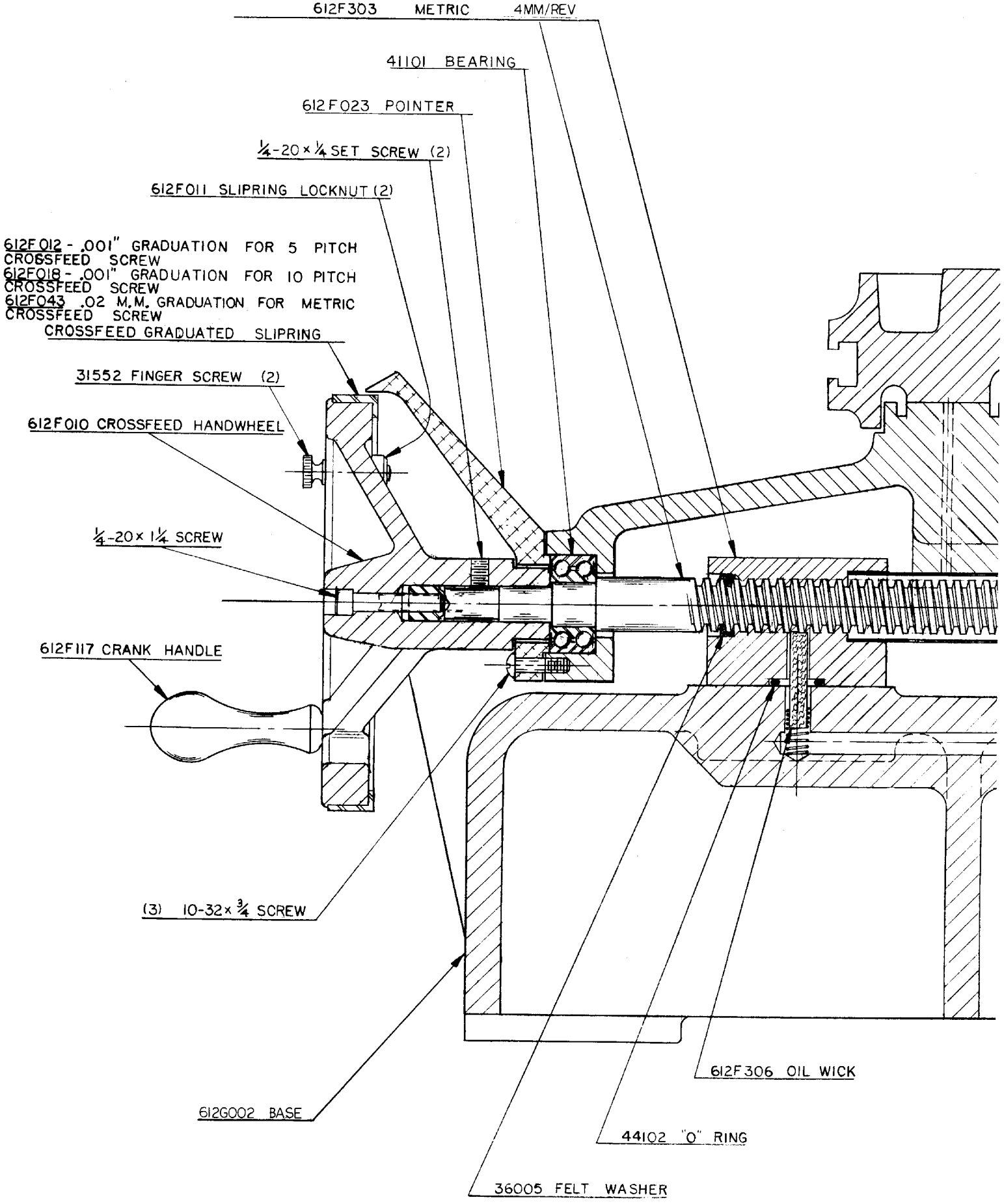


Figure 18
IM-HF-1


POIN
OUT
612F101
ELEVATING SCREW GUARD
41103
BEARING
612F091
SHAFT
41103
BEARING
10-32 x 3/8 SCREW (3)
612F106 BEVEL GEAR
(612F108 METRIC)
3/8-16 x 2 1/2 SCREW (3)
48702 WAVE SPRING
2-612F102 NYLON WASHERS
612F092
SPACER
SLEEVE
612F105
ELEVATING SCREW
(612F107 METRIC, 2 MM PITCH)
612F070 COLUMN
612F
38401
41104 BEARING
612F093

CROSSFEED SCREW - NUTBLOCK ASSEMBLY

612F301 5 PITCH
612F302 10 PITCH
612F303 METRIC 4MM/REV



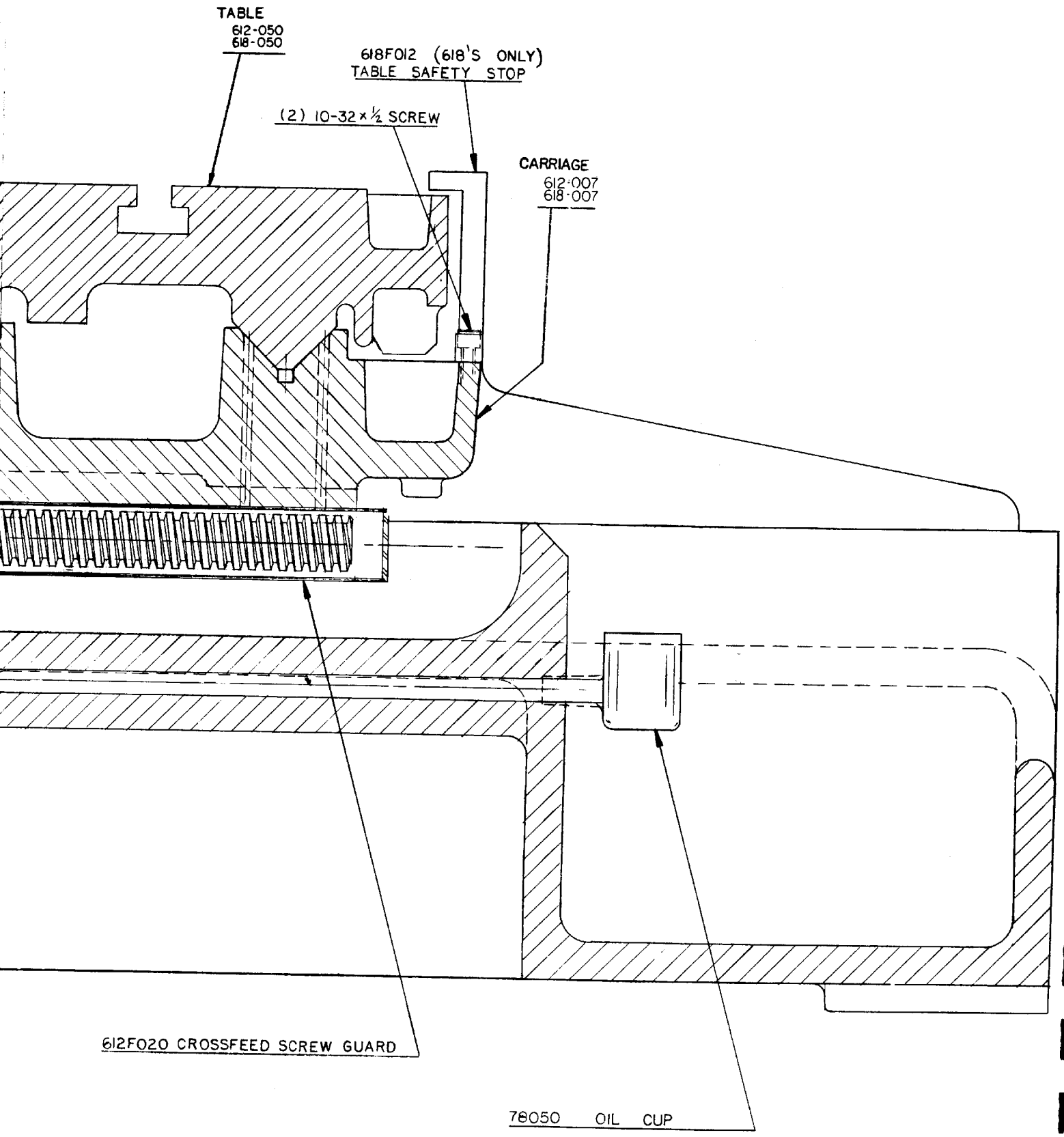
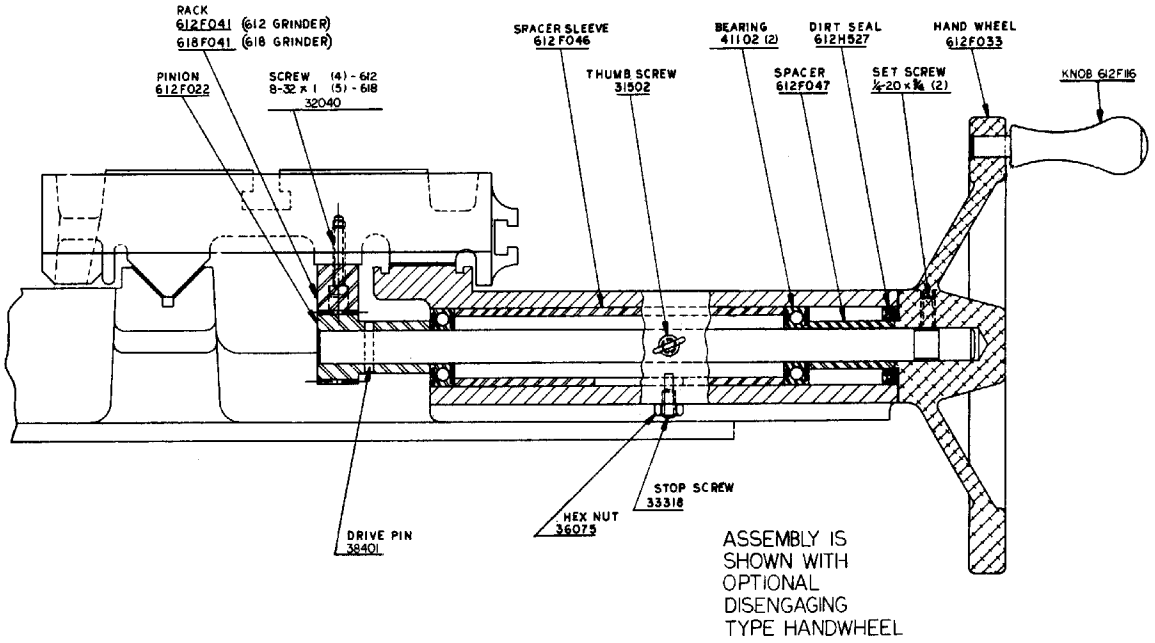


Figure 19
IM-HF-1



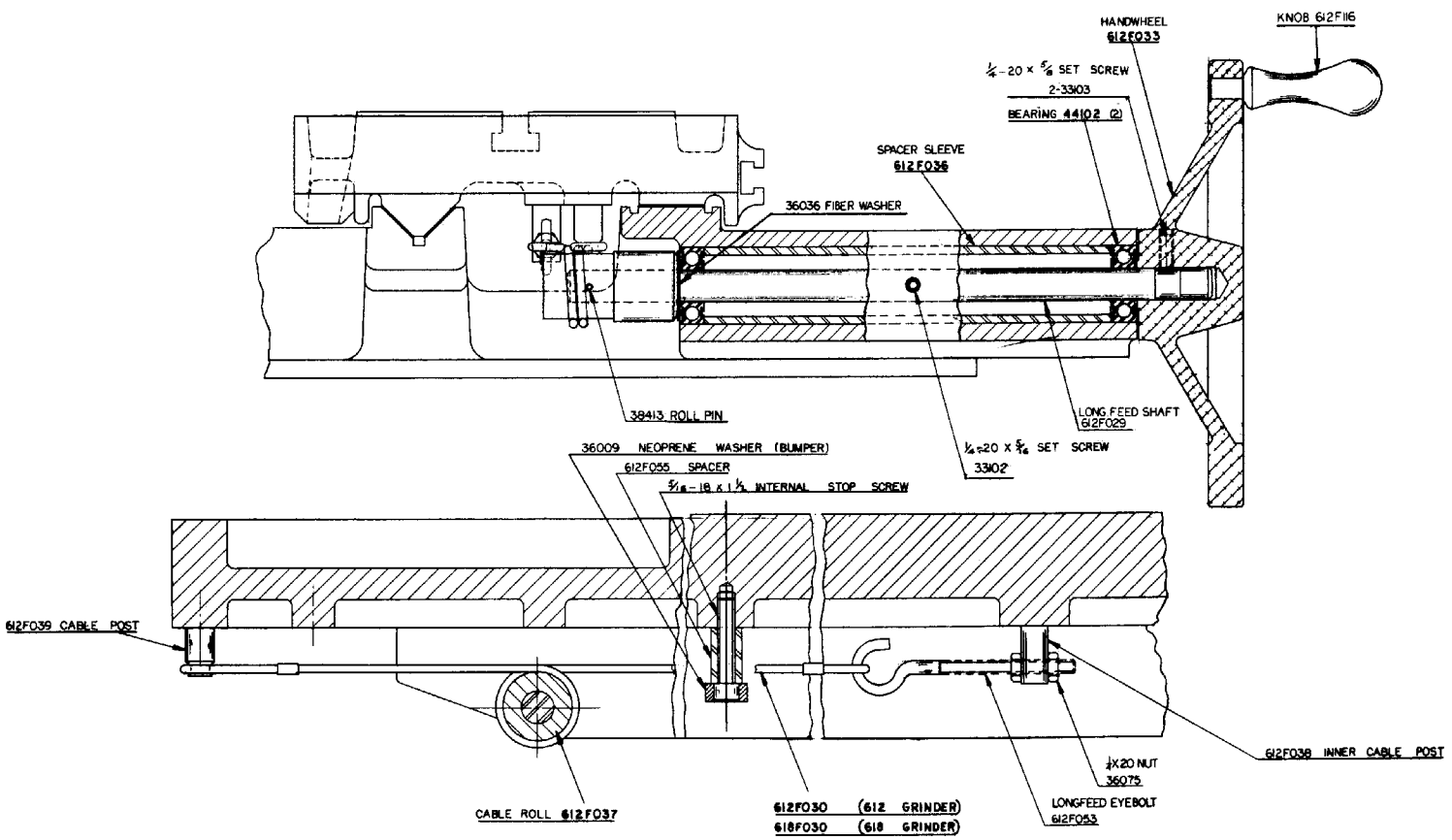


Figure 20
IM-HF-2

FINAL INSPECTION REPORT

DATE 2-21-77
MODEL 612 HF
SERIAL No. 9063

FIG. No.	TEST TO BE APPLIED	ALLOWABLE DEVIATION (inches per foot)	ACTUAL DEVIATION (inches per foot)
1.	WORK TABLE FLATNESS	.0002	.0001
2.	SQUARENESS OF LONGITUDINAL AND CROSSFEED TRAVEL	.0006	.0001
3.	SPINDLE PARALLEL TO WORK TABLE	.0004	.0001
4.	VERTICAL SLIDE SQUARE TO WORK TABLE	.0006	.0003
5.	SPINDLE SQUARE TO LONGITUDINAL TRAVEL OF TABLE	.0004	.0001
6.	TRUE RUNNING OF WHEEL ADAPTOR SLEEVE	.0001 T.I.R.	.00005 T.I.R.

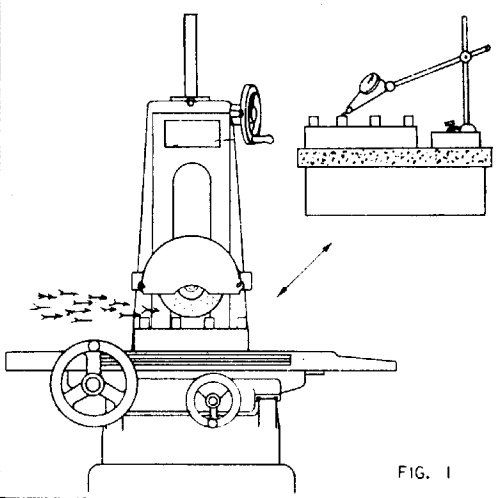


FIG. 1

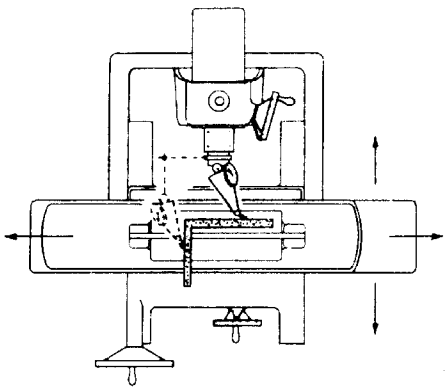


FIG. 2

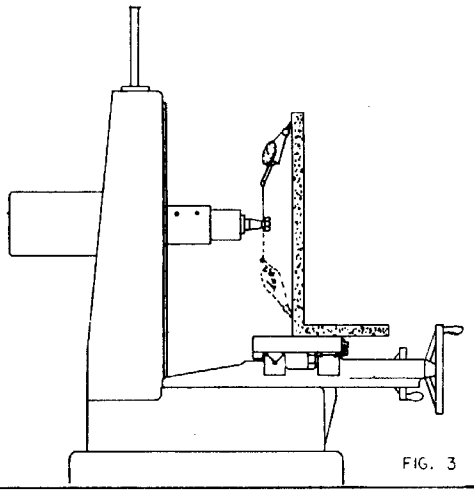


FIG. 3

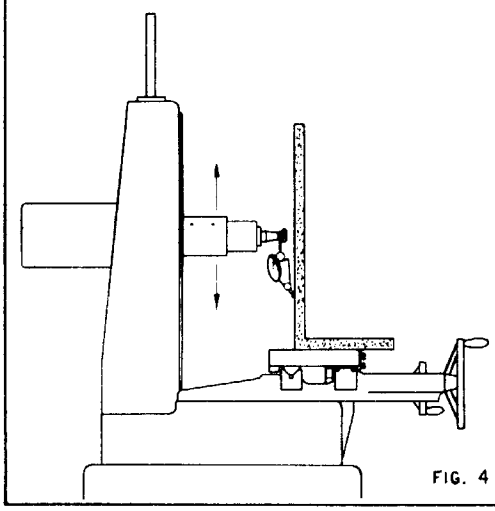


FIG. 4

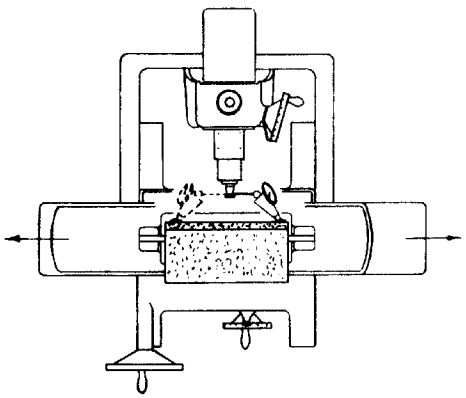


FIG. 5

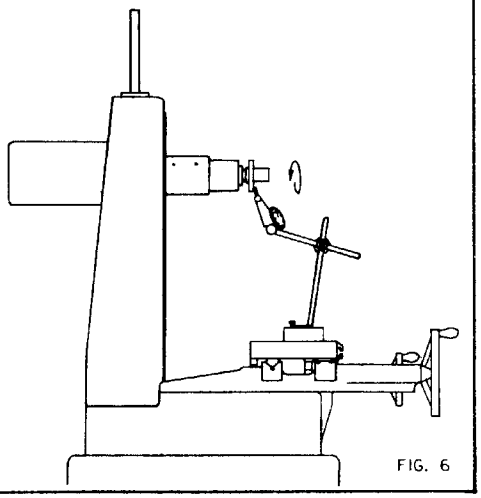


FIG. 6