

PRATT & WHITNEY

6" SHAPER

OPERATOR'S
INSTRUCTION BOOK



PRATT & WHITNEY CO.

Division of NILES-BEMENT-POND COMPANY
HARTFORD, CONNECTICUT, U. S. A.

Branch Offices: Boston, Birmingham, Chicago, Cincinnati, Cleveland, Detroit, Los Angeles,
New York, Philadelphia, Pittsburgh, Rochester, San Francisco, St. Louis

IMPORTANT

SAVE THIS BOOK FOR FUTURE REFERENCE



This book contains operating instructions for the

6" Vertical Shaper

which you purchased recently, and which has just been shipped.

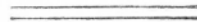
You will find this book a valuable reference for the operator, and it will be of material assistance in ordering repair parts.

When writing to us about this machine please make reference to

Y. B. 51126

M-1506

Ser. No. 325



Pratt and Whitney Company

Division Niles-Bement-Pond Company

Hartford, Connecticut

6" VERTICAL SHAPER - MODEL B

Operator's Instruction Book

Pratt & Whitney Company
Hartford, Connecticut
U.S.A.

IMPORTANT NOTICE

In order to use this book correctly it should be noted that all reference numbers throughout the text are related to a particular illustration. For instance the number C-3 refers to the number 3 which appears on Figure C.

When sending to the factory for information on this machine please refer to this book, giving the specific page numbers in full as they appear in the upper right hand corners of the pages which refer to the question in hand.

All such requests should bear the serial number of the machine as it appears both on the brass plate attached to the machine, and stamped on the bed.

Requests for additional information on machines will be welcomed and will be given our full attention at any time.

GENERAL INSTRUCTIONS

The Vertical Shaper is shipped in a single crate or box, and except for attaching the handwheels it is entirely set up ready for use as soon as it is properly positioned and lubricated. (See lubrication instructions page 6). It should be placed correctly on the shop floor using the floor plan on the following page to obtain the correct clearances.

It should next be carefully leveled before it is bolted to the floor. An accurate level placed on the circular table will determine what wedges must be placed under the feet, and by using the circular table movement the machine can be leveled very quickly.

This initial leveling is very important as a high class machine tool will not give maximum accuracy if it is not properly set up.

CLEANING

The Vertical Shaper, as shipped is covered with heavy grease to protect it against rust. This grease should be carefully cleaned off and the Vertical Shaper oiled according to the instructions given under "LUBRICATION".

It is well known that many machine tools are worn out sooner than necessary simply because dirt has been allowed to settle in the moving parts and has cut the wearing surfaces. A clean machine will last longer, look better and give better service. A high grade Vertical Shaper of this sort deserves good treatment.

Keep it clean!

SPEEDS AND FEEDS

The Speed and Feed Diagram on Page 5 shows all the gear values, speeds, etc., throughout the machine, and a careful study of this will give a better working knowledge of the vertical shaper.

In addition to this diagram the working parts are described in detail later on.

PRATT & WHITNEY CO.
HARTFORD, CONN., U. S. A.
ENGINEERING DEPT.

MACHINE DATA
6 IN. VERTICAL SHAPER MOD. "B"
FLOOR PLAN - MOTOR DRIVE

SHEET NO. MD-

93

DR. BY PIERCE.

APP. BY Teller

M-1506

FOR LOT 8

METRIC

A = 44 M/M RAM DOWN AT NO STROKE
A = 298 M/M RAM UP AT NO STROKE
A = 381 M/M RAM UP AT MAX. STROKE

ENGLISH

A = 1 $\frac{3}{4}$ " RAM DOWN AT NO STROKE
A = 11 $\frac{3}{4}$ " RAM UP AT NO STROKE
A = 15" RAM UP AT MAX. STROKE

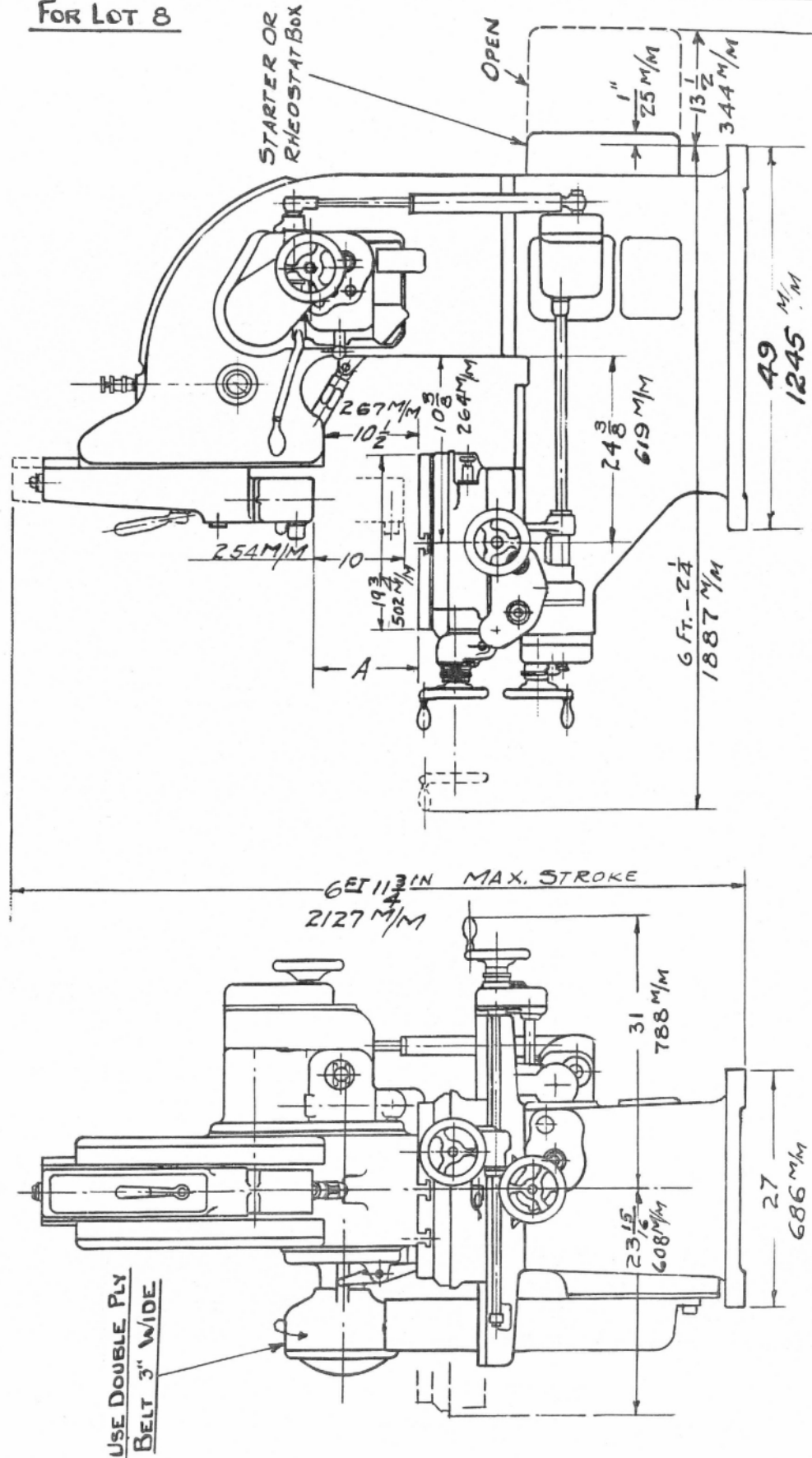


FIG. A1

DATE 10-4-22

33 Strokes per Min.
 49 Strokes per Min.
 76 Strokes per Min.
 116 Strokes per Min.

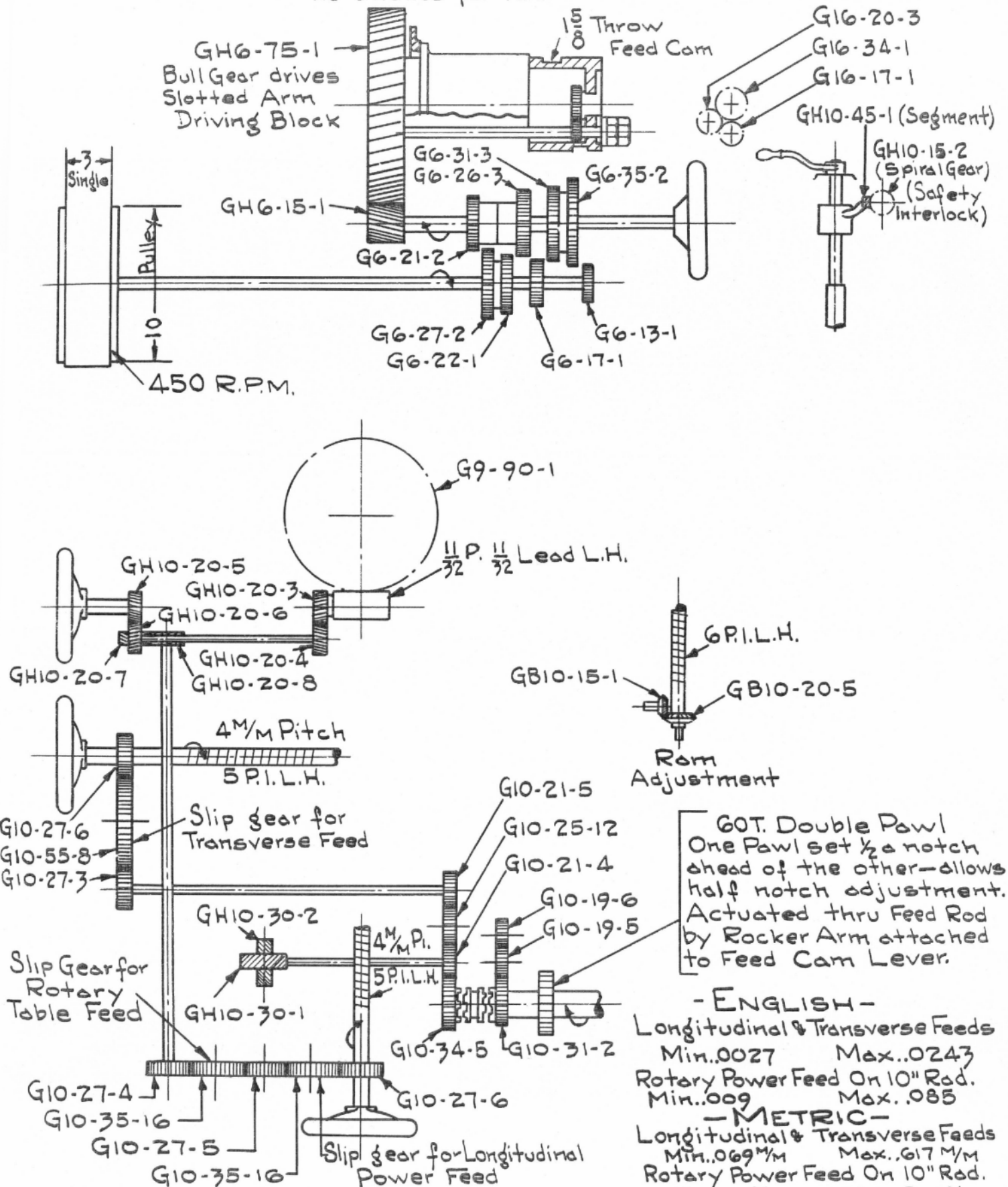


FIG. B

LUBRICATIONGear Box (Ram Speed)

The gear box C-19 is oiled thru a large oiler in the removable cover D-9 at the rear. Pour in machine oil until the gage D-7 on the lower rear side of the gear box shows full to the level marked. (There is an instruction plate on the cover D-9 which reads "Fill to Oil Gage"). If the oil is kept at the level marked, the gears will always be running in oil. The gear transmission is similar to that used in an automobile and is readily accessible by removing the cover plate from the pad D-9 at the rear of the gear box.

The oil may be completely drained and the gears flushed off clean by means of the plug D-11 at the bottom.

An oiler D-6 at the top of the gear box in cover D-10 supplies a shelf like reservoir directly beneath it. Oil pipes run from it to lubricate the main bearing for the bull gear, the inner bearing for the driving pinion shaft and the feed cam lever bearings. Be sure that the oiler D-6 is filled before starting the machine after an idle period. After the machine is running, splash from the gears is guided by means of a deflector, located just below the oiler D-6, to the shelf like reservoir. Any overflow is carried down into the gear box.

Feed Cam

There is a hole in the casting with a cover D-12 marked "Oil". This is used to reach the oil hole which supplies the feed cam follower and its bearing. There is also an open oiler at the end of the feed cam which should be taken care of. The swinging cast iron guard must be opened to reach this oiler.

Gear Box (Reversing)

This gear box C-9 is oiled through the small oil plug C-17 on top, and should be filled until oil runs out of the overflow plug C-18 below.

The Ram Actuating Mechanism (Slotted Arm, etc.)

There is a hand pump on the column in back of the gear box C-19 which forces oil to a small reservoir in the top of the column. Two tubes leading from this reservoir provide lubrication for the entire ram mechanism inside. One tube leads down into a trough on the driving arm. From this trough other tubes supply oil to the link bearings and to the cross head. The second tube provides lubrication to the main bearing on which the driving arm is mounted.

Pump to reservoir one pump full twice each day.

Surplus oil will accumulate inside the column where it will be held by a cross wall just below the speed gear box C-19. This oil should be kept drained out by using the pet cock C-20 on the side of the column. Any great accumulation of oil in this chamber will allow the revolving parts inside the column to splash, so that it should be drained out frequently.

The Ram and Ram Slide

The ram and ram slide are oiled entirely through several small oilers, all of which are in plain sight. All these oilers should be gone over at least twice a day when the machine is in continual operation.

Table Mechanism

The entire table mechanism including the hand and power feeds are oiled through small oilers in the usual manner. These oilers should be gone over twice a day when the machine is in continual use.

The scraped slides should be kept covered with a thin film of oil both to insure ease of operation and to protect the accurately scraped surfaces against rust. Felt chip guards and oilers are provided for the purpose and the felt should be renewed occasionally.

Drive Pulley

The drive pulley is lubricated by two large oilers on top of its shaft. The same pulley is used either for belt or for motor drive.

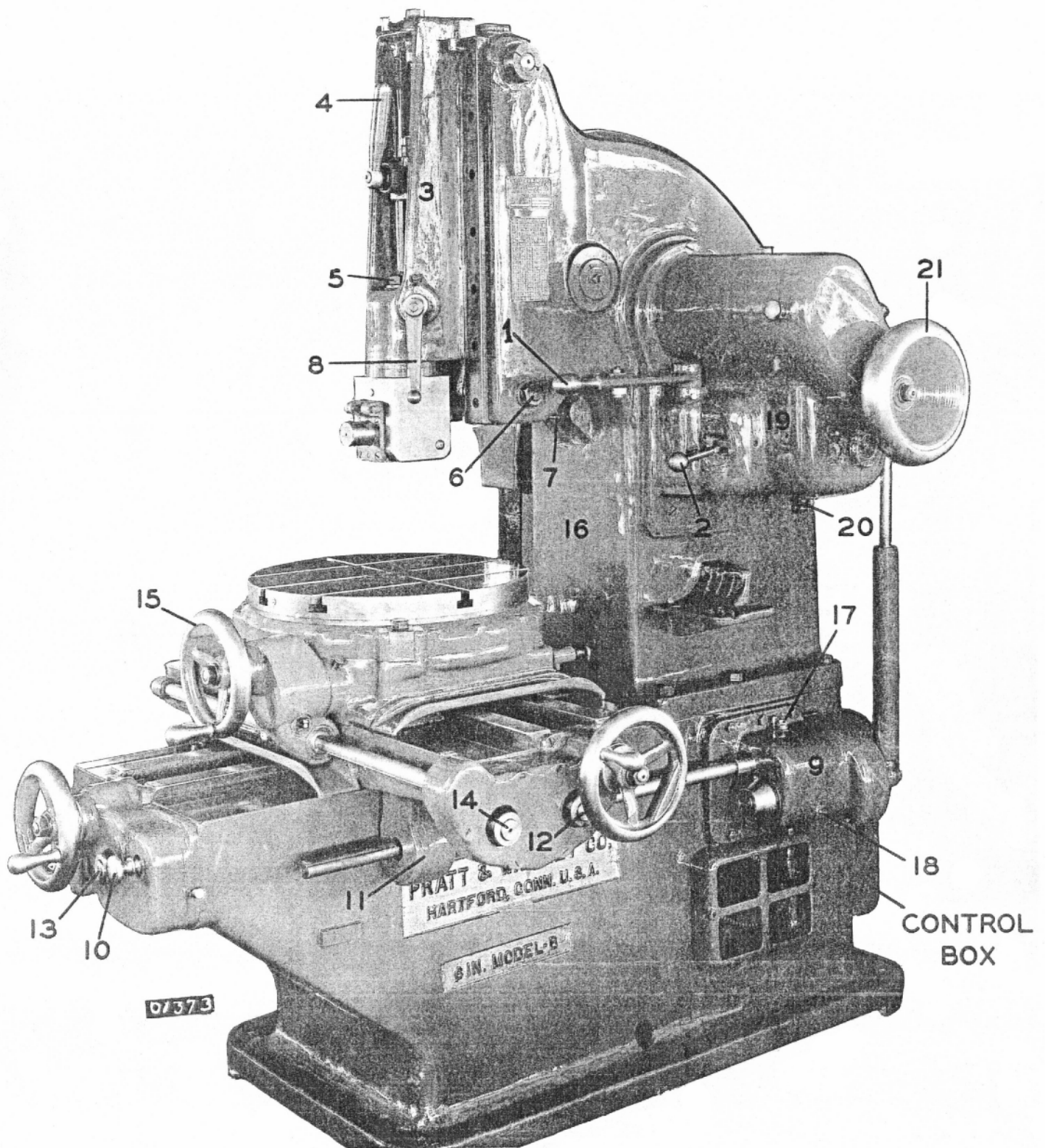
Motor

The motor may be easily oiled through the hand holes provided at the rear and the side of the machine, and should be attended to according to the motor manufacturers directions.

GENERAL

There are other small oilers that are in plain sight on the machine. These should be carefully taken care of each day.

The oiling of machine tools is often neglected when high production is being maintained, or at best is only attended to occasionally. Properly regulated shops usually require machines to be gone over each morning and noon when machines are in continuous service, and time is often allowed on Saturdays for thorough cleaning and adjustment. Proper attention to these details will greatly increase the life of the Vertical Shaper.



GENERAL DESCRIPTION OF WORKING PARTS

Drive to the Machine

Power is delivered to the machine either from a motor mounted within the bed or from a lineshaft, according to the type of drive. Either way the power is brought by belt to the main driving pulley on the rear left hand side of the machine (see Fig. B) from which it is transmitted to the speed gear box at the rear of the machine (see Fig. D). A belt driven machine may be changed to motor drive at any time simply by adding the necessary motor mounting parts and a belt guard.

The friction clutch inside of the main driving pulley is controlled by the lever C-1. A similar lever connected to lever C-1 is located on the left hand side of the machine for the operator's convenience. Movement of either lever will start and stop the entire machine. This lever C-1 has three positions, namely power on, neutral, and a third position which applies a brake for quick stopping of the ram. This brake will be found useful in drifting the ram thru its stroke for positioning the tool and work in setting up.

Ram Speed Gear Box

The gear box is similar to an automobile transmission consisting of sliding gears controlled by an H shift lever C-2. This gear box provides for four speeds and a neutral position (see Fig. B for speeds). A plate on the side of the machine gives all cutting speeds available both as ram strokes per minute and feet per minute.

Access to the speed gear box may be had by removing the rear cover D-9.

Ram Driving Mechanism

Power is taken from the speed gear box directly to the bull gear which drives the slotted arm driving block. The ram is driven in the usual manner by a slotted rocker arm which is connected to the ram itself through a floating link.

The handwheel C-21 may be used to move the ram by hand for positioning. The lock nuts D-8 control the adjustment for length of stroke which is shown by graduations on the end of the feed cam D-1. This adjustment is by means of an eccentric inside the bull gear. This eccentric carries the pin which drives the block in the slotted arm.

It is not possible for the feed to get out of time with the ram due to these adjustments.

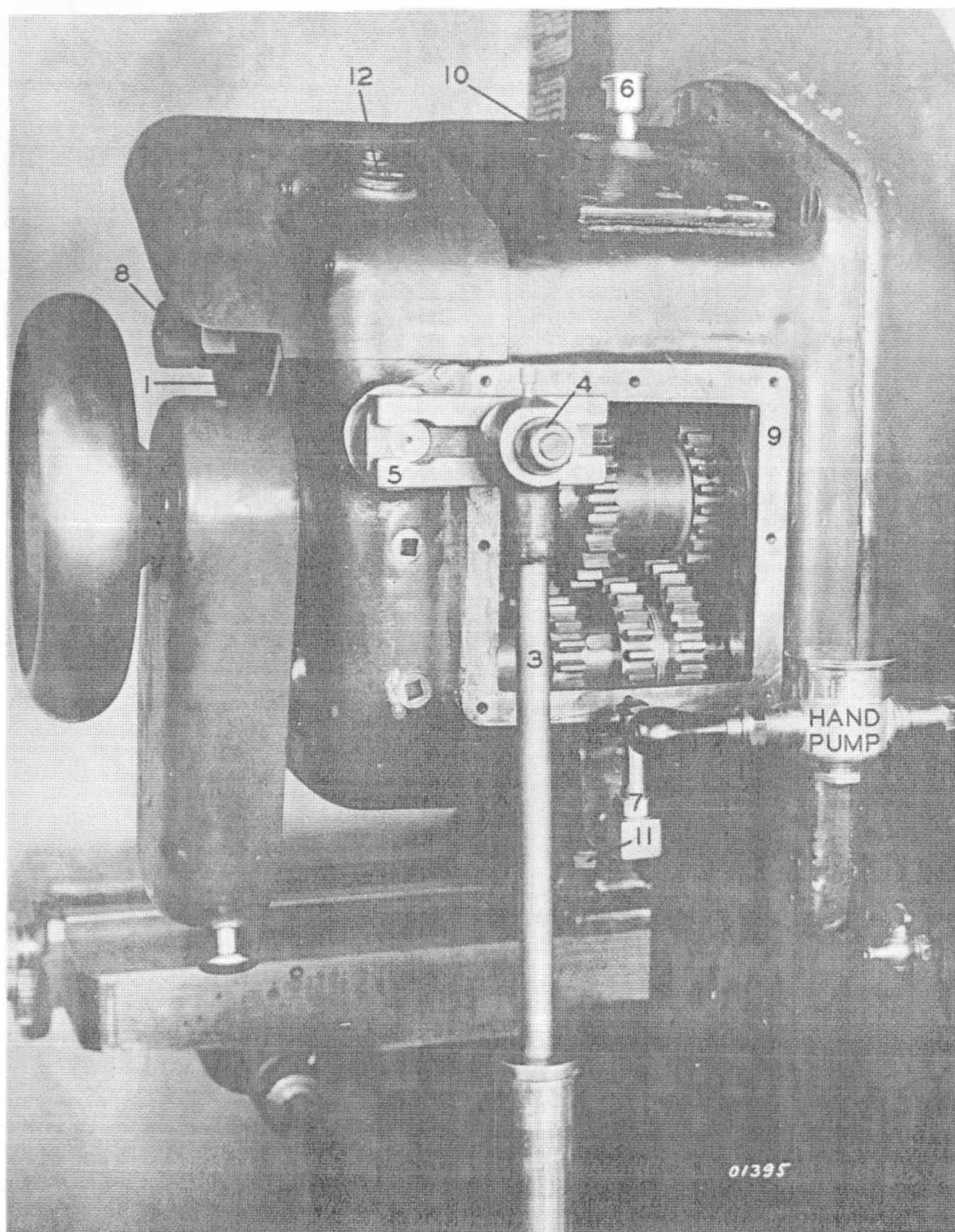


FIG. D

Ram

The ram C-3 slides in a dovetail on the face of the column. It may be positioned vertically by loosening the binder C-4 and turning the crank C-8 which operates a vertical screw.

The angular adjustment of the ram is accomplished by loosening the binder C-6 and adjusting the turnbuckle C-7 until the angularity of the ram is correct as shown by the index marks on the left hand side of the column. Adjustments may be made from 0 to 5° with the vertical. A positive stop is provided for returning the ram to an exact vertical position.

The ram head may be adjusted throughout 360° by loosening the binder C-5, turning the head to the correct position and retightening. Four graduations are provided 90° apart.

Power Feed Drive

Power is taken from the gear box to the cam D-1 and its follower. This follower takes the form of a bell crank which operates the rod D-3 which in turn operates the lower gear box ratchet. The adjustment of this rod D-3 controls the amount of feed. By loosening the nut D-4 the rod may be set at various graduated positions on D-5, thus controlling the amount of travel and hence the amount of feed. By means of this vertical oscillating motion the work is fed intermittently at each stroke of the ram.

Feed Reversing Gear Box

The feed reversing gear box C-9 contains the ratchet and pawl. A reversing mechanism controlled by the knob C-10 permits the direction of intermittent feed motion to be reversed when desired. The knob C-10 has two positions namely either "in" or "cut", and determines the direction of feed of either slide and of the rotary table.

Power is transmitted to the various power feeds on the machine through the spiral gears C-11.

Power Feeds

The three power feeds of the machine are controlled by slip gears. C-12 controls the longitudinal power feed, C-13 the cross power feed and C-14 the rotary power feed. In each case it is simply necessary to pull the slip gear out, meshing it with the driving gear and so completing the gear train.

Hand Controls

The longitudinal and cross slides are provided with handwheels for hand traverse in the usual manner. These handwheels operate traversing screws, and are provided with micrometer dials.

Rotary Table

The rotary table is controlled by the handwheel C-15 which drives a worm and gear. The table is provided with 12 indexing notches by means of which work may be rapidly indexed to any multiple of a twelfth of a circle. Each notch is located by the detent plunger on the longitudinal slide in front of the machine. Be sure that detent plunger is released before throwing in the power feed to rotary table. The lever C-16 disengages the worm which drives the table. A binder is provided for locking the rotary table in position.

The table itself is graduated through 360° and the handwheel has a micrometer dial whose large divisions (total of 4) are degrees of table turn with each degree subdivided 30 times representing 2 minutes.

ADJUSTMENTS FOR WEAR

The table longitudinal and cross slides are gibbed in the usual manner and adjustments for wear are made by taking up the set screw provided for the purpose. It will be necessary to remove the felt wipers when doing this.

The ram slide is also provided with an adjustment for wear. This is done by removing the screws holding the slide in position and scraping the under surface down until a new fit is obtained.

The friction pulley has a nut for adjusting the friction. For best efficiency the clutch should never "grab" or take hold quickly, but should transmit full power when fully engaged.

Repair Part List

for the

Pratt and Whitney

6 Inch Vertical
Shaper

MODEL B

IMPORTANT

This list applies only to machines bearing serial numbers from 167 to 191 inclusive. It is also applicable to machines bearing serial numbers from 192 to 216 inclusive except for a very few minor differences.

Pratt and Whitney Company

Division Niles-Bement-Pond Company

Hartford, Conn.

When Ordering Repair Parts

Please be sure that you send in sufficient information to enable us to supply you correctly. It is vitally important that we have the serial number and correct name of your machine. The serial number is stamped on the bed of the Vertical Shaper and is also stamped on the brass plate attached to the machine.

When sending us repair part orders on the 6-inch Vertical Shaper, Model B please mention M-1506. This is the design number of the machine.

This book covers machines having serial numbers from 167 to 191 inclusive. It also is applicable to Vertical Shapers bearing serial numbers from 192 to 366 inclusive except for a few very minor changes. *Please be sure to give us the serial number of your machine when ordering repair parts.*

Best service can be obtained by ordering from our nearest branch office, as listed on the rear cover.

Additional Equipment

The following additional equipment is available to order for the 6-inch Vertical Shaper: — vise with hardened and ground jaws, height 7", width 6", depth 1 $\frac{5}{8}$ ", opening of jaws 6"; slotted angle iron; two positive stops for longitudinal and transverse travels; countershaft equipment.

Tools

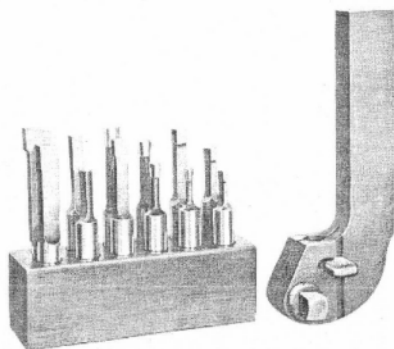
Set of 12 tools with holder for die work (made by Pratt and Whitney) as follows: $\frac{3}{16}$ ", $\frac{1}{4}$ ", $\frac{5}{16}$ " square; $\frac{3}{16}$ ", $\frac{1}{4}$ ", $\frac{5}{16}$ ", $\frac{3}{8}$ " round; $\frac{1}{8}$ " parting; $\frac{3}{8}$ " and $\frac{5}{16}$ " angle; $\frac{3}{16}$ " and $\frac{1}{4}$ " keyseating. One forged cutting off tool is included with this set.

The following tools (made by the O.K. Tool Co., Shelton, Conn.) can be furnished to order.

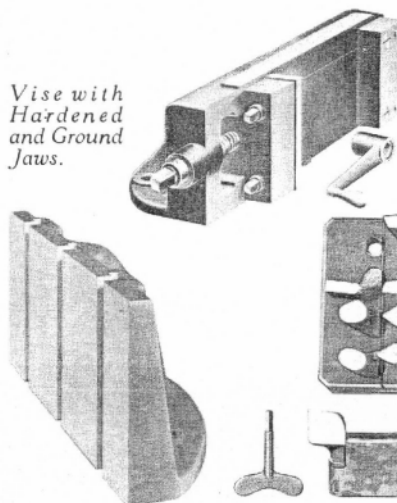
Tool holder No. 092D and 24 tools for general work.

Tool holder No. 092C and 12 keyseating tools, 4 each $\frac{1}{4}$ ", $\frac{5}{16}$ ", $\frac{3}{8}$ ".

Set of Small Tools with Holder for Die Work.

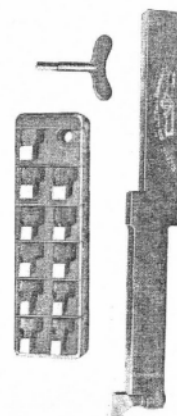


Vise with Hardened and Ground Jaws.



Angle Iron for Bolting to Table.

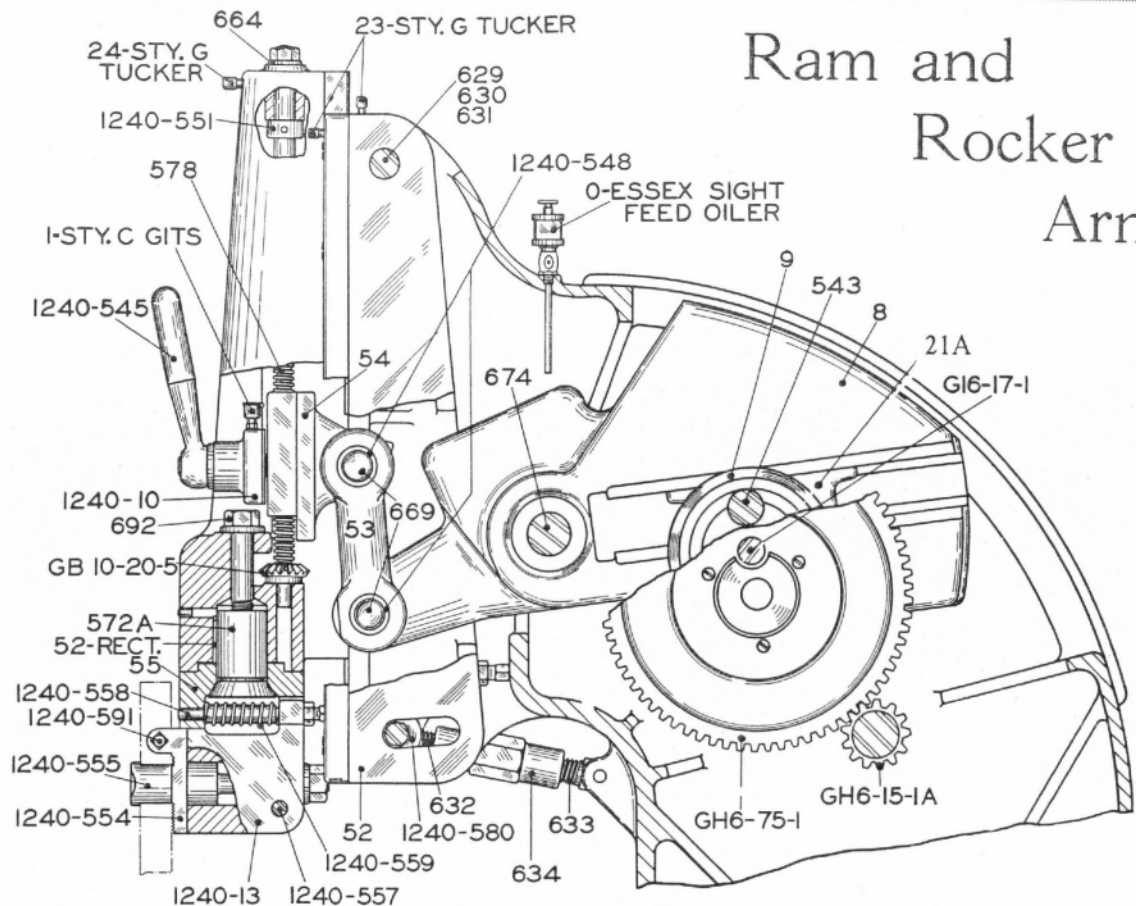
O. K. Tool Holder No. 092C with 12 Keyseating Tools.



O. K. Tool Holder No. 092D with 24 General Working Tools.

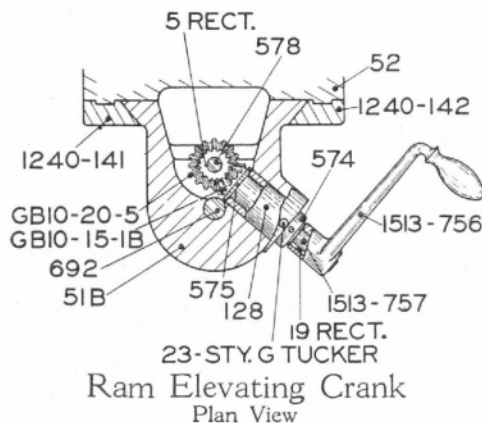


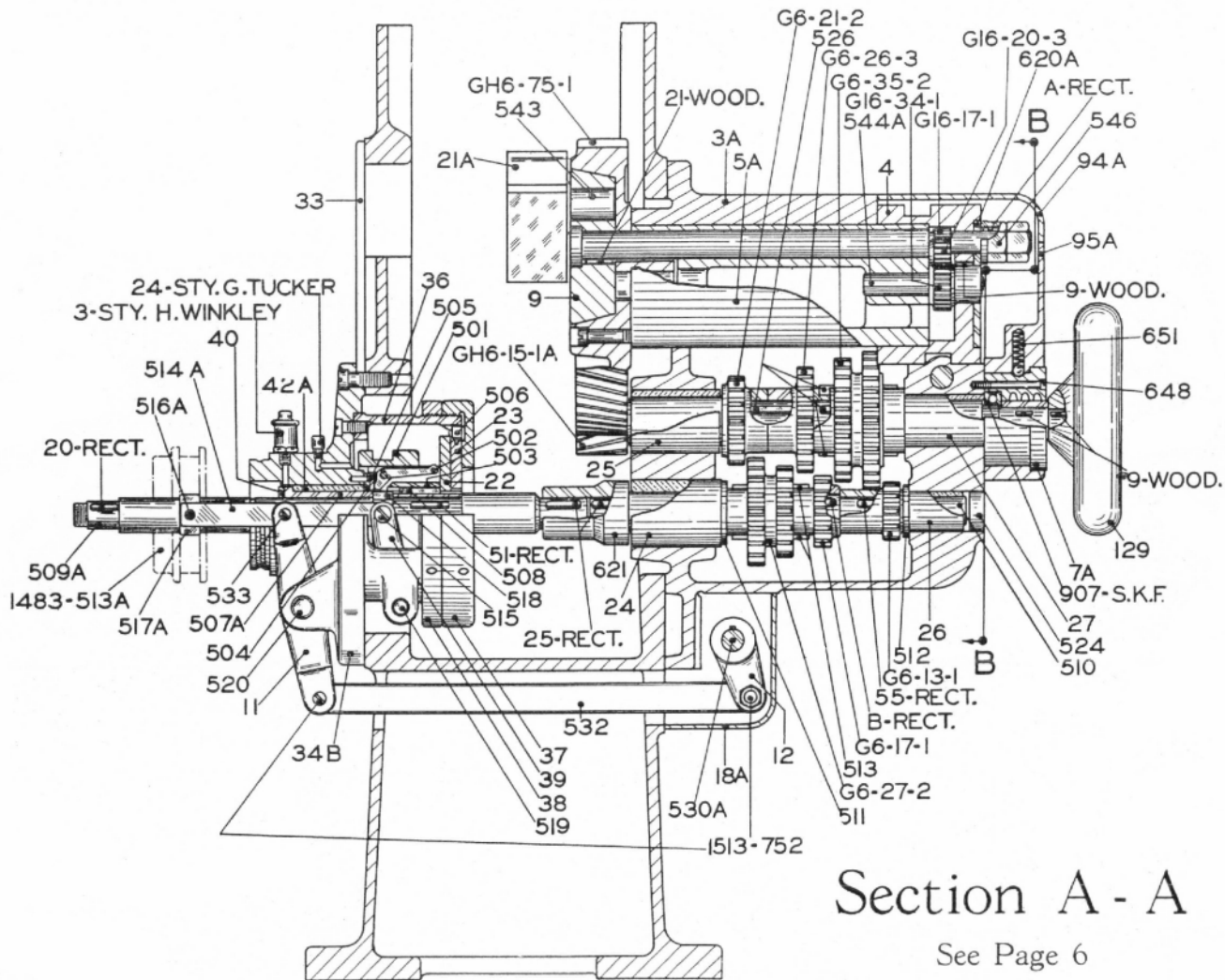
Ram and Rocker Arm



Piece No.	Name of Piece
8	Driving Arm
9	Crank Pin Eccentric
21A	Crank Pin Block
51B	Ram
52	Ram Guide
53	Driving Arm Link
54	Link Block
55	Head
128	Adjusting Pinion Bushing
543	Crank Pin
572A	Head Swivel Stud
574	Adjusting Pinion Collar
575	Adjusting Pinion Thrust Collar
578	Ram Adjusting Screw
629	Ram Guide Fulcrum Pin

Piece No.	Name of Piece
630	Fulcrum Pin Nut
631	Fulcrum Pin Nut Washer
632	Turnbuckle End — R.H.
633	Turnbuckle End — L.H.
634	Turnbuckle Body
664	Ram Adjusting Screw Washer
669	Link Pin
674	Driving Arm Shaft
692	Head Binding Bolt
G16-17-1	Stroke Adjusting Shaft
GH6-15-1A	Driving Pinion
GH6-75-1	Driving Gear
GB10-15-1B	Adjusting Bevel Pinion
GB10-20-5	Adjusting Bevel Gear
1240-10	Link Block Binder
1240-13	Clapper
1240-141	Ram Gib — R.H.
1240-142	Ram Gib — L.H.
1240-545	Link Block Binder Handle
1240-548	Link Bushing
1240-551	Adjusting Screw Collar
1240-554	Tool Post Block
1240-555	Tool Post
1240-557	Clapper Fulcrum Pin
1240-558	Clapper Spring Stud
1240-559	Clapper Spring
1240-580	Ram Guide Clamp Bolt
1240-591	Tool Block Screw
1513-756	Adjusting Pinion Crank
1513-757	Crank Extension





Section A - A

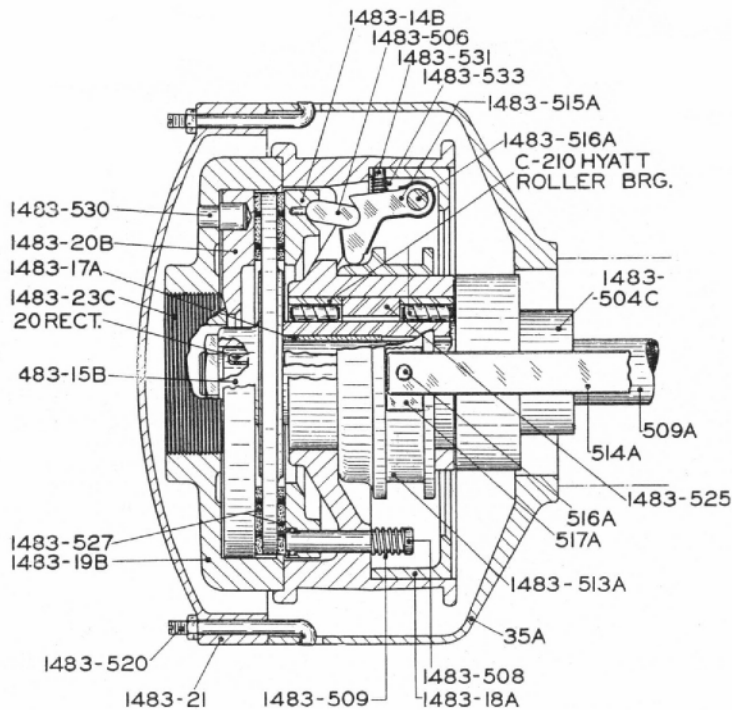
See Page 6

Main Drive Shaft and Speed Change Gear Box

<i>Piece No.</i>	<i>Name of Piece</i>	<i>Piece No.</i>	<i>Name of Piece</i>
3A	Gear Box	39	Friction Clutch Yoke
4	Feed Cam	40	Pulley Shaft Thrust Washer
5A	Feed Cam Sleeve	42A	Pulley Bracket Bearing
7A	Thrust Bearing Guard	94A	Cam Guard
9	Crank Pin Eccentric	95A	Cam Guard Door
11	Friction Pulley Yoke	129	Handwheel
12	Friction Clutch Arm	501	Friction Clutch Spool
18A	Friction Clutch Arm Guard	502	Friction Clutch Fingers
21A	Crank Pin Block	503	Friction Clutch Finger Support
22	Friction Clutch Plate — Inner	504	Friction Clutch Washer
23	Friction Clutch Plate — Outer	505	Friction Clutch Finger Plate
24	Driving Shaft Bearing — Inner	506	Friction Clutch Plate Key
25	Driven Shaft Bearing — Inner	507A	Friction Pulley Shaft Sleeve
26	Driving Shaft Bearing — Outer	508	Pulley Shaft Sleeve Key
27	Driven Shaft Bearing — Outer	509A	Friction Pulley Shaft
33	Column Plate	510	Driving Shaft
34B	Pulley Bracket	511	Driving Shaft Thrust Washer — Inner
36	Friction Clutch Housing	512	Driving Shaft Thrust Washer — Outer
37	Friction Clutch Adjusting Nut	513	Driving Shaft Keys
38	Friction Clutch Adjusting Lock Nut	514A	Friction Pulley Links — Upper

Piece No.	Name of Piece
515	Friction Clutch Yoke Pins
516A	Friction Pulley Link Pins
517A	Pulley Link Pin Shoe
518	Clutch Yoke Pin Shoes
519	Friction Clutch Yoke Shaft
520	Friction Pulley Yoke Shaft
524	Gear Box Plug
526	Gear Keys
530A	Friction Clutch Arm Shaft
532	Link — Lower
533	Link Stud — Upper
543	Crank Pin
544A	Compensating Gear Stud
546	Eccentric Shaft Nut
620A	Stroke Adjusting Dial
621	Drive Shaft Coupling
648	Dust Guard Screw

Piece No.	Name of Piece
651	Cam Guard Door Spring
G6-13-1	Driving Gear — Small
G6-17-1	Driving Gear — Large
G6-21-2	Driven Gear — Small
G6-26-3	Driven Gear — Large
G6-27-2	Driving Gear — Sliding
G6-35-2	Driven Gear — Sliding
G16-17-1	Stroke Adjusting Shaft
G16-20-3	Compensating Gear — Intermediate
G16-34-1	Compensating Gear — Feed Cam
GH6-15-1A	Driving Pinion
GH6-75-1	Driving Gear
1483-513A	Thimble
1513-752	Link Studs — Lower



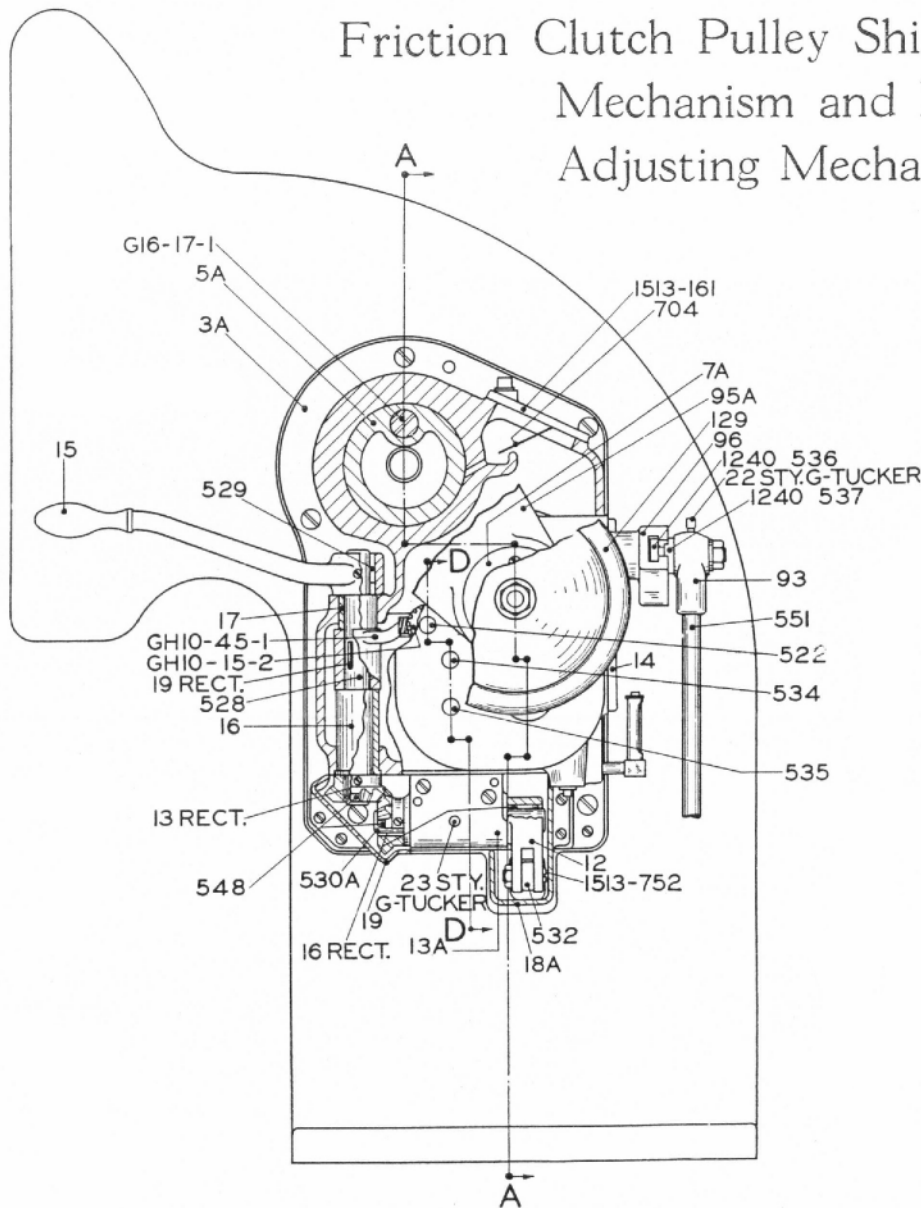
Main Drive Friction Clutch Pulley

Same pulley used for either
belt or motor drive

Piece No.	Name of Piece
35A	Pulley Guard
509A	Friction Pulley Shaft
514A	Friction Pulley Links — Upper
516A	Friction Pulley Link Pins
517A	Pulley Link Pin Shoe
	10" Pulley (Specify Flat or "V" belt)
1483-14B	Inner Friction Ring
1483-15B	Flange
1483-17A	Bushir.g
1483-18A	Finger Carrier
1483-19B	Outer Friction Ring Housing
1483-20B	Outer Friction Ring
1483-21	10" Pulley Guard Cover
1483-23C	Friction Adjusting Nut

Piece No.	Name of Piece
-1483-504C	Bearing Sleeve
1483-506	Links
1483-508	Spring Studs
1483-509	Springs
1483-513A	Thimble
1483-515A	Fingers
1483-516A	Finger Studs
1483-520	Guard Cover Hooks
1483-525	Roller Bearing Spacer
1483-527	Friction Ring Disc
1483-530	Driving Pin
1483-531	Finger Stop Pins
1483-533	Finger Release Springs

Friction Clutch Pulley Shifting Mechanism and Feed Adjusting Mechanism



Piece No. Name of Piece

3A	Gear Box
5A	Feed Cam Sleeve
7A	Thrust Bearing Guard
12	Friction Clutch Arm
13A	Friction Clutch Arm Shaft Bearing
14	Gear Box Cover
15	Friction Clutch Hand Lever
16	Hand Lever Gear Shaft Bearing — Lower
17	Hand Lever Gear Shaft Bearing — Upper
18A	Friction Clutch Arm Guard
19	Hand Lever Gear Guard
93	Connecting Rod Head — Upper
95A	Cam Guard Door
96	Feed Adjusting Lever
129	Handwheel
522	Shifter Locking Shaft

Piece No.

Name of Piece

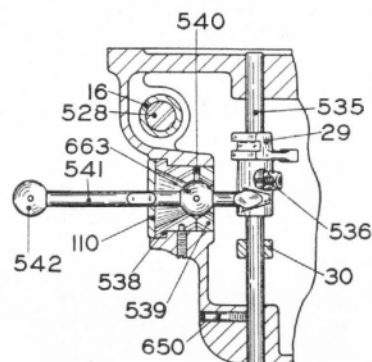
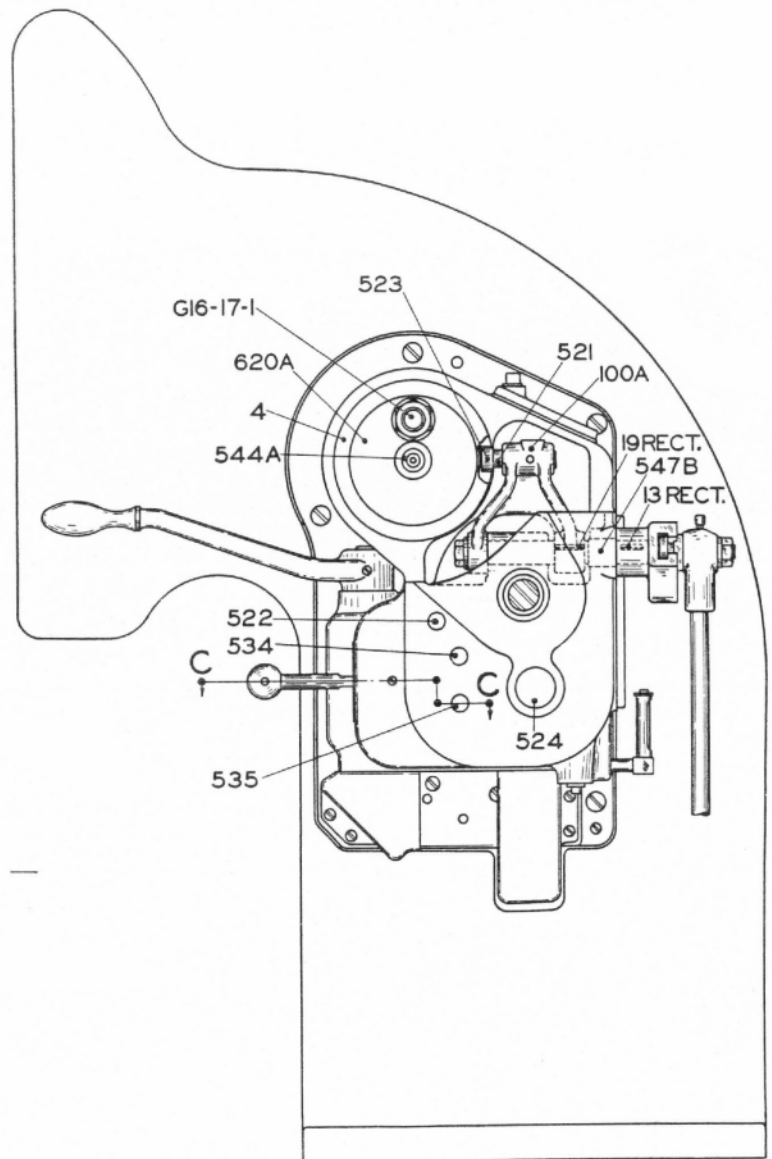
528	Hand Lever Gear Shaft
529	Hand Lever Gear Shaft Key
530A	Friction Clutch Arm Shaft
532	Link — Lower
534	Driven Gear Shifting Shaft
535	Driving Gear Shifting Shaft
548	Clutch Hand Lever Gears
551	Feed Rod
704	Oil Deflector
GH10-15-2	Hand Lever Locking Pinion
GH10-45-1	Hand Lever Locking Gear
G16-17-1	Stroke Adjusting Shaft
1240-536	Tee Bolt
1240-537	Connecting Rod Stud
1513-161	Oil Pocket Cover
1513-752	Link Stud — Lower

Section B - B

See Page 4

Feed Cam Mechanism

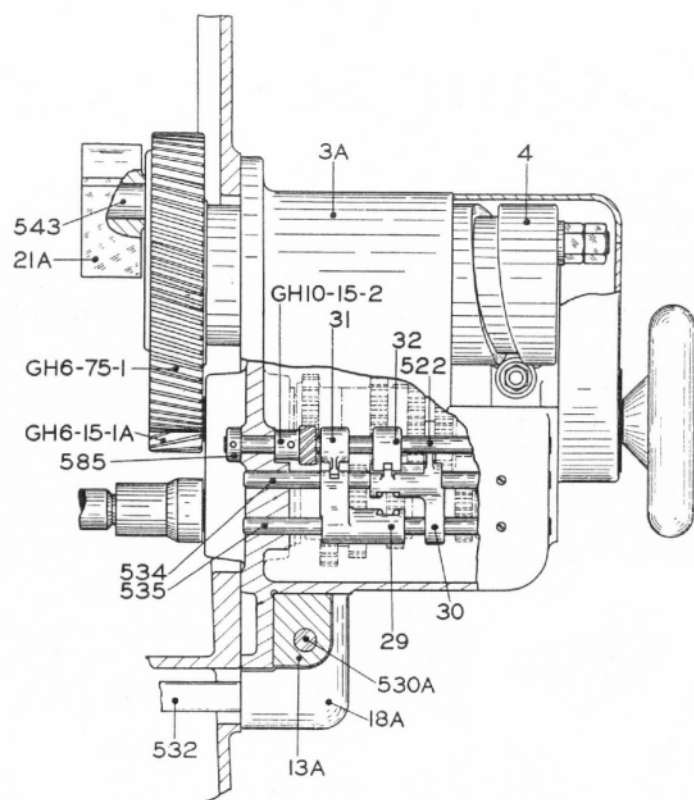
Piece No.	Name of Piece
4	Feed Cam
16	Hand Lever Gear Shaft Bearing — Lower
29	Driving Gear Shifter
30	Driven Gear Shifter
100A	Feed Cam Lever
110	Gear Shifter Lever Guide Plate
521	Feed Cam Roll Carrier
522	Shifter Locking Shaft
523	Feed Cam Roll
524	Gear Box Plug



Section C - C

See above

Piece No.	Name of Piece
528	Hand Lever Gear Shaft
534	Driven Gear Shifting Shaft
535	Driving Gear Shifting Shaft
536	Gear Shifter Springs
538	Gear Shifter Lever Socket
539	Gear Shifter Lever Socket Plate
540	Gear Shifter Lever Pin
541	Gear Shifter Lever
542	Gear Shifter Lever Knob
544A	Compensating Gear Stud
547B	Feed Cam Lever Shaft
620A	Stroke Adjusting Dial
650	Set Screw
663	Lever Fulcrum Ball
G16-17-1	Stroke Adjusting Shaft



Section D - D

See Page 6

Feed Cam, Change
Gear Shifting Yokes,
and Ram Driving Gears

Piece No. Name of Piece

3A	Gear Box
4	Feed Cam
13A	Friction Clutch Arm Shaft Bearing
18A	Friction Clutch Arm Guard
21A	Crank Pin Block
29	Driving Gear Shifter
30	Driven Gear Shifter
31	Driving Gear Shifter Lock
32	Driven Gear Shifter Lock
522	Shifter Locking Shaft

Piece No. Name of Piece

530A	Friction Clutch Arm Shaft
532	Link — Lower
534	Driven Gear Shifting Shaft
535	Driving Gear Shifting Shaft
543	Crank Pin
585	Shaft Collar
GH6-15-1A	Driving Pinion
GH6-75-1	Driving Gear
GH10-15-2	Hand Lever Locking Pinion

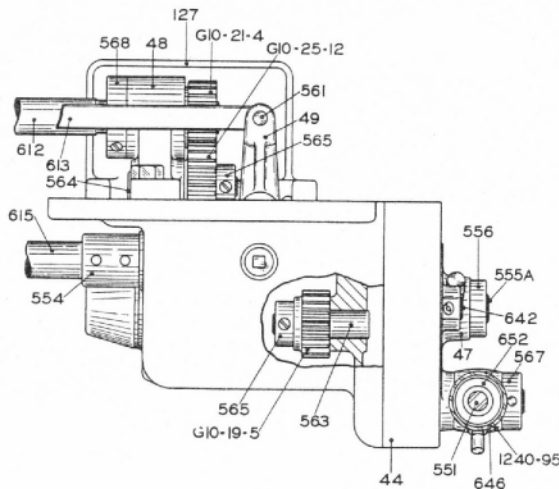
Feed Gear Box

Piece No. Name of Piece

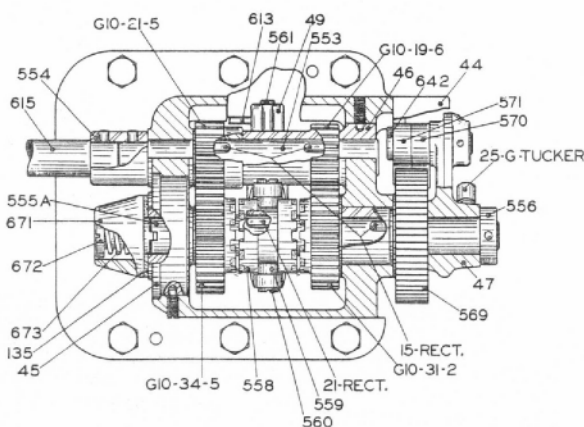
44	Ratchet Guard
45	Gear Box Bearing — Large
46	Gear Box Bearing — Small
47	Feed Rod Lever
48	Gear Bracket
49	Clutch Yoke
127	Clutch Yoke Bracket
135	Friction Block Washer
551	Feed Rod
553	Pinion Shaft
554	Pinion Shaft Coupling
555A	Clutch Gear Shaft

Piece No. Name of Piece

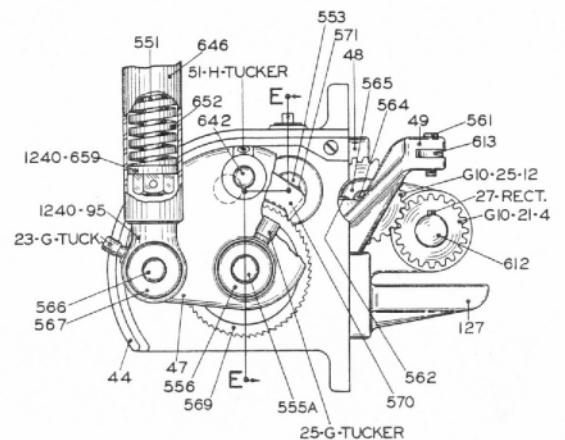
556	Clutch Gear Shaft Collar
558	Sliding Clutch
559	Clutch Yoke Shoes
560	Clutch Yoke Screws
561	Clutch Yoke Pin
562	Clutch Yoke Stud
563	Intermediate Gear Stud
564	Traverse Intermediate Gear Stud
565	Intermediate Gear Stud Collar
566	Feed Rod Lever Stud
567	Feed Rod Lever Stud Collar
568	Traverse Feed Gear Collar
569	Feed Ratchet
570	Feed Pawl — Outer
571	Feed Pawl — Inner
612	Cross Feed Shaft
613	Reverse Clutch Yoke Link
615	Longitudinal Feed Shaft
642	Pawl Stud
646	Feed Rod Cylinder
652	Feed Rod Spring
671	Friction Block
672	Friction Block Stud
673	Friction Block Spring
G10-19-5	Intermediate Gear
G10-19-6	Pinion Shaft Gear — R.H.
G10-21-4	Traverse Feed Gear
G10-21-5	Pinion Shaft Gear — L.H.
G10-25-12	Traverse Intermediate Gear
G10-31-2	Clutch Gear — R.H.
G10-34-5	Clutch Gear — L.H.
1240-95	Connecting Rod Head — Lower
1240-659	Feed Rod Washer



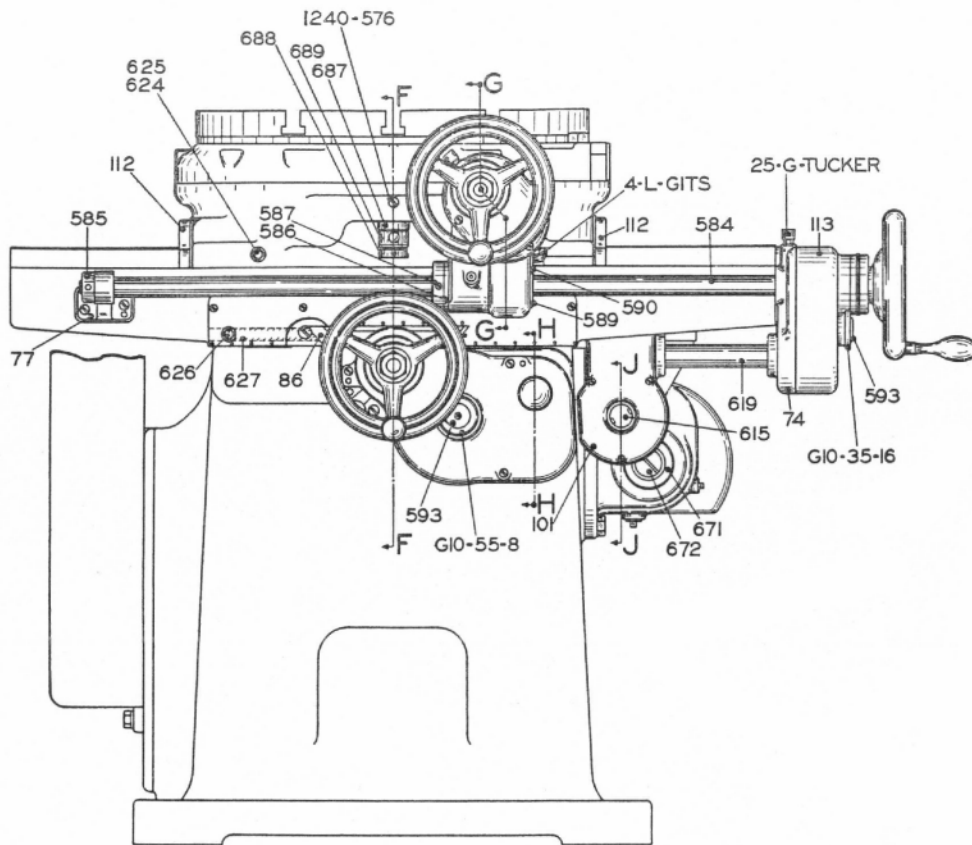
Plan View



Section E - E
Front View



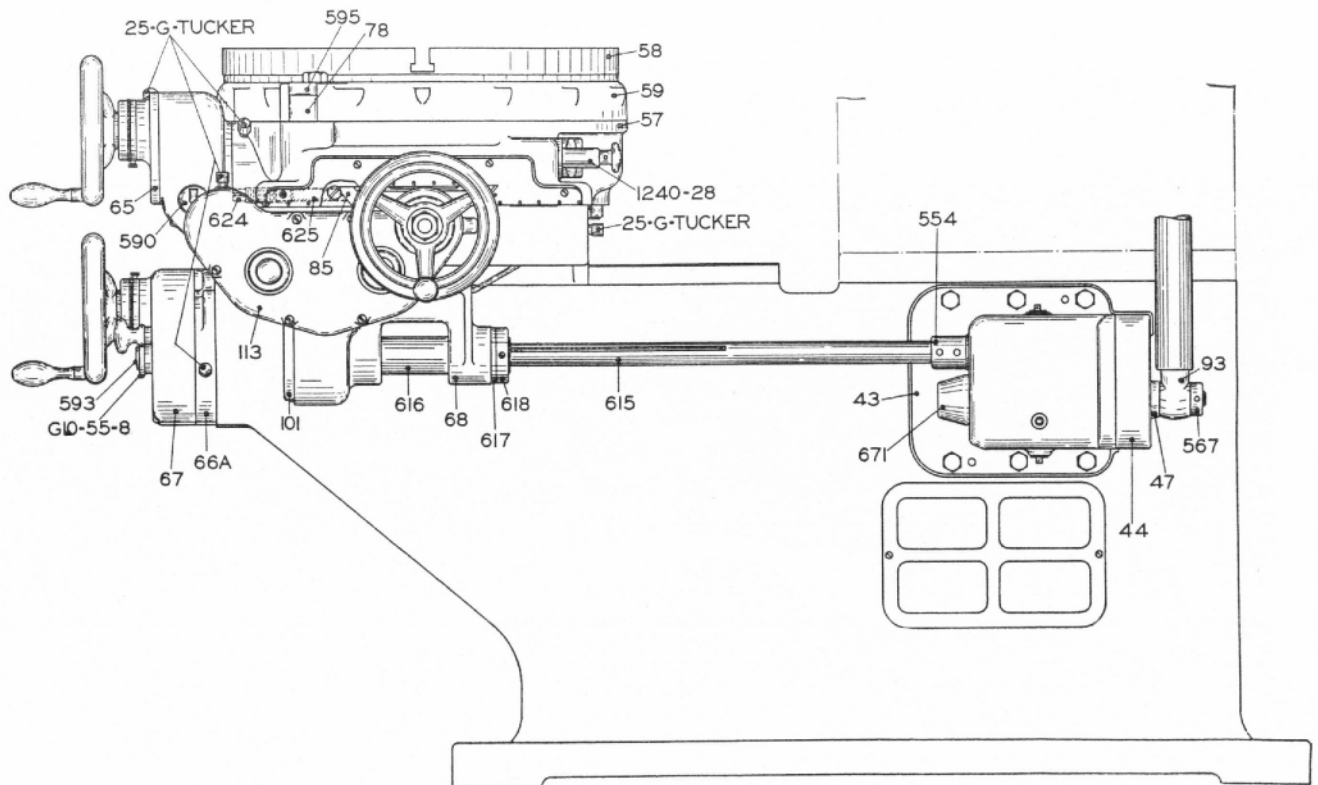
Right Hand End View



Front View of Bed and Rotary Table

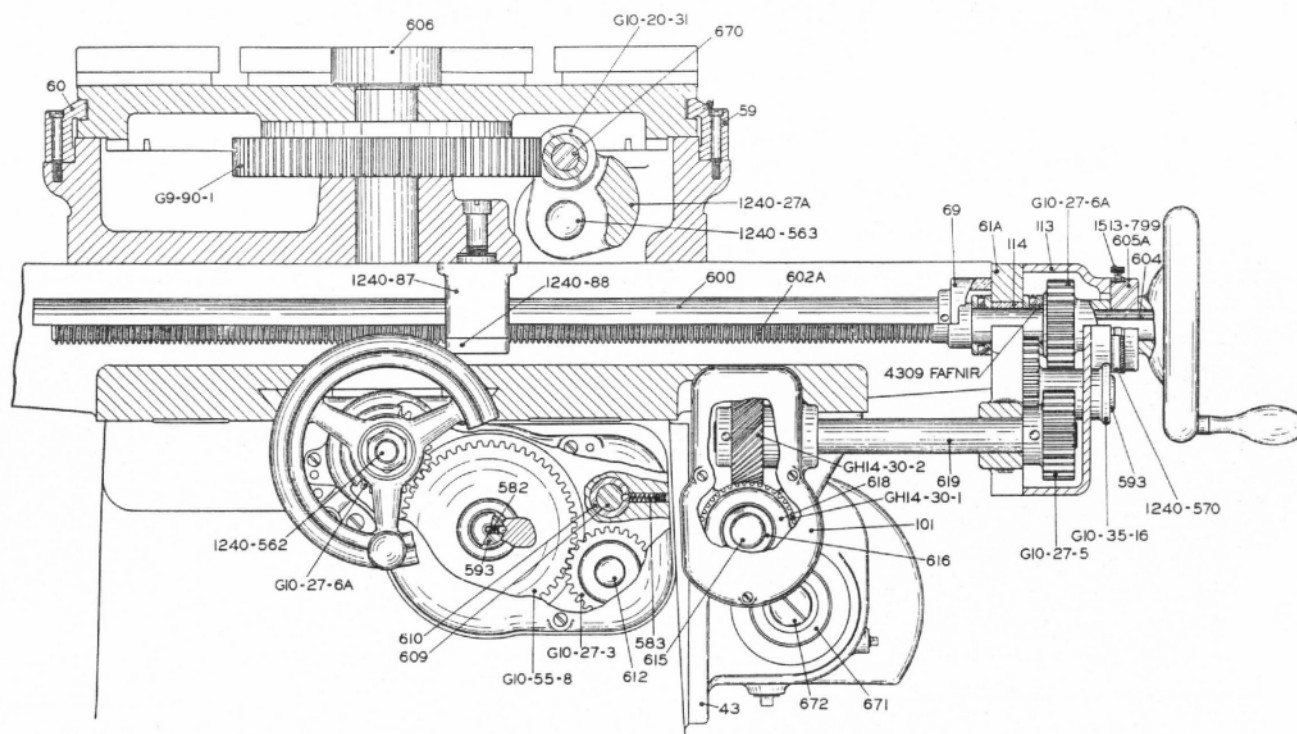
Piece No.	Name of Piece	Piece No.	Name of Piece
74	Slide End Bracket — L.H.	619	Longitudinal Feed Pinion Shaft
77	Rotary Feed Shaft Bracket	624	Carriage Gib Binder Screw
86	Carriage Slide Gib	625	Carriage Gib Binder
101	Feed Shaft Bracket Cover	626	Slide Gib Binder Screw
112	Wiper on Carriage	627	Slide Gib Binder
113	Slide End Bracket Cover	671	Friction Block
584	Rotary Feed Shaft	672	Friction Block Stud
585	Shaft Collar	687	Lock Bolt Casing
586	Feed Shaft Gear Nut	688	Lock Bolt Collar
587	Feed Shaft Washer — Outer	689	Lock Bolt Cam
589	Feed Shaft Washer Collar	G10-35-16	Longitudinal and Rotary Feed Gear
590	Intermediate Gear Stud	G10-55-8	Cross Feed Intermediate Gear
593	Intermediate Sliding Gear Stud	1240-576	Lock Bolt Casing Screw
615	Longitudinal Feed Shaft		

The diagram above is the key to the sectional views that appear on pages 13, 14 and 15. In each case the sections are arranged in sequence so that parts can be identified easily from one section to the next. Three views of the feed gear box are shown on page 9. The remaining views of the bed and table mechanism are shown on pages 11 and 12.



Right Hand Side View of Bed and Rotary Table

Piece No.	Name of Piece	Piece No.	Name of Piece
43	Gear Box	554	Pinion Shaft Coupling
44	Ratchet Guard	567	Feed Rod Lever Stud Collar
47	Feed Rod Lever	590	Intermediate Gear Stud
57	Carriage	593	Intermediate Sliding Gear Stud
58	Table	595	Table Clamp
59	Table Guard — Back Half	615	Longitudinal Feed Shaft
65	Carriage Bracket	616	Longitudinal Feed Shaft Sleeve
66A	Cross Feed Screw Bracket	617	Feed Shaft Sleeve Washer
67	Cross Feed Screw Bracket Cover	618	Feed Shaft Sleeve Nut
68	Longitudinal Feed Shaft Bracket	624	Carriage Gib Binder Screw
78	Clamp Block	625	Carriage Gib Binder
85	Carriage Gib	671	Friction Block
93	Connecting Rod Head — Upper	G10-55-8	Cross Feed Intermediate Gear
101	Feed Shaft Bracket Cover	1240-28	Worm Rocker Lever
113	Slide End Bracket Cover		

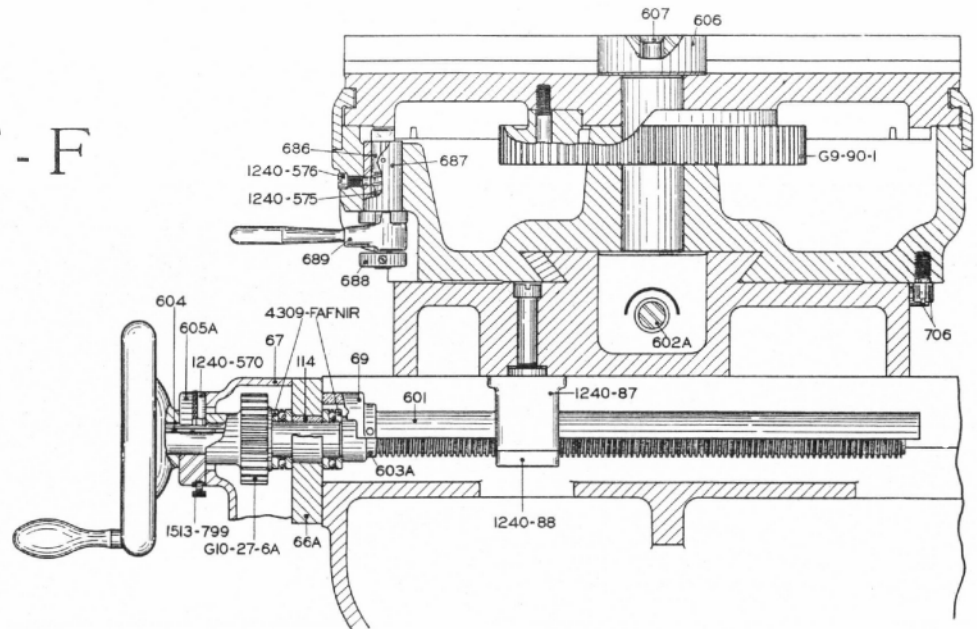


Front View of Rotary Table and Bed in Section Showing
Hand and Power Feed Mechanisms

<i>Piece No.</i>	<i>Name of Piece</i>	<i>Piece No.</i>	<i>Name of Piece</i>
43	Gear Box	619	Longitudinal Feed Pinion Shaft
59	Table Guard — Back Half	670	Worm Shaft
60	Table Guard — Front Half	671	Friction Block
61A	Slide End Bracket — R.H.	672	Friction Block Stud
69	Feed Screw Guard Carrier	G9-90-1	Table Index Gear
101	Feed Shaft Bracket Cover	G10-20-31	Worm
113	Slide End Bracket Cover	G10-27-3	Cross Feed Shaft Gear
114	Feed Screw Bushing	G10-27-5	Longitudinal Feed Pinion Shaft Gear
582	Sliding Gear Detent Spring	G10-27-6A	Longitudinal and Cross Feed Screw Gears
583	Reverse Clutch Detent Spring	G10-35-16	Rotary Feed Intermediate Gear
593	Intermediate Sliding Gear Stud	G10-55-8	Cross Feed Intermediate Gear
600	Feed Screw Guard — Longitudinal	GH14-30-1	Longitudinal Feed Gear
602A	Feed Screw — Longitudinal	GH14-30-2	Longitudinal Feed Pinion
604	Feed Screw Key	1240-27A	Worm Rocker
605A	Index Ring Collar	1240-87	Feed Screw Nut Carrier
606	Table Stud	1240-88	Feed Screw Nut
609	Reverse Clutch Yoke Shaft	1240-562	Handwheel Shaft
610	Reverse Clutch Yoke Handle Bearing	1240-563	Rocker Lever Shaft
612	Cross Feed Shaft	1240-570	Feed Screw Micrometer Ring
615	Longitudinal Feed Shaft	1513-799	Graduated Ring Screw
616	Longitudinal Feed Shaft Key		
618	Feed Shaft Sleeve Nut		

Section F - F

See Page 10



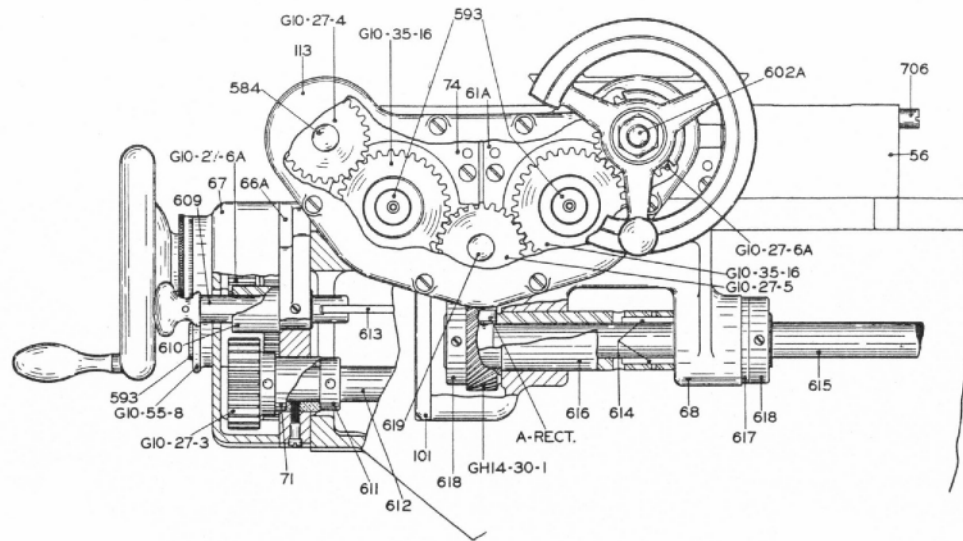
Cross Feed Mechanism and Rotary Table Quick Indexing Plunger

Piece No. *Name of Piece*

66A	Cross Feed Screw Bracket
67	Cross Feed Screw Bracket Cover
69	Feed Screw Guard Carrier
114	Feed Screw Bushing
601	Cross Feed Screw Guard
602A	Longitudinal Feed Screw
603A	Cross Feed Screw
604	Cross Feed Screw Key
605A	Index Ring Collar
606	Table Stud
607	Table Stud Screws
686	Lock Bolt

Piece No. *Name of Piece*

687	Lock Bolt Casing
688	Lock Bolt Collar
689	Lock Bolt Cam
706	Table Stop Screws
G9-90-1	Table Index Gear
G10-27-6A	Longitudinal Screw Gear
1240-87	Feed Screw Nut Carrier
1240-88	Feed Screw Nut
1240-570	Feed Screw Micrometer Ring
1240-575	Lock Bolt Spring
1240-576	Lock Bolt Casing Screw
1513-799	Graduated Ring Screw



Sections H-H and J-J

See Page 10

Power Feed Details

<i>Piece No.</i>	<i>Name of Piece</i>	<i>Piece No.</i>	<i>Name of Piece</i>
56	Carriage Slide	614	Longitudinal Feed Shaft Key
61A	Slide End Bracket — R.H.	615	Longitudinal Feed Shaft
66A	Cross Feed Screw Bracket	616	Longitudinal Feed Shaft Sleeve
67	Cross Feed Screw Bracket Cover	617	Feed Shaft Sleeve Washer
68	Longitudinal Feed Shaft Bracket	618	Feed Shaft Sleeve Nuts
71	Cross Feed Shaft Bearing	619	Longitudinal Feed Pinion Shaft
74	Slide End Bracket — L.H.	706	Table Stop Screw
101	Feed Shaft Bracket Cover	G10-27-3	Cross Feed Shaft Gear
113	Slide End Bracket Cover	G10-27-4	Rotary Feed Shaft Gear
584	Rotary Feed Shaft	G10-27-5	Longitudinal Feed Pinion Shaft Gear
593	Intermediate Sliding Gear Stud	G10-27-6A	Longitudinal and Cross Feed Screw Gears
602A	Longitudinal Feed Screw	G10-35-16	Longitudinal and Rotary Feed Gear
609	Reverse Clutch Yoke Shaft	G10-55-8	Cross Feed Intermediate Gear
610	Reverse Clutch Yoke Handle Bearing	GH14-30-1	Longitudinal Feed Gear
611	Cross Feed Shaft Collar		
612	Cross Feed Shaft		
613	Reverse Clutch Yoke Link		

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