PRATT & WHITNEY

12-INCH LATHE - MODEL B

OPERATOR'S INSTRUCTION BOOK

Publication No. M1395-1

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Colt Industries
Pratt & Whitney
Machine Tool Division

West Hartford, Connecticut 06101

INDEX

INDEX TO CHARTS AND ILLUSTRATIONS

IMPORTANT NOTICE

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

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 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 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.

The life, service and satisfaction derived from any machine tool depends in a large measure on the care and attention given it. The operator should be familiar with the contents of this instruction book before attempting to operate the lathe.

GENERAL INSTRUCTIONS

Setting up the Machine

The lathe is shipped in a single crate. It should be placed in position on the floor using the Floor Plan on Figure A to obtain the correct clearances. The machine next should be carefully leveled before it is bolted to the floor. An accurate level placed across the bed on size blocks will determine the warp of either end due to the floor. The two flats should be used for this and not the top of the V's. Any warp should be corrected by shims under the legs, and the machine should be exactly level in both directions at any point of the bed after it has been bolted to the floor. 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 lathe as shipped is covered with heavy grease to protect it against rust. This grease should be carefully cleaned off and the lathe 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 lathe of this sort deserves good treatment. Keep it clean.

Speeds and Feeds

The Speed and Feed Diagram on Figure B shows all the gear values, speeds, etc., throughout the machine, and a careful study of this will give a better working knowledge of the lathe. In addition to this diagram the working parts are described in detail later on in this book.

Lubrication

Headstock

The headstock gearing and the spindle are lubricated by a pump drawing oil from a reservoir in the lower part of the headstock. Care must be taken to fill the oil reservoir used for this purpose. This can readily be done by removing the pipe plug in the top of the clutch housing at the rear of the head, and filling with oil until the gage shows full to the line on the glass. This oil reservoir should take about two gallons of good machine oil for the initial filling and should always be kept full. A second plug beneath the clutch provides for draining this reservoir.

It should be noted that the oil used in this headstock is tightly enclosed, and is used over and over again in this one place. Although the headstock will keep out all dirt and foreign matter, it is well to empty and flush out the oil chamber at regular intervals, and renew the oil.

Oil is filtered automatically through felt plugs to the spindle bearings from the headstock pump (see Fig. D).

Gear Train Leading into Gear Box

The small oil pocket at the top of the ratio gear box supplies the gear train leading into the feed gear box.

The plainly marked "Oil Hole" on the change gear guard at the left hand end of the lathe serves the intermediate gear stud and should be oiled twice daily.

Feed Gear Box

Two small reservoirs, one at each end of the gear box, supply the various bearings within. These reservoirs are supplied by the two oilers at the top of the gear box, and these should be filled twice a day.

The gear box rocker is oiled thru the three oil holes directly above it, when placed in its extreme left position.

Apron

A reservoir at the lower left hand side of the apron supplies oil to the apron, the carriage and the cross slide ways. This oil is distributed by a pump to the various working parts. A proper level should be maintained at all times, as indicated on the oil gage. The drain plug is conveniently located at the bottom of the apron.

General

With the above exceptions the machine is oiled by means of small oil holes which are plainly in view or marked, and these should be gone over frequently. The slides should be kept oiled at all times both for ease of operation and to protect the scraped surfaces. The double dovetail cross slide may be easily oiled thru the holes provided in the slides. This is necessary when the lathe is being used for relieving.

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 lathe.

General Adjustments

End play in the lead screw is taken up by the lock nut adjustment E-7. The friction clutch at the rear of the machine is adjusted as shown on the brass plate attached to its cover.

If the locking eccentric in the tailstock rides over its high point without locking the tailstock to the bed, it is only necessary to change the adjustment of the bolt underneath.

Friction Clutch and Apron Control Mechanism

Power is delivered to the pulley D-35 on the main drive shaft at the rear of the bed which transmits it to the friction clutch D-36. This clutch is operated by the levers C-1 and C-2 which control the power to the machine itself. Either lever will start or stop the machine promptly.

Operation of either lever sets the plunger C-3 in position so that the spindle speed levers C-4 are locked in the required location. The machine must be stopped before the spindle speed levers can be changed.

A solid shaft passing through the lower section of the headstock is connected to the friction clutch D-36, at the rear of the machine and is attached to lever C-1 with an arm C-5 extending to the splined control rod C-6 for the operation of lever C-2. Movement of lever C-1 to the right will engage the clutch and transmit power to the spindle, whereas movement to the left will disengage the clutch and apply the brake. Lever C-2 moves up and down to obtain the same results.

Lever C-2 is mounted on a splined clutch control rod which is supported by a bracket attached to the apron. This lever operates at any position of the carriage and will be found exceptionally convenient when machining long pieces.

Coolant Pump

The coolant pump when supplied (to order only) with a lathe is attached to a separate pad directly below the taper attachment slide.

Whenever the pump is not needed it should be disconnected, to guard against premature wear, by loosening two screws that hold a small plate in a groove in the upper or driving gear shaft. This shaft is directly connected to the main drive from the friction clutch. After loosening the screws the small plate can be lifted out of the groove and the driving gear shaft pulled out to disengage the driving gear from the driven gear on the pump shaft.

A second groove in the driving gear shaft acts as a lock by dropping the small plate into this groove and tightening the two screws mentioned above. This will eliminate the possibility of accidentally engaging the driving gear.

GENERAL DESCRIPTION OF WORKING PARTS

Headstock Gearing (Fig. D)

A gear attached to the friction clutch carries the drive to the gear D-1 within the headstock. The friction clutch is entirely submerged and acts as the splash gear for distributing the oil throughout the headstock. In addition there is a small pump which carries oil up to a spreader which sprays it down on top of the gears when they are in motion. This pump is shown in Fig. D.

From the gear D-1 the power is carried up to the spindle nose thru the train of change gears as shown. The change gears D-7, D-8, D-9 and D-10 are mounted on a sleeve which is mounted on the spindle but which is not keyed to it in any way. The back gears D-13 and D-14 are beneath the spindle and are shown in the engaged position. They are operated by the eccentric shaft and lever D-17.

The back gear lock takes the form of a gear clutch D-11 which performs the double duty of connecting the change gears with the spindle nose D-16 when the back gears are "out", and of disconnecting the change gears from the spindle nose D-16 and engaging the back gears when the latter are "in". This clutch is simply a double gear which is shifted back and forth by the lever D-15. As shown, the gear D-11 is mated with the back gear D-13, while the gear corresponding to D-11 is within the gear D-10 where it always engages an internal gear. When the lever D-15 is thrown to the left the gear D-11 slides into mesh with an internal gear within the gear D-12 making the connection directly between the change gears and the spindle nose D-16. If left in this position (lever D-15 to the left and the back gears engaged) the spindle is locked. To operate with the change gears direct connected the back gears must be moved down out of engagement.

The following numbers (Fig. D) show the gear trains used to produce the eight spindle speeds ranging in order from the highest to lowest:

Back gears out, lever D-15 to the left

525 r.p.m.	1 - 2 - 3 - 7 - 16
322 r.p.m.	1 - 2 - 3 - 4 - 8 - 16
210 r.p.m.	1 - 2 - 3 - 5 - 9 - 16
126 r.p.m.	1 - 2 - 3 - 6 - 10 - 16

Back gears in, lever D-15 to the right

75 r.p.m.	1 - 2 - 3 - 7 - 11 - 13 - 14 - 12 - 16
46 r.p.m.	1 - 2 - 3 - 4 - 8 - 11 - 13 - 14 - 12 - 16
30 r.p.m.	1 - 2 - 3 - 5 - 9 - 11 - 13 - 14 - 12 - 16
18 r.p.m.	1 - 2 - 3 - 6 - 10 - 11 - 13 - 14 - 12 - 16

The shifting of the change gears D-3, D-4, D-5 and D-6 is accomplished by the two levers D-37 on the front of the headstock. A direct reading plate shows at a glance the spindle speed being used. A positive interlock between the two levers absolutely prevents meshing more than one set of gears at a time. These levers also are interlocked with the clutch control rod, so that the friction clutch must be opened before the gears can be shifted.

Feed Gearing (Fig. D)

Driving from the spindle gears D-18 and D-20 a train of feed gears leads down to the feed gear box D-41. This train provides for reversing the feed for right or left hand work and also contains a set of ratio gears D-24, D-25 and D-26 used for obtaining the various feeds or threads. The feed gear train is connected to D-20 or D-18 according to the setting of the reverse lever F-16 on the apron, or when left in the neutral position as shown in Figure D, the drive to the feed gear box is entirely disconnected. The reverse lever F-16 operates two single tooth clutches placed inside the gears D-19 and D-21 respectively, which connect the forward or reverse feed drive as desired. Either the gear D-21 or D-19 moves into line with the mating gears when connected.

The ratio gears D-24, D-25 and D-26 are moved by the ratio lever D-33. The three combinations are as follows:

Lever in upper hole - ratio 4 to 1
22 - 25 - 26 - 27 - 29 - 30 - 32

Lever in middle hole - ratio 1 to 1
22 - 25 - 28 - 29 - 30 - 32

Lever in lower hole - ratio 1 to 4
23 - 24 - 25 - 28 - 29 - 30 - 32

The extra gear D-31 is used for obtaining 11-1/2 threads per inch and must be interchanged with D-32 for the purpose as shown on the feed index plate. An adjustment is provided for properly meshing the gears.

Feed Gear Box (Fig. E)

The gear D-32 drives the small pinion which is carried within the large sleeve inside the feed gear box. This pinion meshes with a rocker gear controlled by the lever D-34, and this rocker gear in turn meshes with the cone of feed gears inside the box. A direct reading index plate is provided by means of which any thread per inch or feed per revolution can be instantly selected and set without the use of tables or charts. The lever E-1 is set at the end of the proper horizontal line which contains the desired thread or feed, and the rocker lever E-2 is set below the corresponding vertical line on the index plate, and with the result that the two settings converge at the desired point. Figure E shows the gear box set for 80 threads per inch or a feed of .0012 inches per revolution of the spindle according to the setting of the lever E-3.

The one exception to this instantaneous setting is for 11-1/2 threads per inch. This setting requires the extra gear D-31 as described under the feed gearing.

The lead screw E-6, feed rod E-5, and stop and reverse rod E-4 lead out from the right hand end of the gear box. A selective lever E-3 permits either the feed rod or the lead screw to be used as desired, and when one is in use the other is at rest. This lever operates a sliding gear, so that when thrown to the right the lead screw is engaged and when thrown to the left the feed rod is engaged.

Apron and Apron Controls (Fig. F)

Figure F shows the general construction of the apron. No bevel gears are used, the entire drive being thru worms and spur gears. A study of the illustration will give all necessary information.

The stop and reverse rod is a feature which will be appreciated. The lever F-16 which operates this rod has three positions which enables the carriage to be traversed in either direction or held stationary as desired.

The lead screw nut engaging lever F-15 interlocks with the longitudinal traverse power feed knob F-12 and the cross traverse power feed knob F-14. This lever F-15 cannot be engaged until the knobs F-12 and F-14 are fully released. These two knobs operate cast iron cone clutches. The longitudinal handwheel disengaging knob F-12 releases handwheel F-1.

CAUTION

Do not engage or reverse clutch lever with spindle running above 322 R.P.M. Above this speed engage clutch lever before starting spindle.

Carriage (Fig. F)

Figure F shows the working details of the carriage. No difficulty should be experienced in understanding the various operating parts, and a study of the sectional view will give all the necessary information.

The quick withdrawing attachment is a device for thread cutting. It merely consists of a coarse screw which is engaged in place of the regular cross feed screw, so that a slight turn of the handwheel will completely withdraw the tool from the thread. Either the fine or coarse feed is engaged by means of the square nuts shown in the sectional view. When both are tightened the cross feed is locked.

Graduated rings are provided on each handwheel for fine adjustment. These rings are loose and may be set as desired.

Tailstock

The tailstock spindle is graduated for drilling. A tang slot is provided for a drift key for removing the center. This will be found to be an advantage when the spindle is extended as it saves the time required to turn the spindle back. The center may also be removed in the usual way however. The same handle which locks the tailstock to the bed serves as a convenient handle for moving the tailstock into position.

Spindle and Cam-Lock Spindle Nose

The spindle is hardened, tempered and accurately ground, leaving the front end very hard, to prevent the embedding of chips and to assure permanent accuracy. It is mounted on preloaded super-precision ball bearings, and will require no further adjustment.

In accordance with the newest and best lathe practice, this lathe is equipped with the Cam-Lock Spindle Nose, which holds face plates and chucks true and rigid.

To mount face plates or chucks on the Cam-Lock Spindle Nose, proceed as follows:

1. Wipe off all chips and dirt from the pilot and flange of the spindle nose and of the corresponding recess and shoulder on the face plate or chuck, so that no chips remain that would otherwise prevent their running true.

2. Place the registration lines G-2 on the heads of the six Cam-Locks, so as to match the corresponding lines G-1 on the outer rim of the spindle nose. Detents will hold them in these positions.

3. Lift the face plate or chuck up in line with the spindle, either by hand (resting it on a wooden block) or by using the sling of a crane, and push it onto the spindle nose.

4. Tighten the Cam-Locks G-3 by a "clockwise" turn of the wrench, pulling them up tight by hand -- it is not necessary to use a hammer on the wrench. When the Cam-Locks are tightened, the registration lines G-2 on their heads should be between the "three o'clock" and "six o'clock" positions. If any one of these does not register within this range, the mating stud G-4 in the face plate or chuck should be adjusted.

   This is done by removing the hollow head retaining screw G-5, and by turning the stud G-4 one or more complete turns to the right to shorten and to the left to lengthen. Be sure to replace the hollow head retaining screw G-5.

It takes less than a minute to mount a chuck or face plate, the weight of which is within a man's ability to lift off the bench.

To remove the face plate or chuck reverse the operations. That is:

1. Unlock the Cam-Lock studs G-3 by turning the wrench "counter-clockwise" until the registration lines G-2 on the heads of the six cam-locks match the corresponding lines G-1 on the flange of the spindle nose.

2. Gently tap the face plate or chuck with a lead hammer so as to loosen the pinch at the pilot, and then pull it away from the spindle nose. This operation also takes less than a minute under similar conditions.

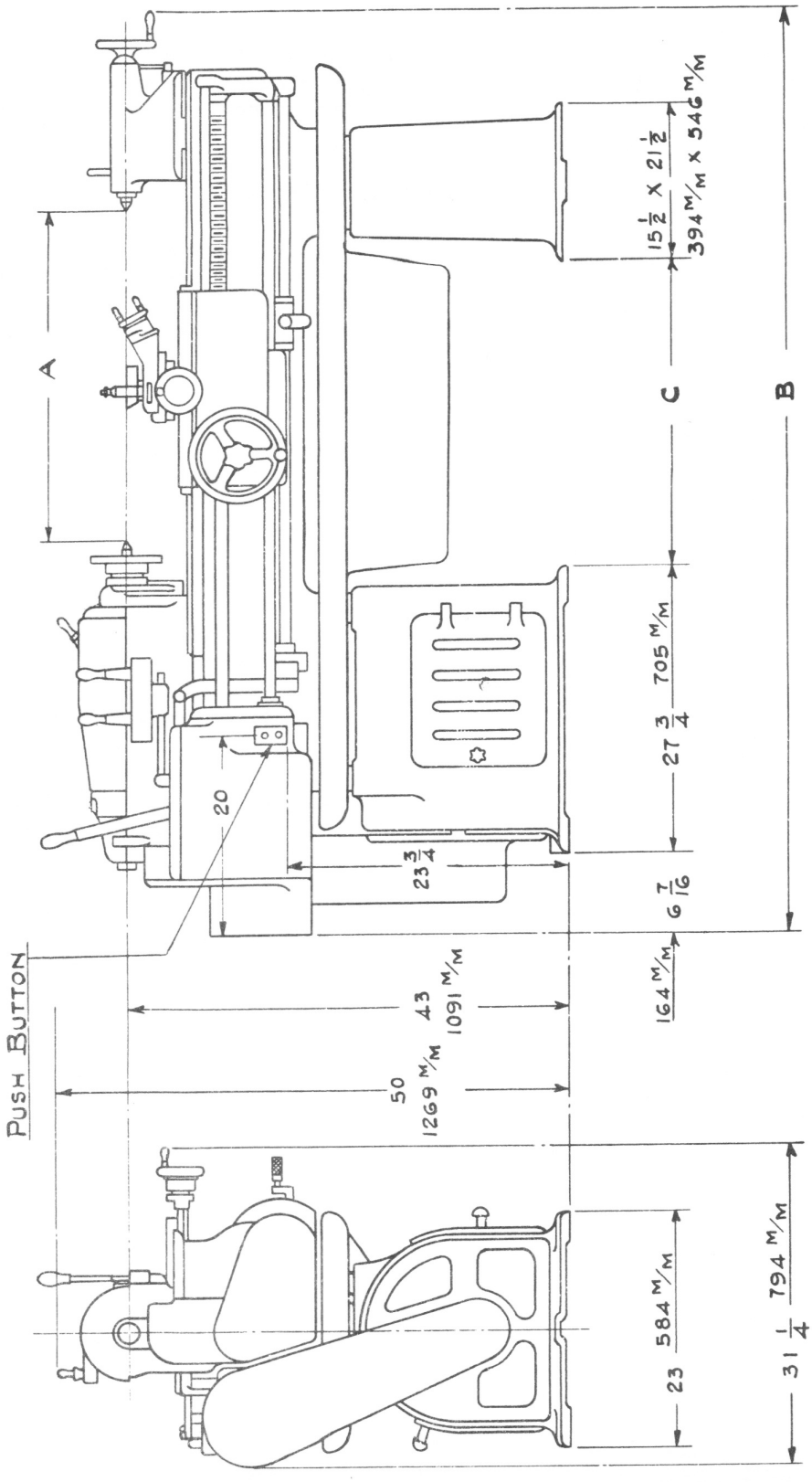
The Cam-Lock spindle nose has been developed under the procedure of the American Standards Association (ASA-B-5-L) and sponsored by the Society of Automotive Engineers, the Society of Mechanical Engineers, and the National Machine Tool Builders' Association, and is designated as "Lathe Spindle Nose, Type D-1".

It is interchangeable with the American Standard Spindle Nose for turret and automatic lathe. Therefore, a Cam-Lock chuck for a turret lathe may be used on this lathe or vice versa.

The taper hole in the front end of the spindle is hardened and accurately ground for true mounting of a center sleeve, collet closers, expansion bushing arbors, etc.

Capacity	Length Over All		Space Between Feet	
A	B		C	
30	813 M/M	87 5/8	29 1/8	740 M/M
48	1270 M/M	105 5/8	47 1/8	1197 M/M

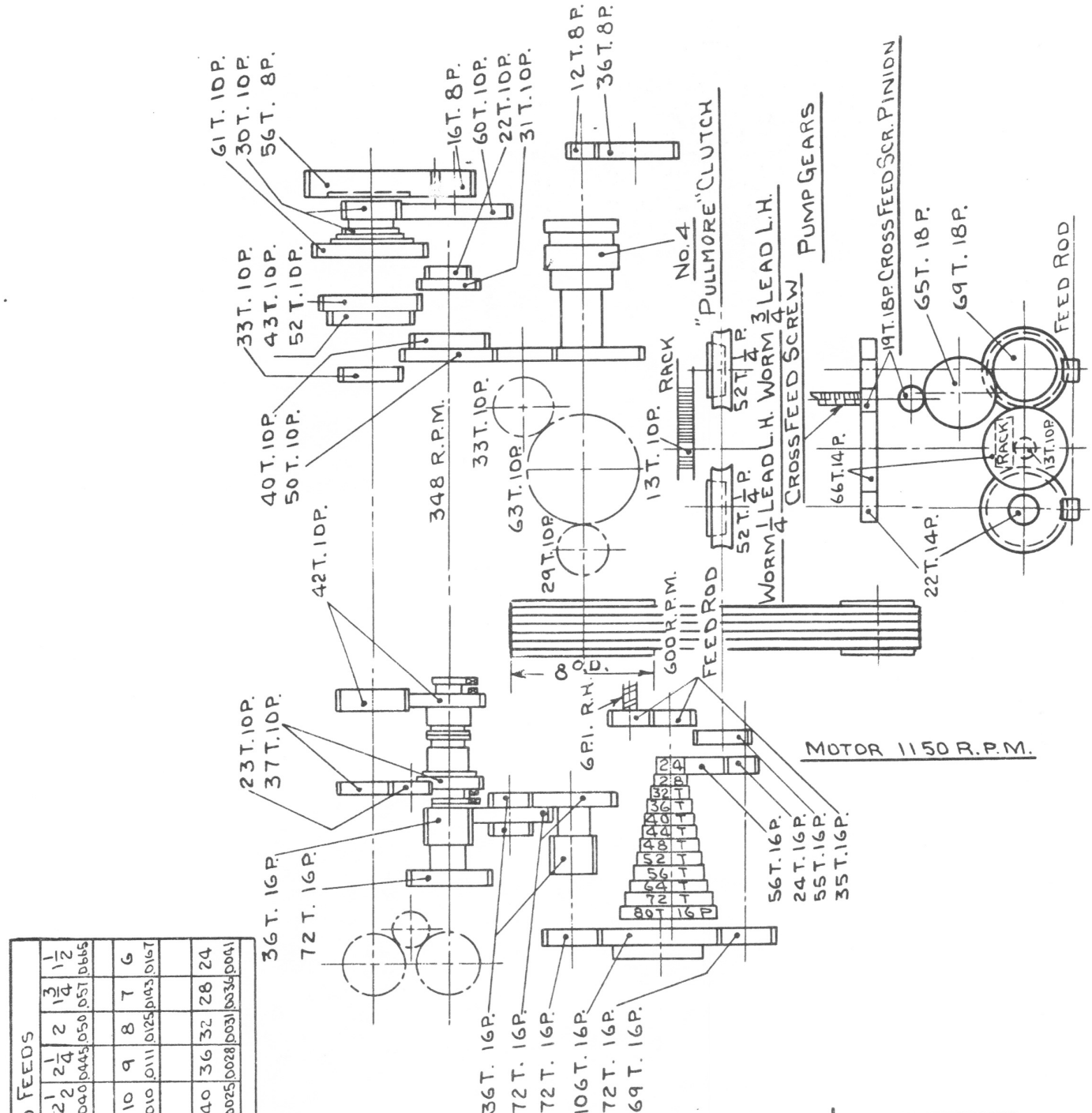
Spindle Speeds
18
126
30
210
46
322
75
525



FLOOR PLAN

FIG. A

MD-229



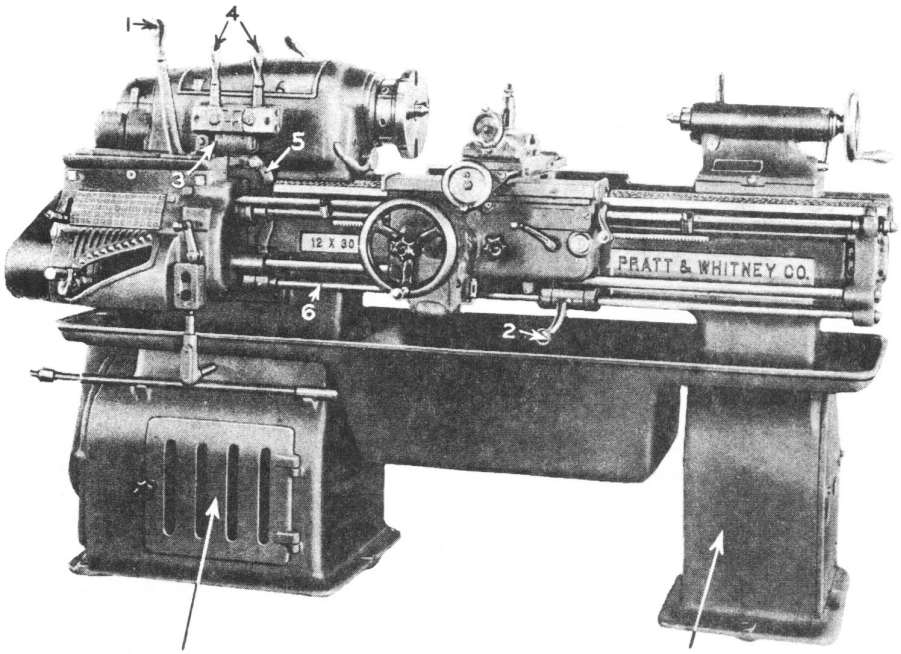
Stud	Screw	Threads And Feeds																					
72	72	5 .020	4 1/2 .0222	4 .025	3 1/2 .0286	3 1/4 .0308	3 .033	2 3/4 .036	2 1/2 .040	2 1/4 .0445	2 .050	1 3/4 .057	1 1/2 .0665										
72	72	20 .005	18 .0055	16 .0062	14 .0071	13 .0077	12 .0083	11 .0091	10 .010	9 .0111	8 .0125	7 .0143	6 .0167										
72	69	Middle Hole 11 1/2																					
72	72	80 .0012	72 .0014	64 .0015	56 .0018	52 .0019	48 .0021	44 .0023	40 .0025	36 .0028	32 .0031	28 .0034	24 .0041										

MD-314

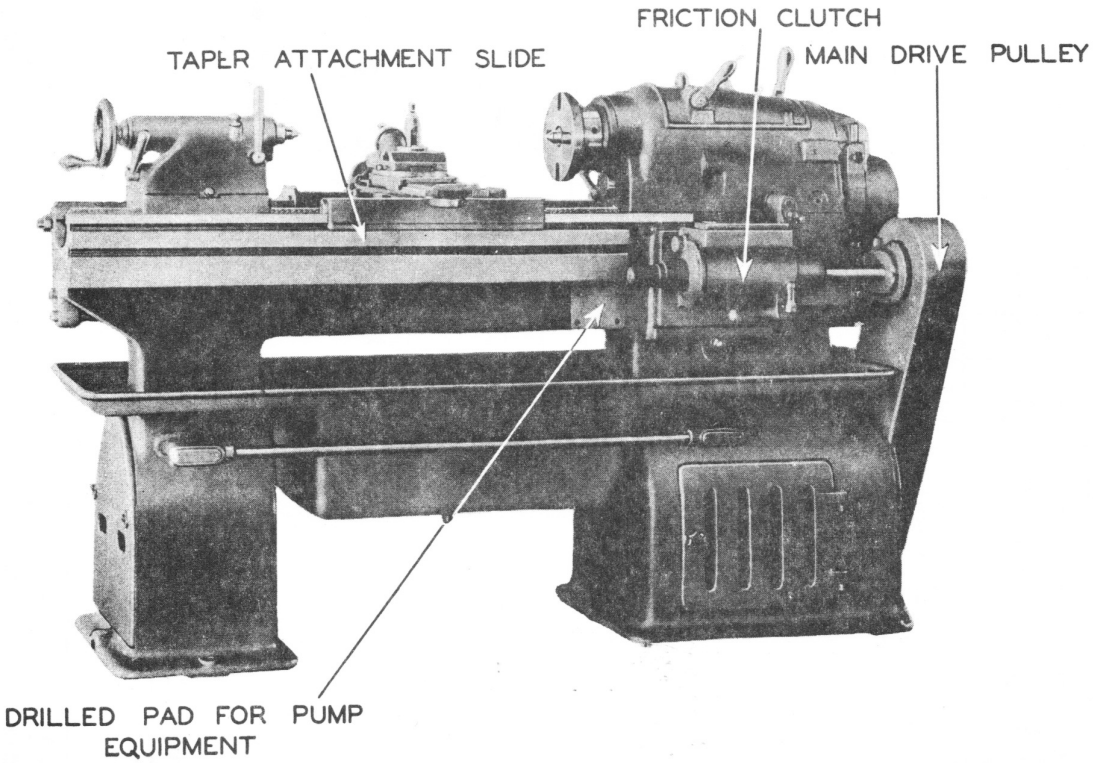
Spindle Speeds	
18	126
30	210
46	322
75	525

SPEED & FEED DIAGRAM

FIG. B



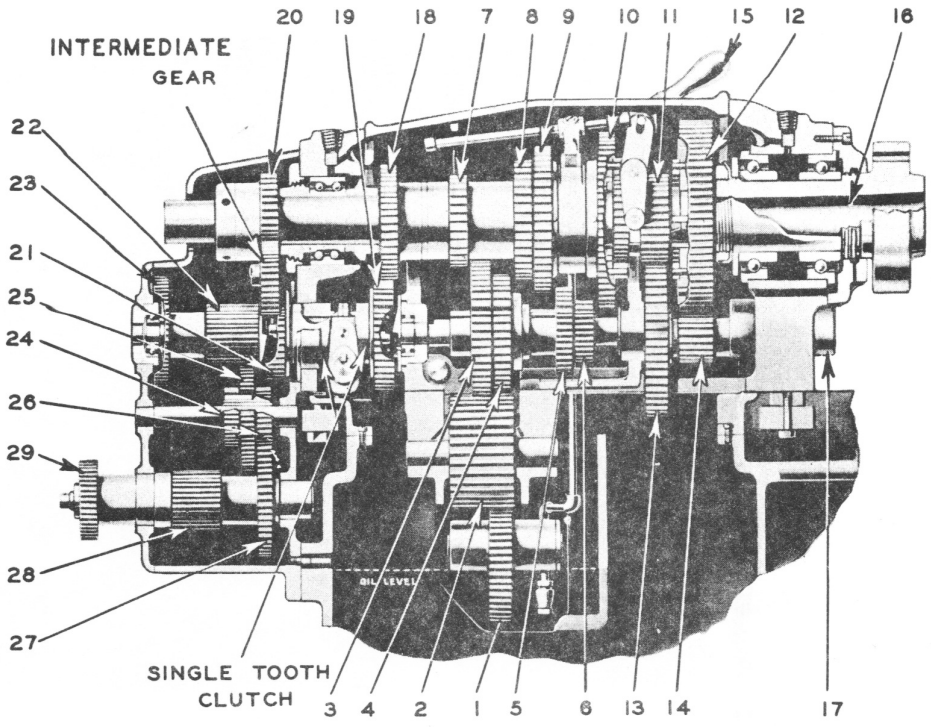
FRONT VIEW



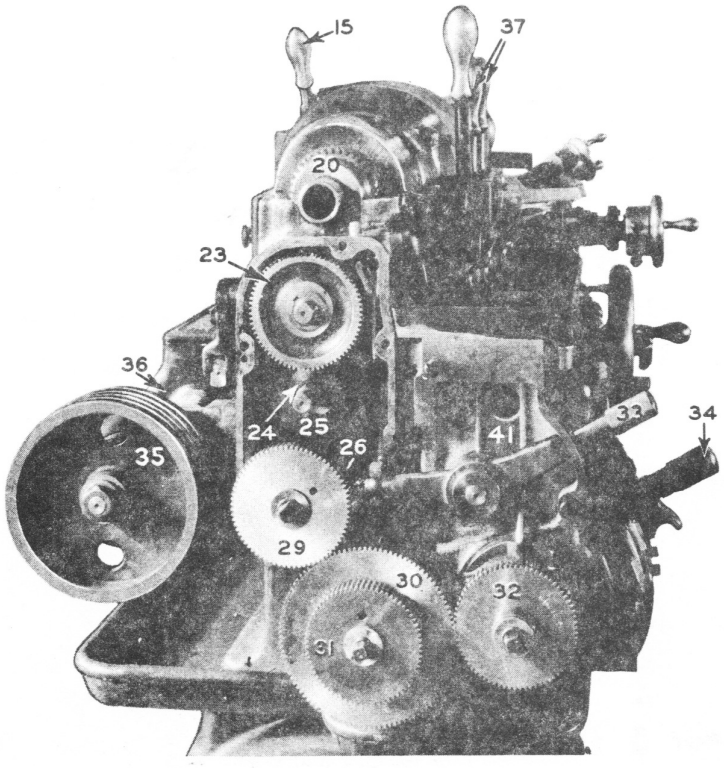
REAR VIEW

FIG. C

SECTION THROUGH HEAD

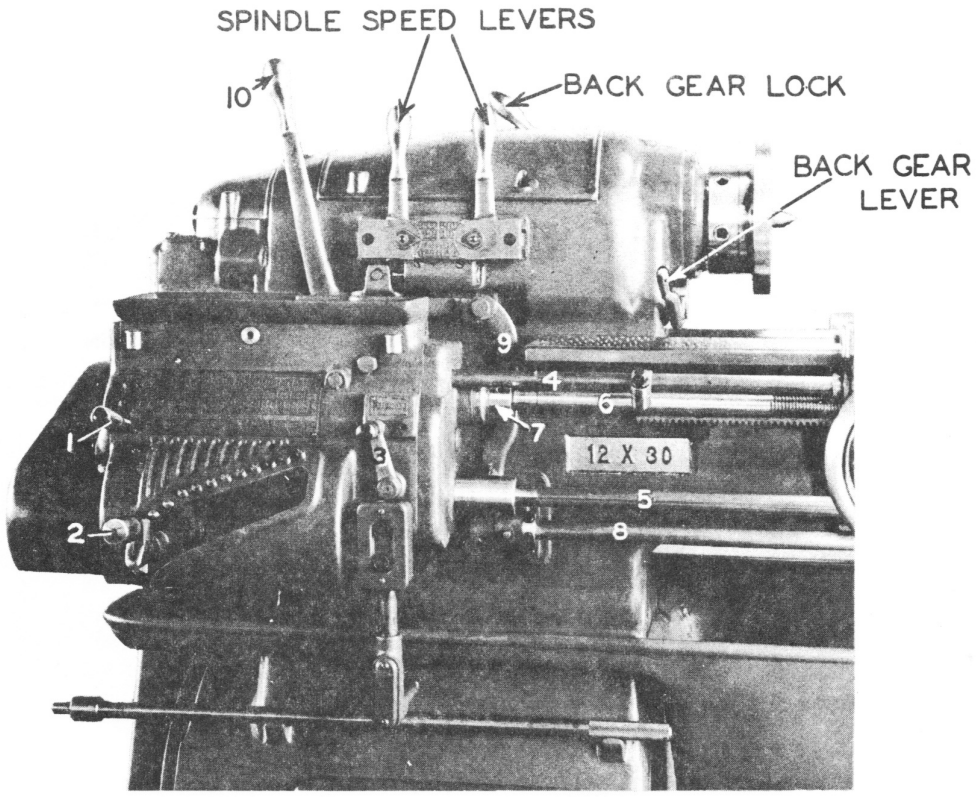


GEAR TRAIN LEADING INTO GEAR BOX



DETAILS OF MAIN DRIVE

FIG. D



GEAR BOX

AS SHOWN THE GEAR BOX IS SET FOR A FEED OF .0012 INCHES PER REVOLUTION OF THE SPINDLE. BY SHIFTING THE LEVER E-3 THE POWER IS SHIFTED FROM THE FEED ROD TO THE LEAD SCREW, AND THE LATHE IS THEN SET FOR 80 THREADS PER INCH.

1-RATIO LEVER
2-ROCKER LEVER
3-FEED TO SCR. SHIFT LEVER
4-STOP & REVERSE ROD
5-FEED ROD
6-LEAD SCREW
7-END PLAY ADJ. (LEAD SCREW)
8-CLUTCH CONTROL ROD
9-CLUTCH SHIPPER LINK
10-CLUTCH CONTROL LEVER

STUD	SCREW	THREADS AND FEEDS											
72	72	5 .020	4 1/2 .0222	4 .025	3 1/2 .0286	3 1/4 .0308	3 .033	2 3/4 .0364	2 1/2 .040	2 1/4 .0445	2 .050	1 3/4 .057	1 1/2 .0665
72	72	20 .005	18 .0055	16 .0062	14 .0071	13 .0077	12 .0083	11 .0091	10 .010	9 .0111	8 .0125	7 .0143	6 .0167
72	69	MIDDLE HOLE					11 1/2						
72	72	80 .0012	72 .0014	64 .0015	56 .0018	52 .0019	48 .0021	44 .0023	40 .0025	36 .0028	32 .0031	28 .0036	24 .0041

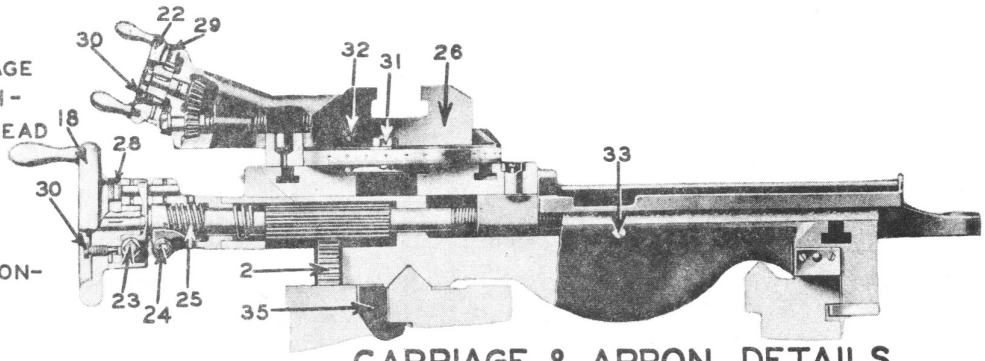
FIG. E

-RIGHT-

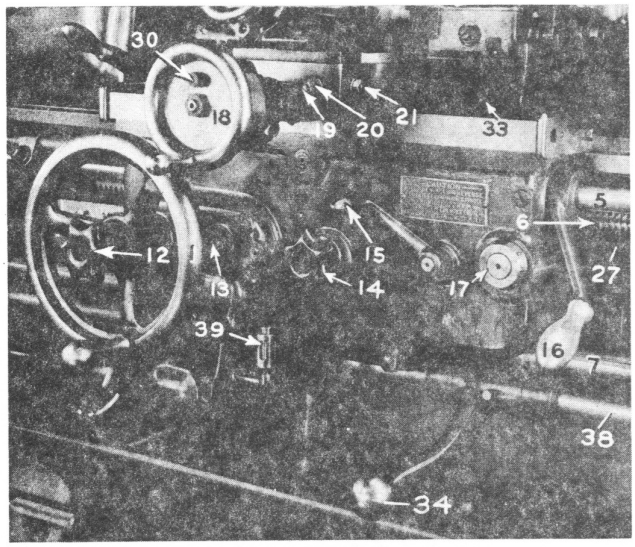
SECTION THROUGH CARRIAGE SHOWING THE QUICK WITHDRAWING DEVISE FOR THREAD CUTTING.

-BELOW-

GENERAL VIEW OF APRON SHOWING THE VARIOUS CONTROLS.

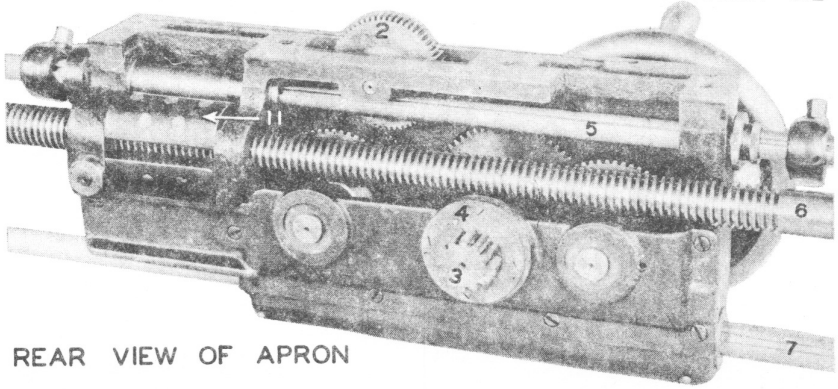


CARRIAGE & APRON DETAILS



THE CARRIAGE IS PROVIDED WITH BOTH THE OLD STYLE OF THREAD CUTTING STOP F-20, AND THE NEW QUICK-WITHDRAWING SLEEVE OPERATED BY THE COURSE SCREW F-25. THE CHASING DIAL F-17 IS GRADUATED IN FOUR POSITIONS AND WHEN ONCE SET CORRECTLY, THE LEAD SCREW NUT F-11 CAN BE ENGAGED VERY EASILY AT ANY OF THE FOUR PLACES BY MEANS OF LEVER F-15.

1-LONGITUDINAL FEED HANDWHEEL
2-CROSS FEED INTERMEDIATE GEAR
3-RACK PINION
4-BALL BEARING HOUSING
5-STOP & REVERSE ROD
6-LEAD SCREW
7-FEED ROD
8-ADJUSTABLE CARRIAGE STOP
9-CARRIAGE STOP NUT
10-STOP COLLARS
11-LEAD SCREW NUT
12-LONGITUDINAL FEED FRICTION KNOB
13-RACK PINION DISENGAGING KNOB
14-CROSS FEED FRICTION KNOB
15-LEAD SCREW NUT ENGAGING LEVER
16-APRON REVERSE LEVER
17-THREAD CHASING INDICATOR DIAL
18-QUICK WITHDRAWING HANDWHEEL
19-CROSS SLIDE STOP NUT
20-CROSS SLIDE STOP ROD NUTS
21-CROSS SLIDE STOP ROD BINDER
22-TOOL POST SLIDE HANDWHEEL
23-QUICK WITHDRAWING BINDER SCREW
24-QUICK WITHDRAWING SLEEVE BINDER NUT
25-QUICK WITHDRAWING SLEEVE
26-COMPOUND REST
27-CARRIAGE RACK
28-CROSS FEED GRADUATED RING
29-TOOL POST SLIDE GRADUATED RING
30-GRADUATED RING BINDER SCREW
31-TOOL POST SWIVEL T BOLTS
32-TOOL POST SLIDE BINDER
33-TAPER SLIDE BINDER
34-APRON CLUTCH CONTROL LEVER
35-CARRIAGE CLAMP
36-CARRIAGE CLAMP BINDER
38-CLUTCH CONTROL ROD
39-APRON OIL GAGE & FILLER

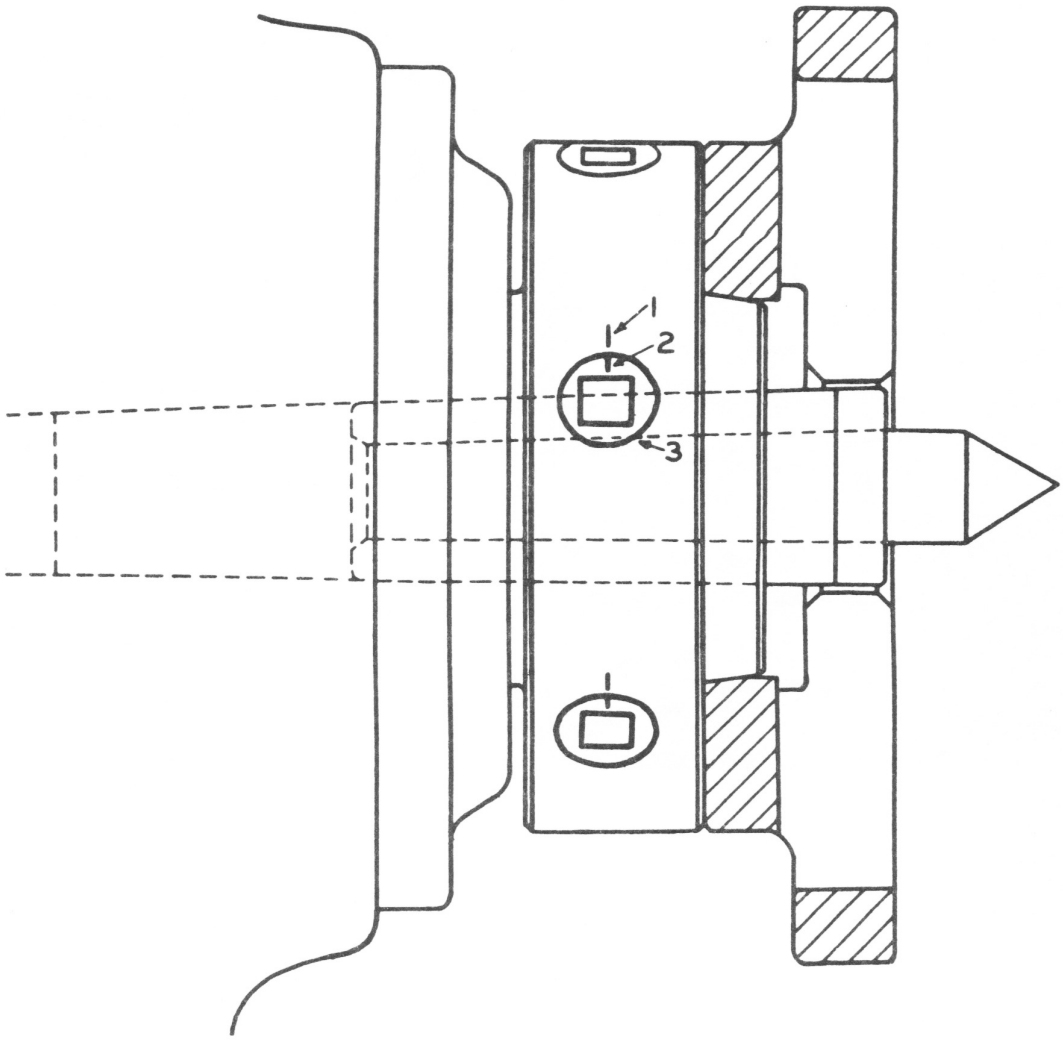


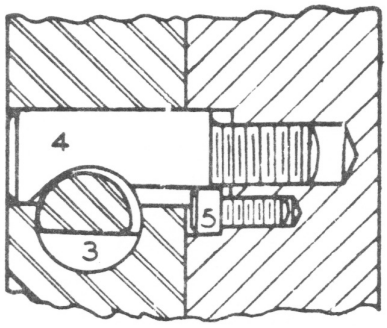
REAR VIEW OF APRON

THE DOUBLE WALLED CONSTRUCTION OF THE APRON IS SHOWN AT THE LEFT. THE LONGITUDINAL TRAVEL IS OBTAINED BY THE PINION F-3 WHICH IS MOUNTED IN A BALL BEARING HOUSED IN F-4.

THE LEAD SCREW NUT F-11 IS BABBITTED TO REDUCE WEAR ON THE SCREW AND THE BABBITT CAN EASILY BE REPLACED AT ANY TIME IN THE USUAL MANNER.

FIG. F

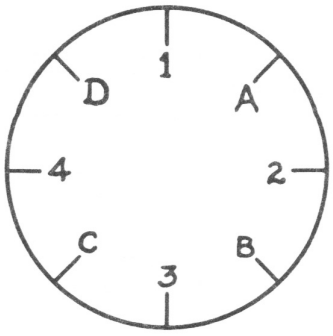




CAM-LOCK

SPINDLE NOSE

FIG. G



Lead Screw 1-1/4"D 6 PI R.H. Single

Indicator Pinion 24T

1 Turn of Dial indicates 4" advance on Lead Screw

Method of Using Dial

For even threads that are multiples of 6
half nuts may be engaged at any point.
For even threads that are not multiples of 6
half nuts may be engaged at any graduation.
For odd threads
half nuts may be engaged at alternate graduations.
For fractional threads in halves
half nuts may be engaged at opposite graduations.
For fractional threads in quarters
use same graduation each time.
For other fractional threads use of dial is not recommended. readings being either fractionally less or more than one full turn of dial.

THREAD CHASING DIAL DIAGRAM

MD-373

FIG. H

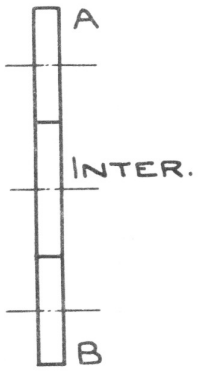
1395-B-22

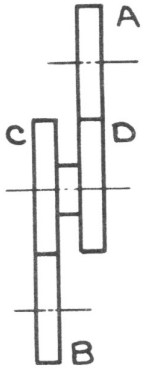
Position of Ratio Lever	80T.	72T.	64T.	56T.	52T.	48T.	44T.	40T.	36T.	32T.	28T.	24T.
Upper Hole R=4/1	○	○	○	○	○	○	○	○	○	○	○	○
Middle Hole R=1/1	○	○	○	○	○	○	○	○	○	○	○	○
Lower Hole R=1/4	○	○	○	○	○	○	○	○	○	○	○	○

Gear In Cone Bank = G

Rocker Gear = 24T.

Lead Screw 6 P.I.





-For Simple Gearing-

$$\frac{A \times 24 \times R}{B \times G \times 6} = \frac{A \times 4 \times R}{B \times G} = \text{Lead} = \frac{1}{\text{T.P.I.}}$$

-For Compound Gearing-

$$\frac{A \times C \times 4 \times R}{B \times D \times G} = \text{Lead} = \frac{1}{\text{T.P.I.}}$$

The Following Method Can Be Used In Most Cases

Select Some Convenient Thread On Index Plate And

Set Change Gear Levers As For Cutting This Thread

$$\frac{\text{Thd. On Index Plate}}{\text{Thd. To Be Cut}} = \frac{\text{Gear On Stud A}}{\text{Gear On Screw B}}$$

For Example - To Cut 27 P.I., Set Levers To 36 On Index Plate-

-Then $\frac{36}{27} = \frac{72}{54} = \frac{A}{B}$ Then Gear On Stud = 72T.

Gear On Screw = 54T.

This May Be Checked By The Formula $\frac{A \times 4 \times R}{B \times G} = \frac{72 \times 4 \times 1}{54 \times 36 \times 4} = \frac{1}{27}$

In Some Cases It Will Be Found Necessary To Use-

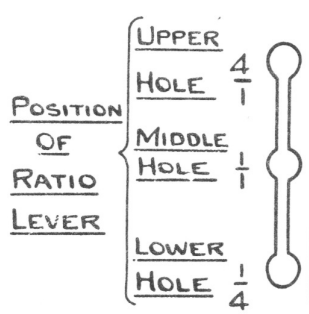
Compound Gearing-In Which Case The Rule Becomes

$$\frac{\text{Thd. On Index Plate}}{\text{Thd. To Be Cut}} = \frac{A \times C}{B \times D}$$

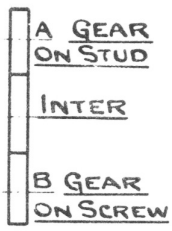
FORMULA FOR FIGURING CHANGE GEARS FOR SPECIAL THREADS

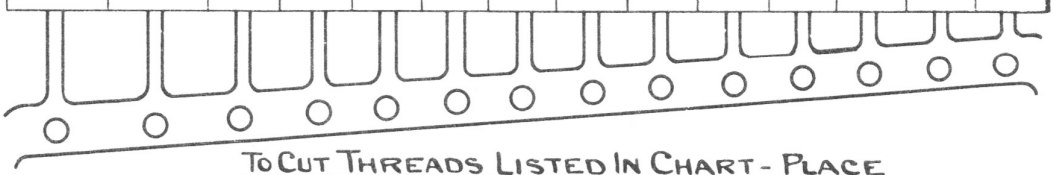
FIG. J

MD-340



STUD	SCREW												
72	72	5	4½	4	3½	3¼	3	2¾	2½	2¼	2	1¾	1½
72	72	20	18	16	14	13	12	11	10	9	8	7	6
72	69						11½						
72	72	80	72	64	56	52	48	44	40	36	32	28	24





TO CUT THREADS LISTED IN CHART - PLACE CHANGE GEARS ON MACHINE AS SHOWN AND SET QUICK CHANGE LEVERS AS FOR CUTTING THREAD LISTED UNDER "INDEX" WHOLE THREADS NOT SHOWN ARE GIVEN ON THE STD. INDEX PLATE ON MACHINE. GEAR RATIOS FOR ODD LEADS ARE CALCULATED AS SHOWN ON DATA SHEET M.D.-340

STUD A	SCREW B	THREADS PER INCH	INDEX	STUD A	SCREW B	THREADS PER INCH	INDEX	STUD A	SCREW B	THREADS PER INCH	INDEX
72	60	15	18	48	60	50	40	72	79	79	72
72	51	17	24	72	51	51	72	48	54	81	72
72	57	19	24	72	53	53	72	72	82	82	72
72	54	21	28	72	54	54	72	72	83	83	72
72	66	22	24	48	60	55	44	48	72	84	56
72	69	23	24	72	57	57	72	48	51	85	80
48	60	25	20	72	58	58	72	72	86	86	72
72	52	26	36	72	59	59	72	48	58	87	72
72	54	27	36	72	60	60	72	48	66	88	64
72	58	29	36	72	61	61	72	72	89	89	72
72	60	30	36	72	62	62	72	48	54	90	80
72	62	31	36	72	63	63	72	72	91	91	72
72	66	33	36	48	60	65	52	48	69	92	64
72	51	34	48	72	66	66	72	48	62	93	72
48	60	35	28	72	67	67	72	72	94	94	72
72	74	37	36	48	51	68	64	48	57	95	80
72	57	38	48	72	69	69	72	60	72	96	80
48	52	39	36	48	60	70	56	72	97	97	72
72	82	41	36	72	71	71	72	72	98	98	72
72	54	42	56	72	73	73	72	48	66	99	72
72	86	43	36	72	74	74	72	48	60	100	80
48	60	45	36	48	50	75	72	48	66	110	80
72	69	46	48	48	57	76	64	48	72	120	80
72	94	47	36	48	66	77	56				
72	49	49	72	48	52	78	72				

CHART FOR SPECIAL THREADS

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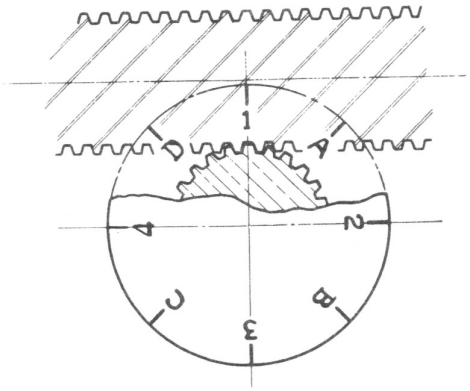
FIG. K

Chart For Multiple Thread Indexing With Thread Chasing Dial



Lead Screw 6 P.I.-R.H. Acme
Indicator Pinion 24 T.
1 Turn Of Dial = 4" Travel Of Carriage

To Cut Multiple Start Threads-
Close Half Nut At No. 1 Graduation And Take First Cut. Open Half Nut And Change To Positions Shown In The Table Below For Different Threads And Starts. Dial Can Be Made To Turn By Moving Carriage With Handwheel Or With Carriage Stationary By Allowing Lead Screw To Turn. The Half Nut Is Closed When The Proper Graduation Is In Line With Reference Mark On Apron And The Next Cut Taken.

Set Levers To Cut	Lead	Pitch		
		2 Start	4 Start	
$1\frac{3}{4}$	$\frac{4}{7}$	$3\frac{1}{2}$	7	For 2 Starts Use No's. 1 & 3 For 4 Starts Use No's. 1, 2, 3 & 4
$2\frac{1}{4}$	$\frac{4}{9}$	$4\frac{1}{2}$	9	
$2\frac{3}{4}$	$\frac{4}{11}$	$5\frac{1}{2}$	11	
$3\frac{1}{4}$	$\frac{4}{13}$	$6\frac{1}{2}$	13	
$1\frac{1}{2}$	$\frac{2}{3}$	3	6	For 2 Starts Use No's. 1 & 2 For 4 Starts Use No's. 1, A, 2 & B
$2\frac{1}{2}$	$\frac{2}{5}$	5	10	
$3\frac{1}{2}$	$\frac{2}{7}$	7	14	
$4\frac{1}{2}$	$\frac{2}{9}$	9	18	
3	$\frac{1}{3}$	6		For 2 Starts Use No's. 1 & A Or Start At Any No. And Change To Any Letter.
5	$\frac{1}{5}$	10		
7	$\frac{1}{7}$	14		
9	$\frac{1}{9}$	18		
11	$\frac{1}{11}$	22		
13	$\frac{1}{13}$	26		

Even Threads 2, 4, 6 Etc. Can Not Be Indexed.

MULTIPLE THREAD INDEXING CHART

FIG. L

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