



VICEROY 280VS

METAL TURNING LATHE

VICEROY 280VS

VARI-SPEED LATHE MANUFACTURED BY DEFA

VS.

INSTALLATION
OPERATION AND
MAINTENANCE
INSTRUCTIONS

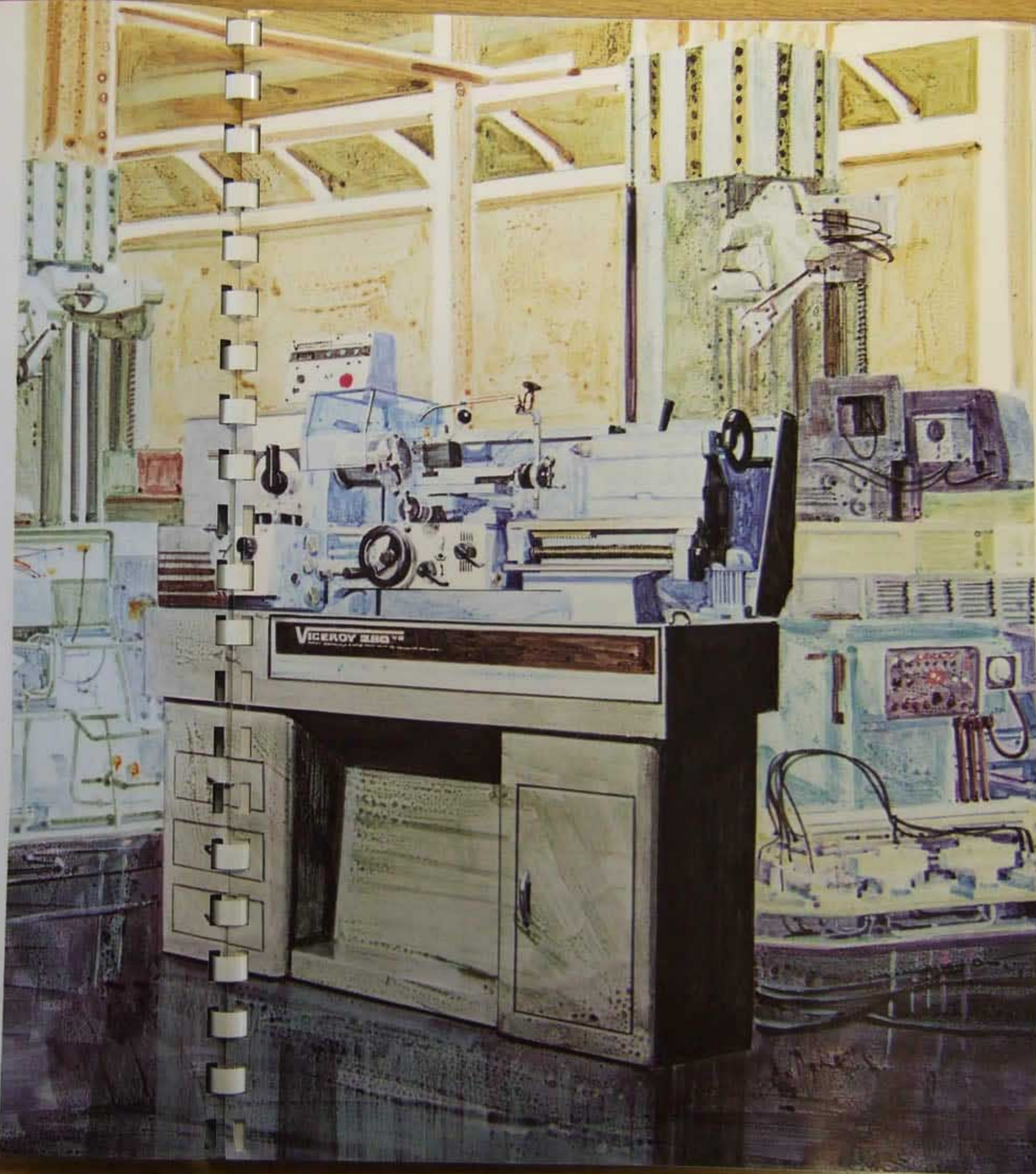
VICEROY 280 vs

METAL TURNING LATHE

Generations of machine tool operatives owe at least some of their skills to training they received on Viceroy machine tools, designed and made in Britain by Denford. Viceroy has been a household name in the field of technical training for most of the twenty years of the Company's existence.

Today, the Denford name is carried by an increasingly broad range of machine shop equipment; metal and woodworking lathes, grinders, shapers, sanders, drilling machines, tool sharpeners and dust extractors, with a high reputation for quality and sound after-sales service and spares.

All Denford products are designed with safety as a pre-requisite. Manufacturing traditionally for the technical education market, Denford have always sought to provide the ultimate in safety by demanding a simplicity of design and operation consistent with top performance.

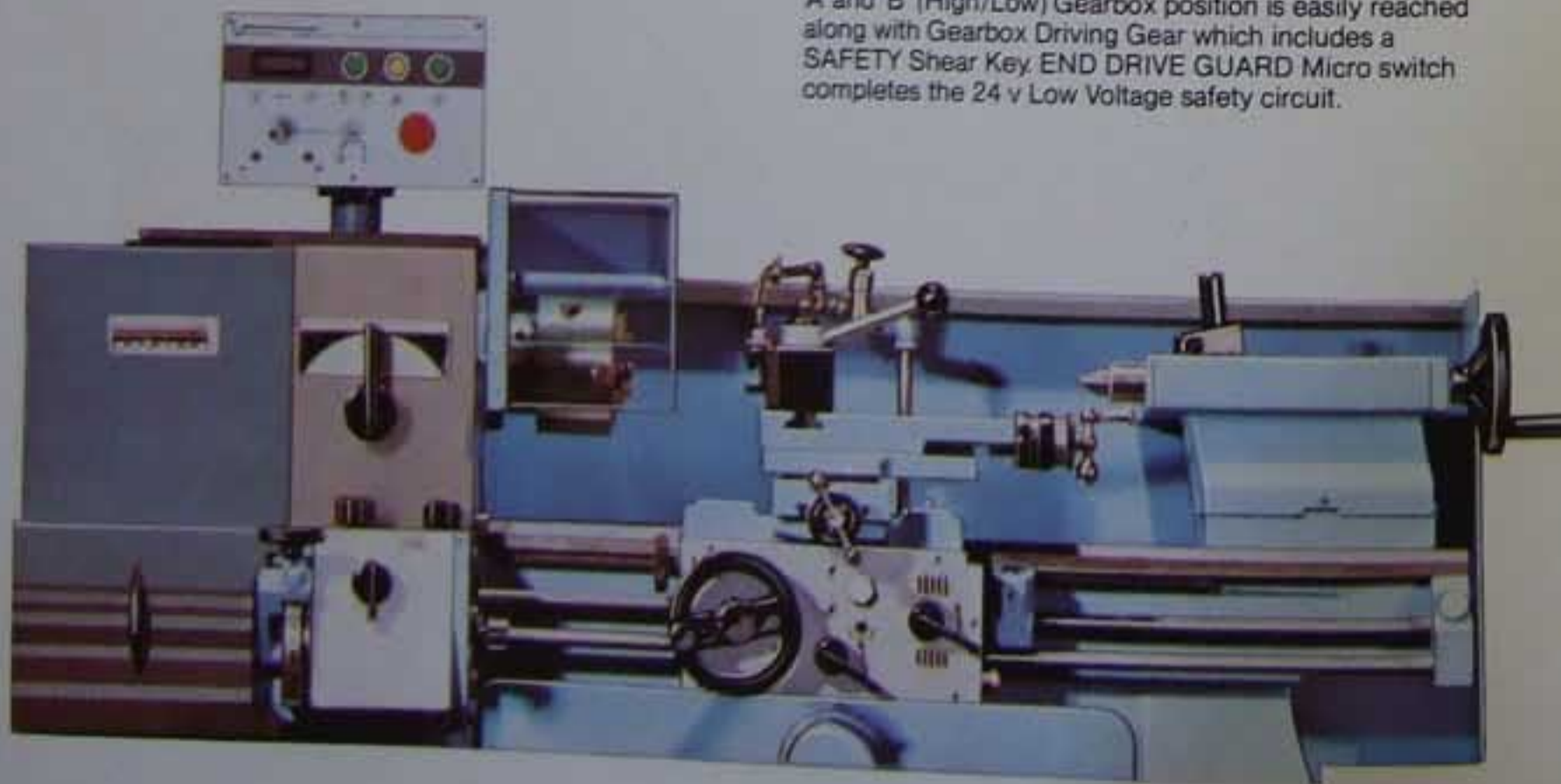




HEADSTOCK AND GEARBOX

Ergonomically Designed Controls for Headstock and Gearbox ensure simplicity and ease of operation. High and low Range lever for Headstock engages Backgear.

Dial Selector Gearbox has graphically designed chart to ease operator training.



CARRIAGE AND TAILSTOCK

Robust, compact saddle, Crossslide, swivel and top slide with quick change toolpost in position. Separate leadscrew and feed-shaft with end drive bracket incorporating needle thrust washers is illustrated. Sculptured Tailstock designed for maximum capacity and performance. Safety bed stop.

END DRIVE

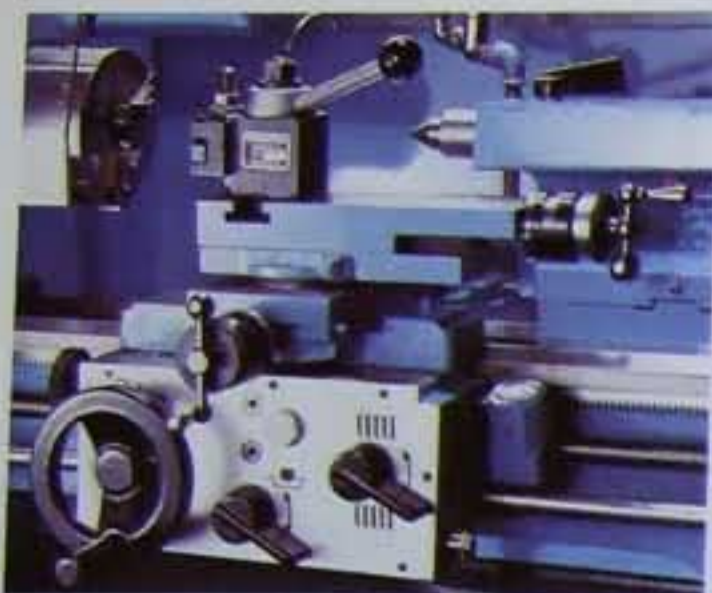
Spindle/Gearbox End Drive incorporates Forward/Reverse Selector for leadscrew and feedshaft. 'A' and 'B' (High/Low) Gearbox position is easily reached along with Gearbox Driving Gear which includes a SAFETY Shear Key. END DRIVE GUARD Micro switch completes the 24 v Low Voltage safety circuit.

OPERATING PENDANT

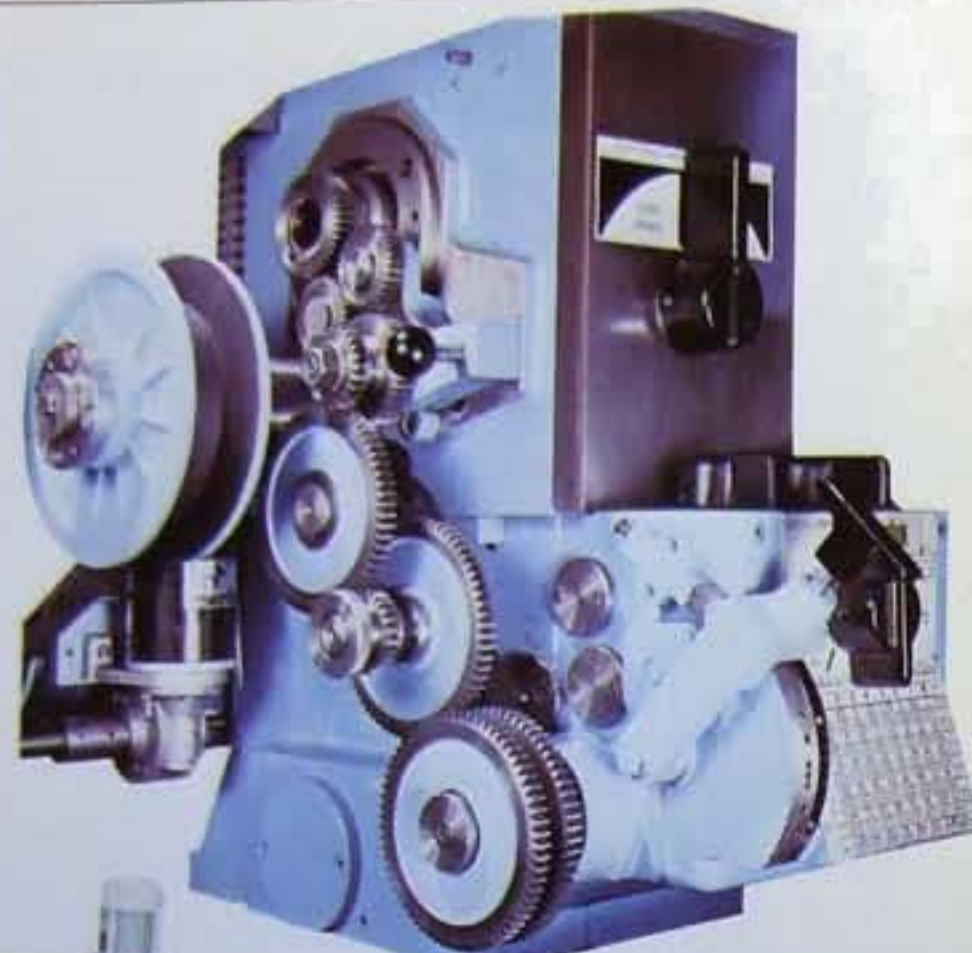
Module design of assembly enables electrical components to be serviced or replaced easily. Electronic Digital Tachometer. Illuminated Push Button controls for easy operation.

1. Electronic Digital Tachometer.
2. Speed Interlock. Key Switch.
3. Speed Change Indicators (Green).
4. Joy Stick Speed Control.
5. Mushroom Stop Button.
6. Forward and Reverse Indicators.
7. Forward and Reversing Switch (Yellow).
8. Coolant Pump Switch.
9. Start Button.





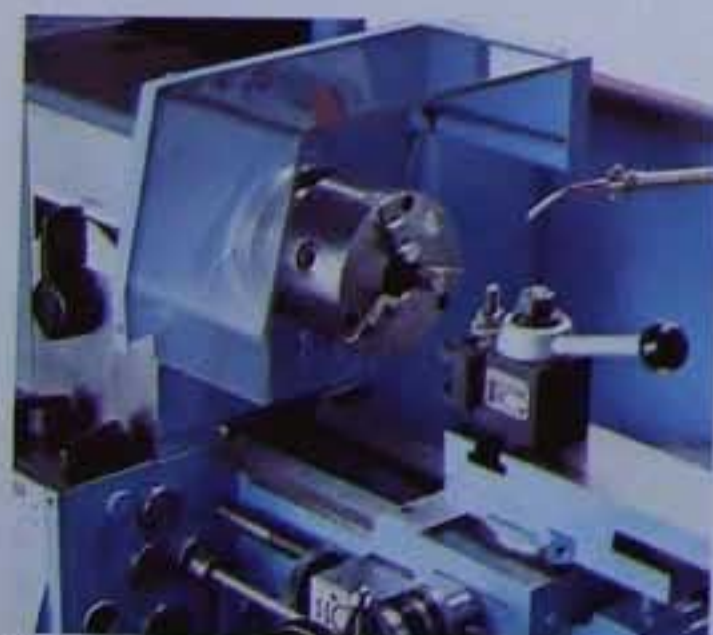
Ergonomic grouping of controls on apron, compound slide and Q.C. toolpost.



Input. Variable speed pulley, with end drive reversing bracket, quadrant and high/low change gears.



Toolmakers Cabinet, tray and fittings supplied in lieu of standard cabinet.

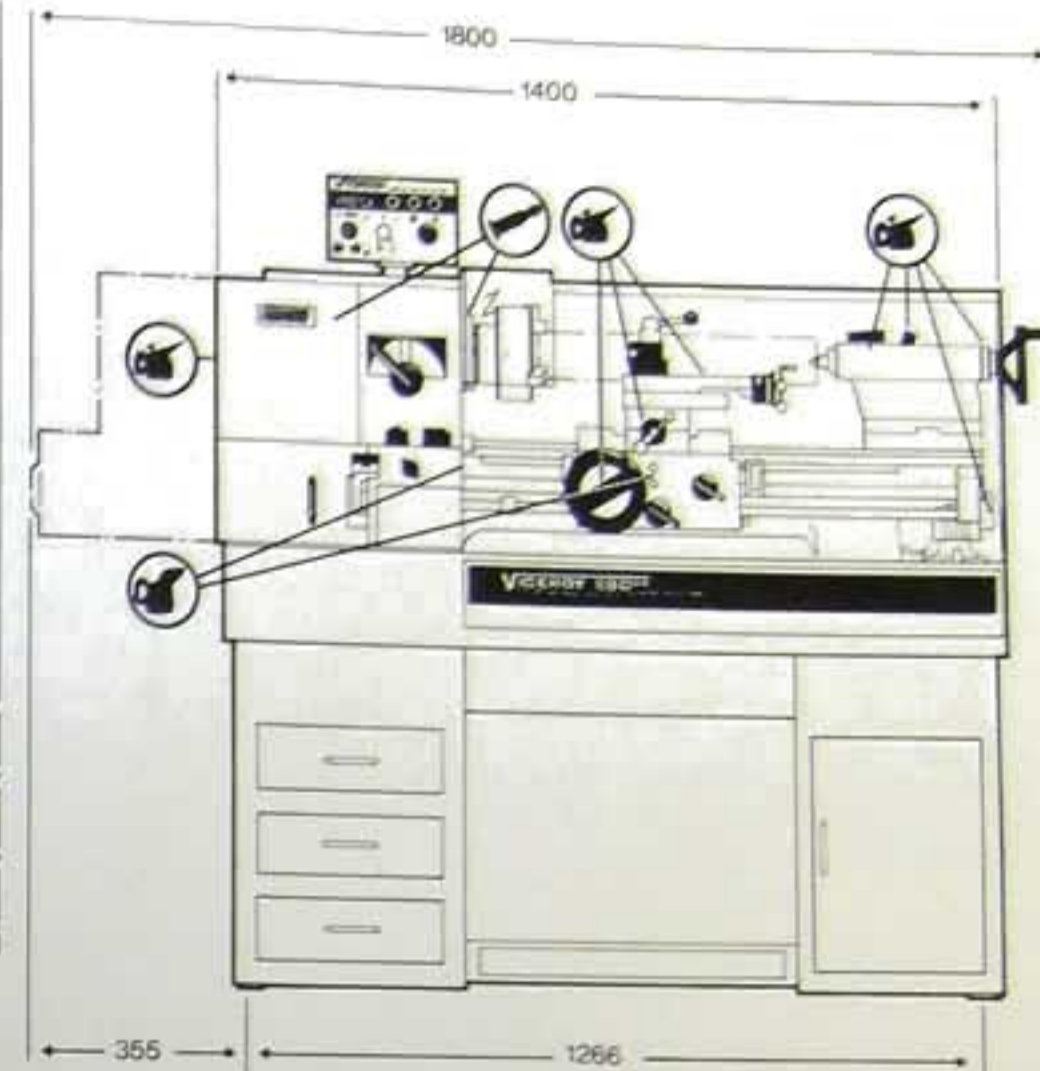
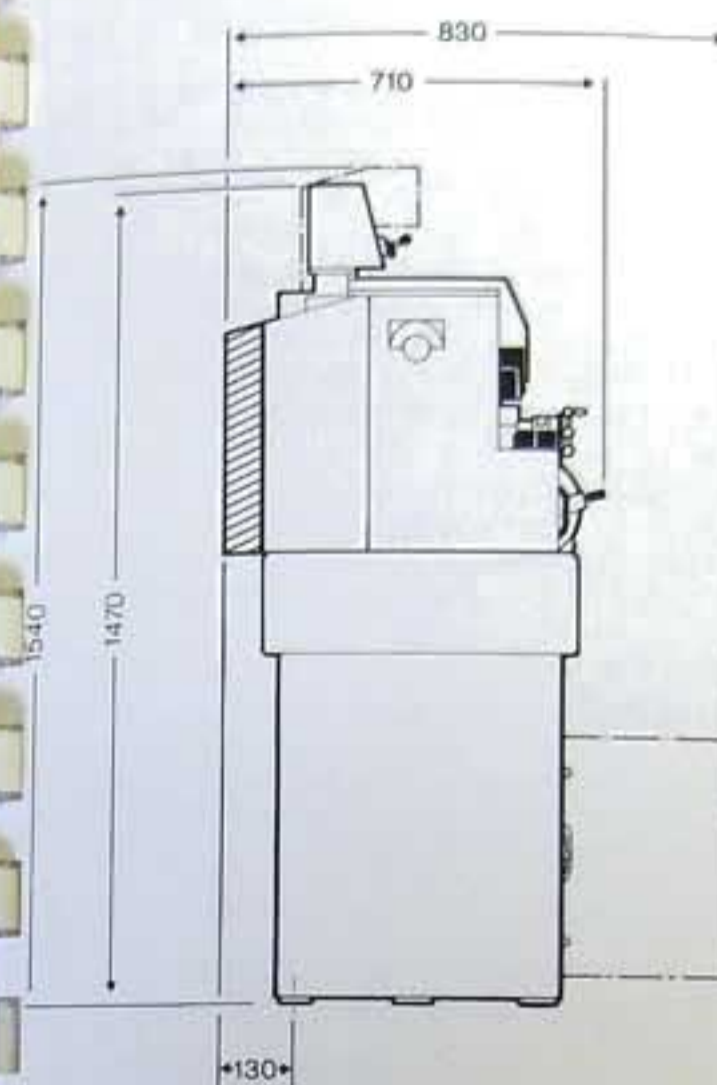


Operators view of the headstock, ready for work and with ultra-modern tinted safety guard in position.



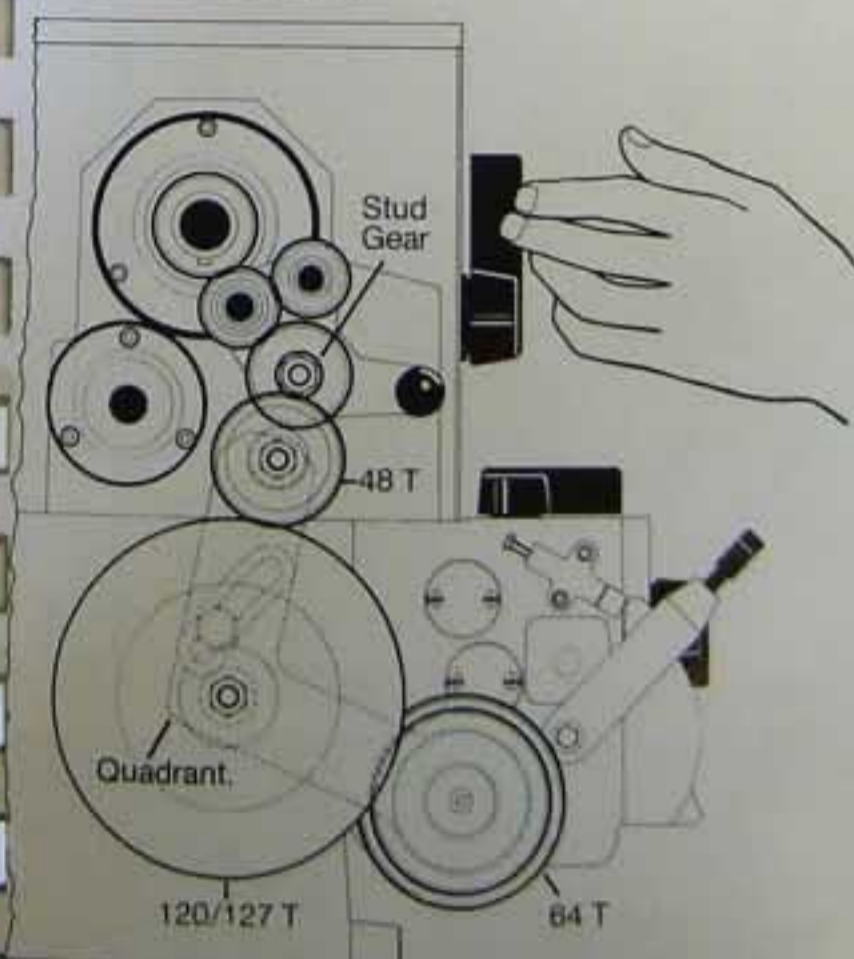
Output, from main camlock spindle showing compact arrangement of saddle assembly.

Viceroy 280 vs metal turning lathe.



All measurements in millimetres. Minimum and maximum dimensions shown. Easy access to oil points means easy maintenance.

Metric End Drive Layout.



Metric transposition gears layout. (8 TPI. Leadscrew)

TECHNICAL SPECIFICATION

CAPACITIES	Metric	Imperial
Swing Over Bed	280 mm.	11"
Swing Over Saddle Wings	240 mm.	9 1/2"
Swing Over Cross Slide	170 mm.	6 3/4"
Spindle Bar Capacity	26 mm.	1 1/8"
Distance Between Centres	800 mm.	24"
	or 1000 mm.	36"
	1140 mm.	45"
Base Height to Centre Line		
HEADSTOCK		
Spindle Nose	Ø1 1/3 Camlock	
Spindle Bore	27 mm.	1 1/8"
Spindle Nose Internal Taper	4 M.T.	
Spindle Bearings	Timken Taper Roller	
Spindle Speeds	75 to 2000 r.p.m.	
Low Range	75 to 450 r.p.m.	
High Range	450 to 2000 r.p.m.	
THREADS AND FEEDS		
Number of Threads and Feeds	72	48
Number of L.S.O. Threads	25 (0.2 to 7.0)	224 (1 p.i. to 4 t.p.i.)
Longitudinal Feed Range	0.3 to 2.14 mm.	0.014" to 0.085"
Cross Feed Range	0.12 to .34 mm.	.0005" to .030"
Leadscrew	3 mm.	8 t.p.i.
CARRIAGE		
Movement along Bed	530 or 935 mm.	20" or 36"
Cross Slide Movement	130 mm.	5 1/4"
Top Slide Movement	105 mm.	4 1/8"
Swivel Slide Graduated Left and Right	0.90°	
Top Slide to Spindle C/L	27 mm.	1 1/8"
BED		
Length	915 mm.	36"
Width	150 mm.	6"
Ground Ways	2 Vees — 2 Flats	
TAILSTOCK		
Barrel Taper	3 M.T.	
Barrel Movement	70 mm.	2 3/4"
Barrel Graduation	1.0 mm.	1/16"
MOTOR		
1.500 r.p.m. at 50 Hz.	1100 w	1 1/2 h.p.
MACHINE		
Length	1400 mm.	55"
Height	1470 mm.	58"
Width	710 mm.	28"
Weight	365 kg.	796 lbs.

HEADSTOCK

The Headstock is totally enclosed, sump lubricated and provides a full range of stepless speeds from 75-2000 r.p.m. with backgear to provide maximum torque, in the low speed range. The spindle accepts 27 mm or 1.1/16" and is mounted on TIMKEN pre-loaded tapered roller bearings with a No. 4 M.T. and D1/3 Camlock.

SPINDLE CONTROLS

An Electronic Digital Tachometer through a sensor mounted on the main spindle operated by a joy stick control, with key interlock.

GEARBOX

The pre-selector Gearbox provides a full range of threads or feeds without changing end gears. Feeds are selected by a Dial and Lever Combination which incorporates a safety interlock to prevent dual engagement.

BED AND BASE

High quality cast iron designed with wide ports for rapid swarf clearance. Double 'V' ways ensure accurate alignment for the carriage and tailstock. The bed is bolted to a heavy gauge Steel Cabinet (extra) providing a rigid structure and incorporating the coolant tray and tank.

SADDLE AND SLIDES

The saddle top and Cross slides are all equipped with adjustable jibs. 'T' slots are incorporated in the saddle wings to fit accessories and the compound slide can be removed to fit the Boring Table. Adjustable Collar fitted to feedshaft for pre-setting automatic longitudinal feed trip.

APRON

The apron is double wall design with feedshaft worm and gears oil bath lubricated. Quick and convenient selection dials/levers are provided for the leadscrew and feedshaft which are interlocked to prevent dual engagement.

TAILSTOCK

Tailstock incorporates auto ejection with a No. 3 M.T. and graduated barrel. Set over screws are provided for alignment and taper turning. Positional clamping is cam operated by a quick action lever.

OPERATING PENDANT

Incorporates NV/OL Release Contactor and overload, coupled to End Drive Micro Switch. Speed Interlock. Mushroom Stop Button. Forward and Reverse Switch Controls Joy Stick control to electronic Digital Tachometer. Low voltage Control Circuit and single phase protection.

STANDARD ELECTRICS

1100 w - 1½ h.p. 380/440/3/50 Hz motor; no volt overload release starter power cut-off to end drive guard; isolator switch; electronic Digital Tachometer; forward and reversing switch; 80 w motor to control vari-speed control selector.

STANDARD EQUIPMENT (ELCB STD)

Two-way all-position tool post; back splash guard and tool tray; tinted chuck guard; feed-shaft with adjustable auto feed trip; No. 4 M.T. Spindle taper centre; No. 3 M.T. tailstock taper centre; driving plate with adaptor; hexagon wrenches; keys and grease gun; instruction and service manual.

ALTERNATIVE EQUIPMENT

Chrome Hardened Bed; Anglo-Metric dials; Anglo-Metric transposition gears, 1000mm. Long Bed and 10 Speed quick change Lathe.

VICEROY ACCESSORIES.

The display of Accessories and Equipment illustrated is backed up by a full range of equipment including Taper Turning Attachment, Toolmakers Cabinet, Coolant Tray, Pump and fittings.



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MACHINE TOOLS

DENFORD MACHINE TOOLS LIMITED
BIRDS ROYD BRIGHOUSE WEST YORKSHIRE
Phone: 0484 712264 Grams: Denmachb Telex: 517470

INSTALLATION

Cleaning

Before wiring the machine to the mains supply, first remove all anti-corrosive coatings from the slideways, leadscrew, feedshaft and all bright surfaces using a kerosene based cleaner. After cleaning, oil all bright and machined surfaces with a light machine oil.

LIFTING

Bench Model (without tray or cabinet)

Fix lifting eye bolt to underside of slideway at the headstock end, move the tailstock to the opposite end of bed and lock. Move saddle assembly up to tailstock and lock to counter balance. With rope sling through the eye bolt - the machine can then be lifted - See Fig. 1.

Cabinet Model

Remove chip guard and rear splash guard. Place lifting rope around each end of the cabinet - See Fig. 2.

Fork Lift - To lift the cabinet model using a Fork Lift, place the forks in the slot above the centre panel.

If Skates are used, support only on the bolting down bosses.

ERECTION ON SITE

The machine must be situated in such a place as to allow free access for operating and maintenance (see layout diagram).

Bench Model (without tray or cabinet)

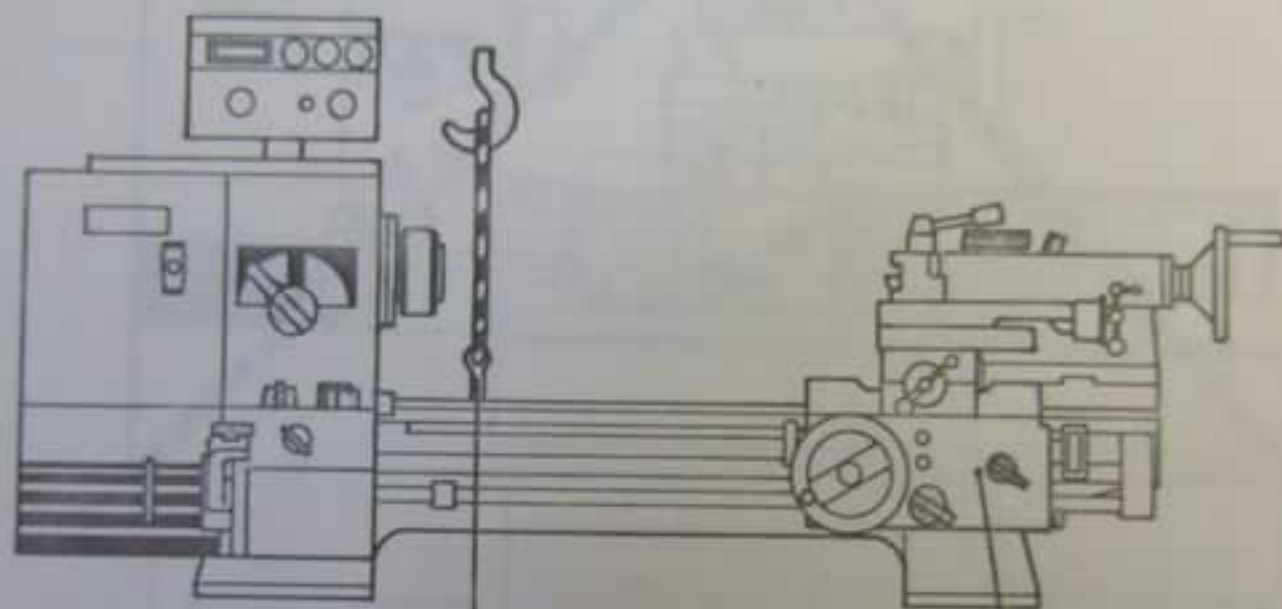
The machine should be bolted down on a rigid level bench. Care must be taken not to over-tighten the bolts and distort lathe bed. After installation the machine must be accurately levelled with a precision level at the headstock and the tailstock ends of the machine bed.

Cabinet Model

The machine can be free standing on a level solid surface. If the machine is bolted down care must be taken not to over-tighten the foundation bolts. The same levelling procedure must be undertaken as described for the bench model.

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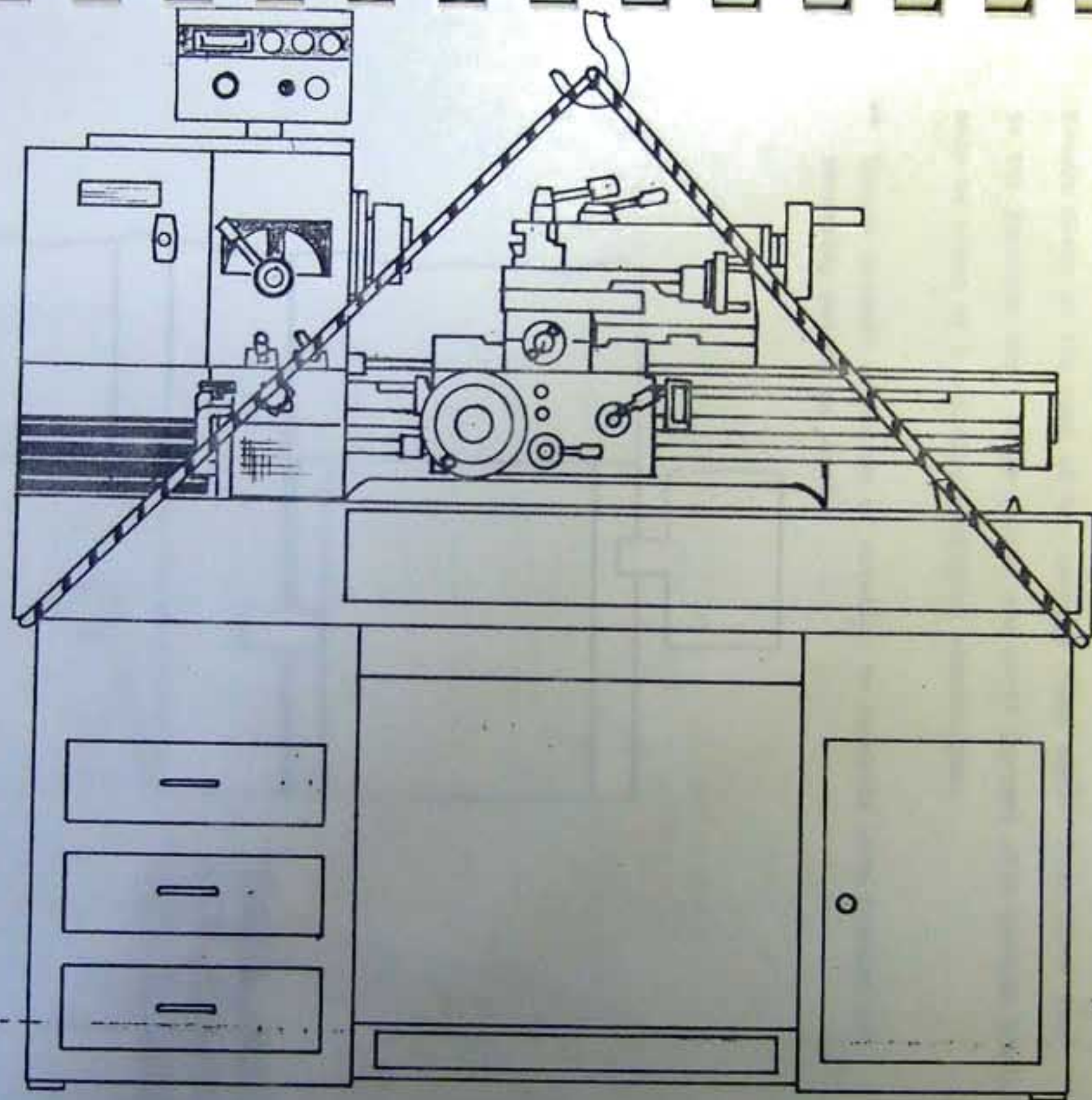
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LIFT LATHE WITH EYE
BOLT THROUGH BED.

MOVE SADDLE & TAILSTOCK
TO RH. END FOR BALANCE.

FIG 1.



Page 3

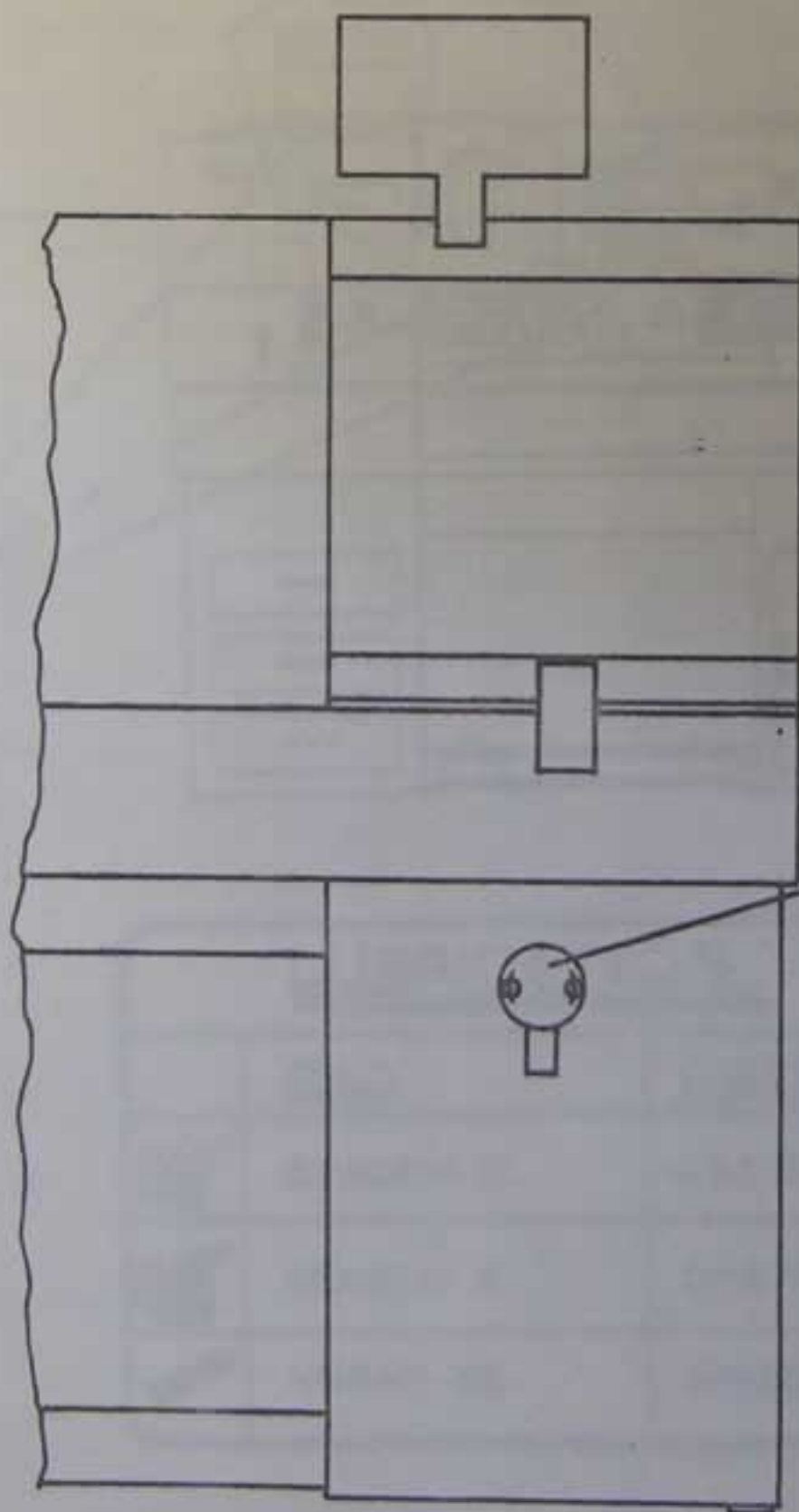
FIG 2

ELECTRICAL SUPPLY CONNECTION

Three phase connection with earth.

Remove cover at the back of the machine (Head end). Four wires lead to the junction box (three phases and earth (green)).The machine should only be wired by a suitably qualified electrician.

** Ensure correct direction of rotation to coincide with forward and reversing switch on panel.



REMOVE JUNCTION BOX
COVER & CONNECT FOUR
WIRES TO MAINS SUPPLY.

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LUBRICATION CHECKS

All oiling and greasing points have been fitted prior to despatch. Before operation of the machine, check the oilsite levels in the headstock gearbox and the apron and fill to correct levels. All slideways should be lightly oiled before movement of the saddle and tailstock. Ensure endrive is lubricated and free to move. For frequency of lubrication and correct grade oils, refer to the chart - Fig.3

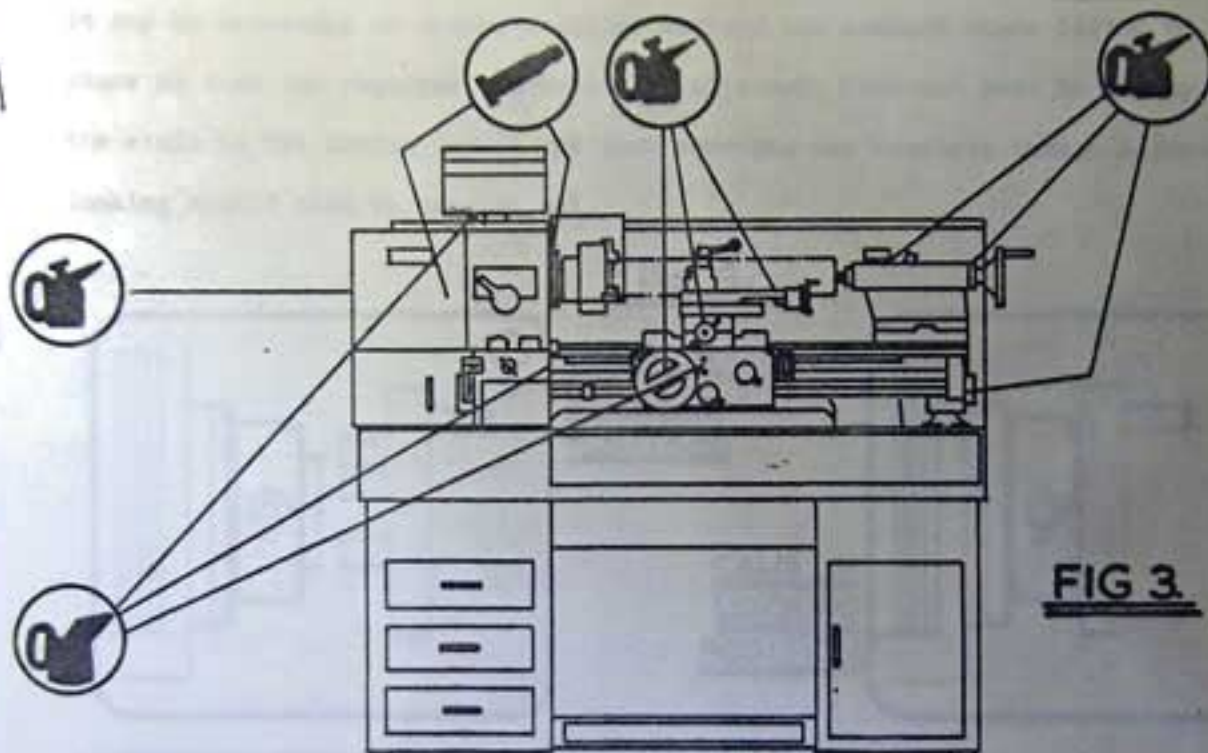





FIG 3

<u>LUBRICATION.</u>		
	<u>ESSO.</u>	<u>CASTROL.</u>
	BEACON 3.	CASTROLITE.
	BEACON 3.	CASTROLITE.
	NURAY 32.	SPHEEROL-AP3.

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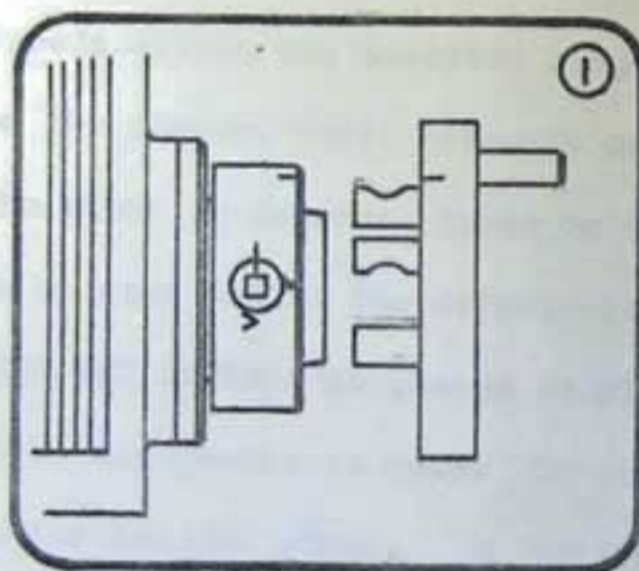
CHUCK AND FACEPLATE MOUNTING

Before mounting chuck or faceplate first ensure that the spindle taper and the internal taper of the chuck or faceplate is clean and free from dirt or protective covering.

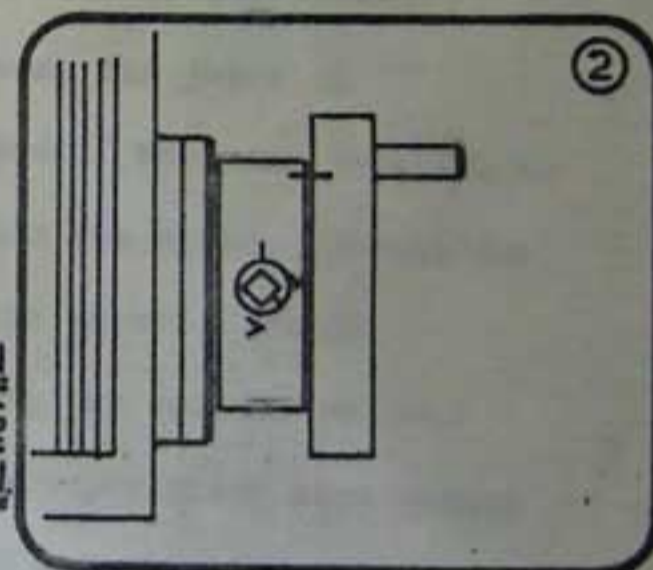
The line on the camlock cams in the spindle should be in line with the mark on the spindle o/d when the chuck is loaded to the spindle. Load the chuck and turn the cams with the key provided in a clockwise direction to tighten and lock the chuck to the spindle nose. The correct position of the cams in the lock position is shown in diagram 2 - Fig. 4.

It may be necessary on chucks supplied without the camlock studs fitted to adjust the studs so that the required cam action is obtained. This can best be set by screwing the studs to the bottom thread and then removing one complete turn. Adjustment for locking should then be carried out.

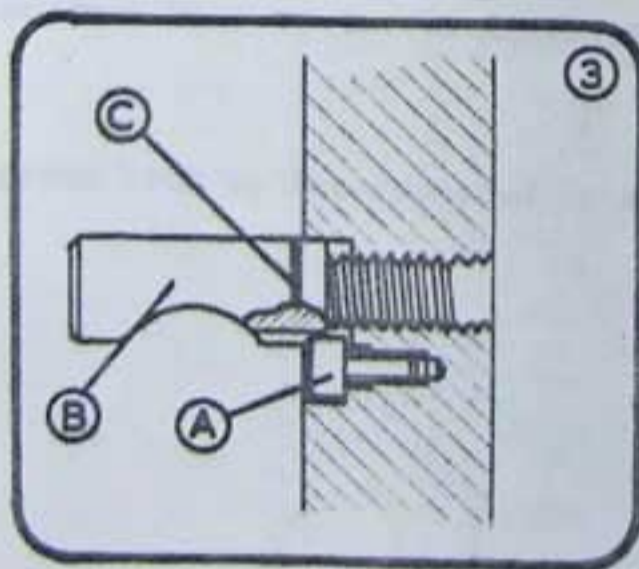
FIG 4.



**CAMS IN
RELEASE
POSITION.**



**CAMS IN
LOCKING
POSITION.**



TO ADJUST 'CAMLOCK STUDS'

REMOVE LOCKSCREW (A) TURN
STUD (B) ONE FULL TURN, IN
OR OUT AS REQUIRED,
REPLACE LOCKSCREW AND TIGHTEN.

**NOTE :- A DATUM RING (C) ON EACH STUD
DENOTES THE ORIGINAL SETTING.**

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OPERATION

Having carried out the necessary procedure for the installation of the machine it is now ready for operation.

Switch on the isolation switch, then the switch on the pendant panel to forward or reverse for spindle travel, then press the ON (green) button to start spindle. First run should be at a slow speed to ensure freedom of all running parts.

SPEED SELECTION - OPERATION OF SPINDLE

The spindle speeds are divided into high and low range, selection is made by moving the lever on the headstock face (Fig.6 (B) to HIGH or LOW range.

Speeds within the selected range are obtained by moving the joystick on the pendant panel directly below the digital readout. Move the joystick to the right to increase speed or to the left to decrease the speed. Speeds can be changed whilst the spindle is in motion within the selected range.

STOP THE SPINDLE to change to HIGH or LOW range moving the spindle by hand until engagement is made. To stop the machine press the Mushroom stop button on the pendant panel. To rotate the spindle by hand move the lever on the headstock face to the intermediate vertical position.

A speed lock is incorporated in the pendant for locking in any desired speed.

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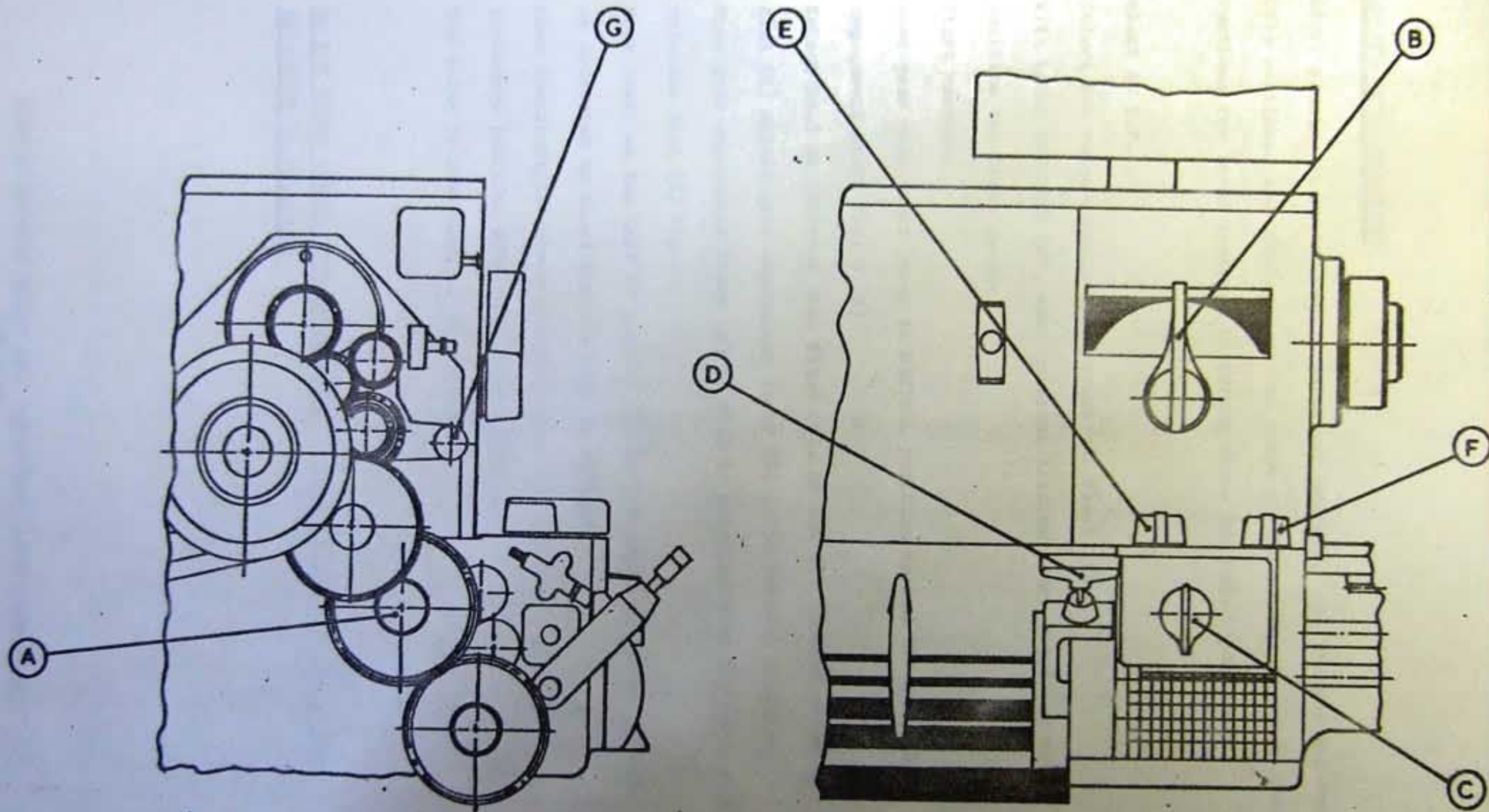


FIG 6.

THREAD AND FEED SELECTION

The 280VS machine is fitted with a universal gearbox. All threads and feeds directly available are displayed on the front of the gearbox together with instructions for lever settings to obtain them. See Fig. 11 and 12.

e.g.

To select 20 T.P.I.

- 1). Select low range spindle speed required. Fig.6 (B)
- 2). With LATHE SWITCHED OFF, move quadrant sliding gear. Fig.6 (A) to IN position and close guard.
- 3). Start machine.
- 4). Move gear engagement lever to NEUTRAL position marked 'N' on gear engagement chart Fig. 6 (D)
- 5). Select No.3 on selector dial Fig.6 (C). DO NOT TRY TO MOVE selector dial (C) unless gear engagement lever (D) is in NEUTRAL position.
- 6). Move gear engagement lever (D) to No.3 to correspond to the number on selector dial (C) Fig.6
- 7). Move lever on top left of gearbox (E) to the right to select 20 T.P.I as indicated on chart when MACHINE IS RUNNING.
- 8). Move feedshaft/leadscrew selector lever (F) on top of gearbox to leadscrew position WHEN MACHINE IS RUNNING.

The lathe is now ready to cut 20 T.P.I.

NB. DO NOT FORCE LEVERS INTO ENGAGEMENT. ENSURE CORRECT SEQUENCE FOR SELECTION IS OBSERVED.

CROSS AND TOP SLIDES

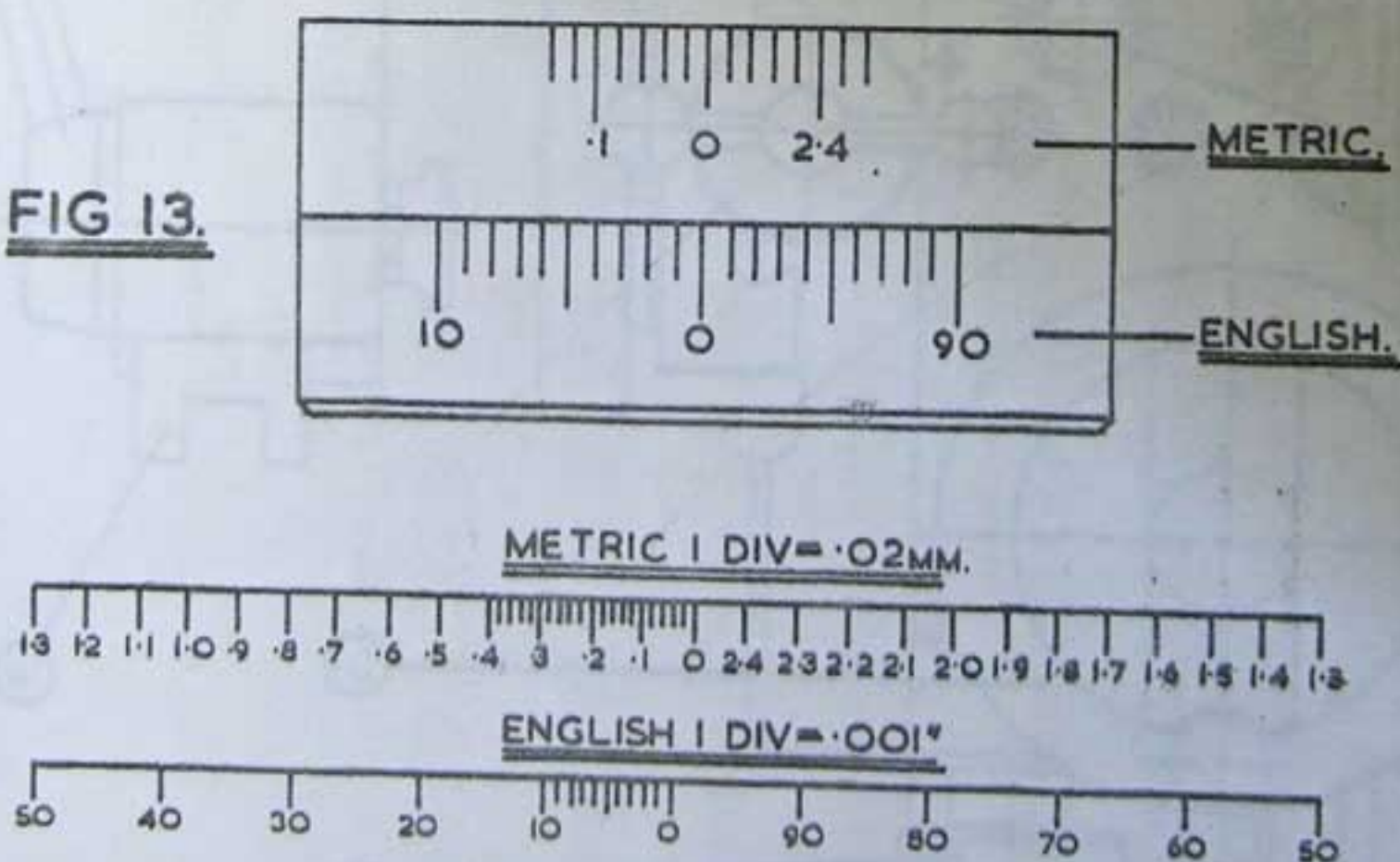
The tapped holes in the saddle wings of the 280VS Lathe facilitate the clamping of ancillary equipment e.g. travelling steady, coolant taps etc. By removing the top slide a boring table may be fitted for boring and milling operations using the chuck as a toolholder.

The top slide can be swung to any angle for short taper turning operations by hand. There are three types of toolpost available- the two-way is standard to the 280VS lathe, a four-way and Quick Change toolpost (E) Fig.7 is also available for repetitive work.

The 280VS Lathe is fitted with 'dual dials' to the top and cross slide screws to read imperial or metric. Details of graduations are given in Fig.13.

TOPSLIDE & CROSSLIDE DIALS.

FIG 13.



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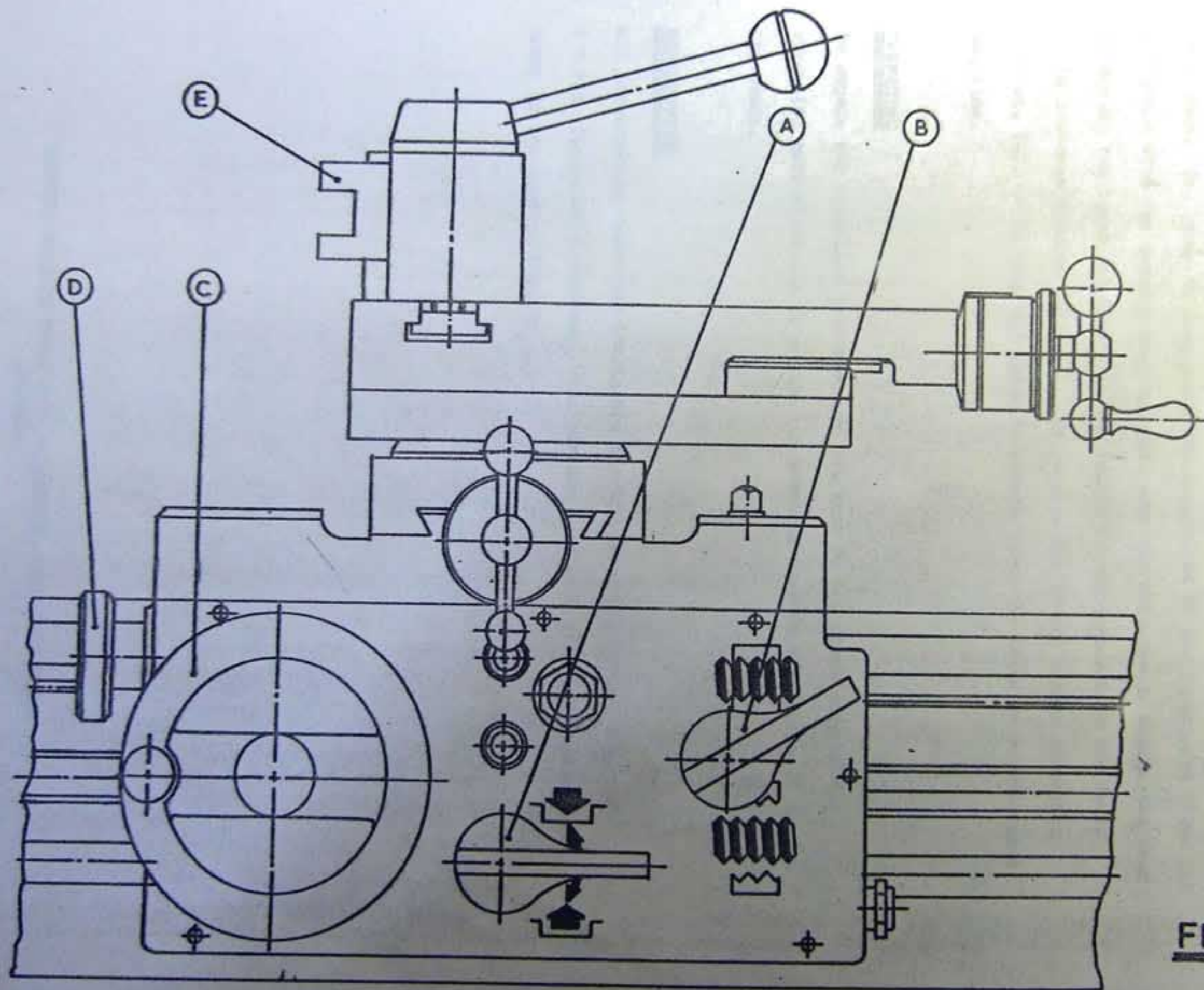


FIG 7.

OPERATION OF APRON FOR SLIDING AND SURFACING

Select feed from the chart on the gearbox and set the levers to the appropriate positions. The apron is then ready for engagement on the feedshaft. Clear the workpiece with the cutting tool and pull down the chip guard. Engage the feed by moving the lever (A) Fig. 7 in the centre of the apron. Move the lever up to traverse towards the chuck. To reverse the travel engage reversing bracket, (G). To stop the apron traversing move the lever to a horizontal position.

SURFACING

To engage the crossslide traverse turn the knob on the chuck side of the apron (D) anti-clockwise to engage the traverse towards the centre of the chuck.

SCREWCUTTING

All screwcutting feeds are obtainable through the 3mm pitch (metric) or 8 T.P.I. (imperial leadscrew. The pitches available are displayed on the front of the gearbox Fig. 11 and 12.

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IMPERIAL THREADS & FEEDS.

QUADRANT SLIDING GEAR	TOP LEVER	THREADS PER INCH — FEEDS IN THOUSANDTHS								DIAL READING
		1	2	3	4	5	6	7	8	
IN	LEFT	4 ·0764 ·0300	4½ ·0680 ·0267	5 ·0611 ·0240	5½ ·0555 ·0218	5¾ ·0531 ·0209	6 ·0509 ·0200	6½ ·0470 ·0184	7 ·0437 ·0171	T.P.I. SLIDING SURFACING
	CENTRE	8 ·0382 ·0150	9 ·0340 ·0134	10 ·0306 ·0120	11 ·0279 ·0109	11½ ·0266 ·0104	12 ·0254 ·0100	13 ·0235 ·0092	14 ·0218 ·0086	T.P.I. SLIDING SURFACING
	RIGHT	16 ·0191 ·0075	18 ·0170 ·0067	20 ·0153 ·0060	22 ·0139 ·0055	23 ·0133 ·0052	24 ·0127 ·0050	26 ·0118 ·0046	28 ·0109 ·0043	T.P.I. SLIDING SURFACING
OUT	LEFT	32 ·0096 ·0038	36 ·0085 ·0034	40 ·0076 ·0030	44 ·0070 ·0027	46 ·0066 ·0026	48 ·0064 ·0025	52 ·0059 ·0023	56 ·0054 ·0021	T.P.I. SLIDING SURFACING
	CENTRE	64 ·0048 ·0019	72 ·0042 ·0017	80 ·0038 ·0015	88 ·0035 ·0014	92 ·0033 ·0013	96 ·0032 ·0012	104 ·0029 ·0011	112 ·0027 ·0010	T.P.I. SLIDING SURFACING
	RIGHT	128 ·0024 ·0009	144 ·0021 ·0008	160 ·0019 ·0008	176 ·0018 ·0007	184 ·0017 ·0007	192 ·0016 ·0006	208 ·0015 ·0006	224 ·0014 ·0005	T.P.I. SLIDING SURFACING

FIG 11.

I.S.O. THREADS & FEEDS.

QUAD SLIDING GEAR	TOP LEVER	3 ^{M/M} L'SCREW PITCHES AND FEEDS IN M/M												STUD GEAR DIAL READING
		G	D	G	C	E	G	D	F	C	D	B	A	
IN	LEFT	7·0 2·140 ·840	6·0 1·833 ·720	—	5·5 1·680 ·672	—	5·0 1·589 ·624	—	4·5 1·528 ·600	—	4·0 1·467 ·576	—	—	—
	CENTRE	3·5 1·070 ·420	3·0 ·916 ·360	—	—	—	2·5 ·856 ·336	—	—	—	2·0 ·840 ·330	—	—	—
	RIGHT	1·75 ·535 ·210	1·5 ·468 ·180	1·4 ·428 ·168	—	1·3 ·397 ·156	1·25 ·382 ·150	1·2 ·366 ·144	—	1·1 ·343 ·135	1·0 ·336 ·132	·90 ·305 ·120	·80 ·275 ·108	—
OUT	LEFT	—	·75 ·268 ·105	·70 ·229 ·090	—	—	—	·60 ·198 ·075	—	—	—	·50 ·183 ·072	·45 ·171 ·068	·40 ·168 ·066
	CENTRE	—	·375 ·124 ·052	·35 ·114 ·045	—	·325 ·107 ·042	—	·30 ·105 ·041	—	·275 ·099 ·039	·25 ·095 ·038	·225 ·091 ·036	·20 ·085 ·034	—
	RIGHT	—	—	·175 ·067 ·026	—	—	—	·15 ·057 ·022	—	—	—	·125 ·054 ·021	·10 ·052 ·020	—

FIG 12.

TAILSTOCK

The tailstock is of solid cast iron construction mounted on a cast iron shoe for adjustment and the turning of shallow tapers.

The tailstock quill is self ejecting and is graduated for direct reading for drill depths etc. The quill has a 3MT bore and may be locked in position by the locking handle as shown in Fig.5.

LOCKING

The tailstock is locked to the bed by means of a bed clamp operated by lever (B) Fig.8 The quill is locked by moving lever (A) away from the headstock in a clockwise direction.

ADJUSTMENT

The tailstock is set to turn parallel to the bed. Should any adjustment be required i.e. taper turning - adjustment is made by the two grub screws at the front and back of the tailstock. To adjust, loosen off one of the grub screws A and B and tighten the other until the desired taper is achieved. Fig.5.

NB. Ensure that the two screws are tight before reclamping the tailstock to the bed. The amount of set over required for a given taper may be calculated as follows :-

$$\text{Set over required (mm).} = \frac{\text{Length (mm)} \times \text{taper (mm)}}{2}$$

$$\text{Set over required (inches)} = \frac{\text{Taper per foot on dia.} \times \text{length (ins)}}{24}$$

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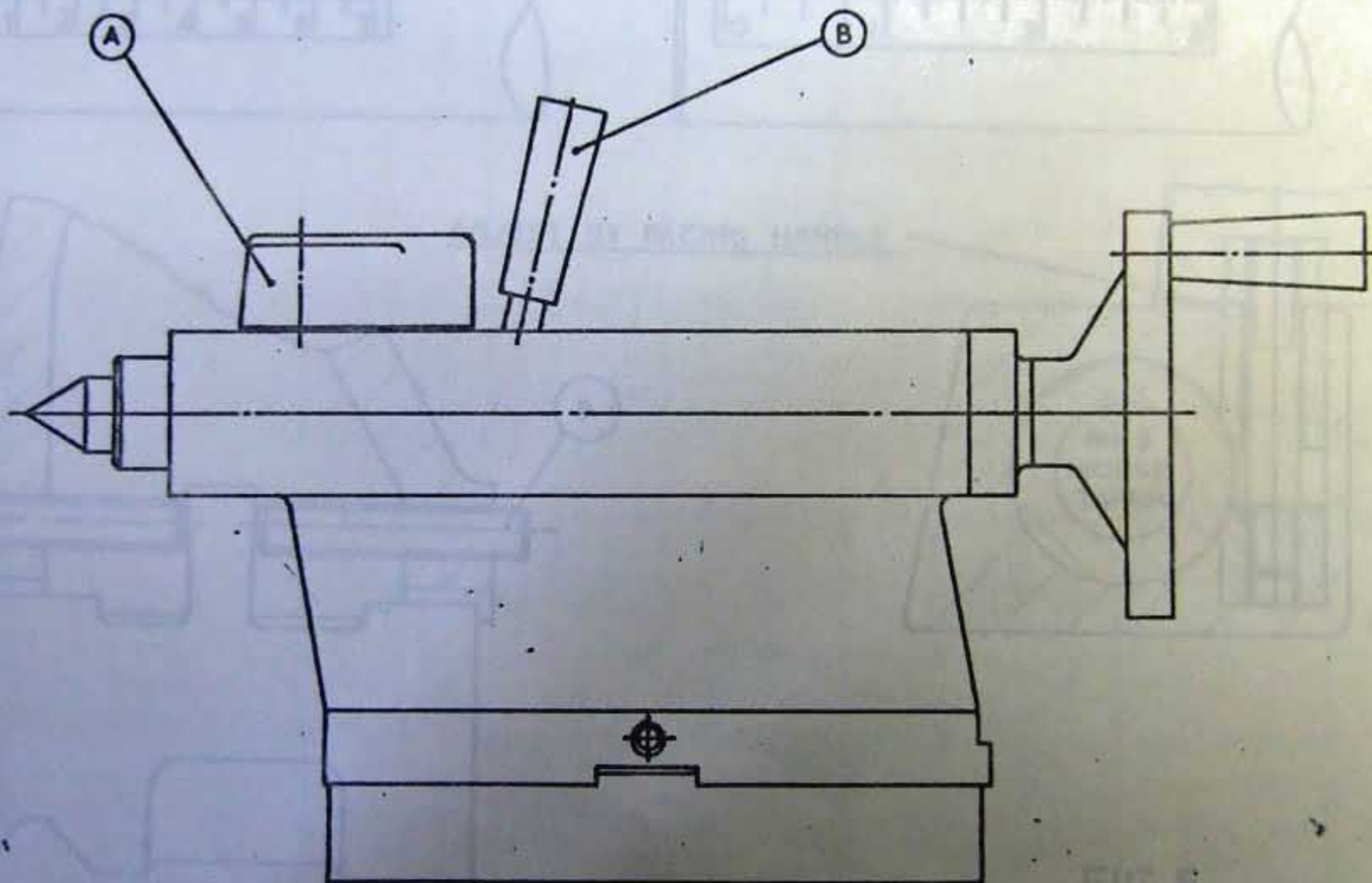
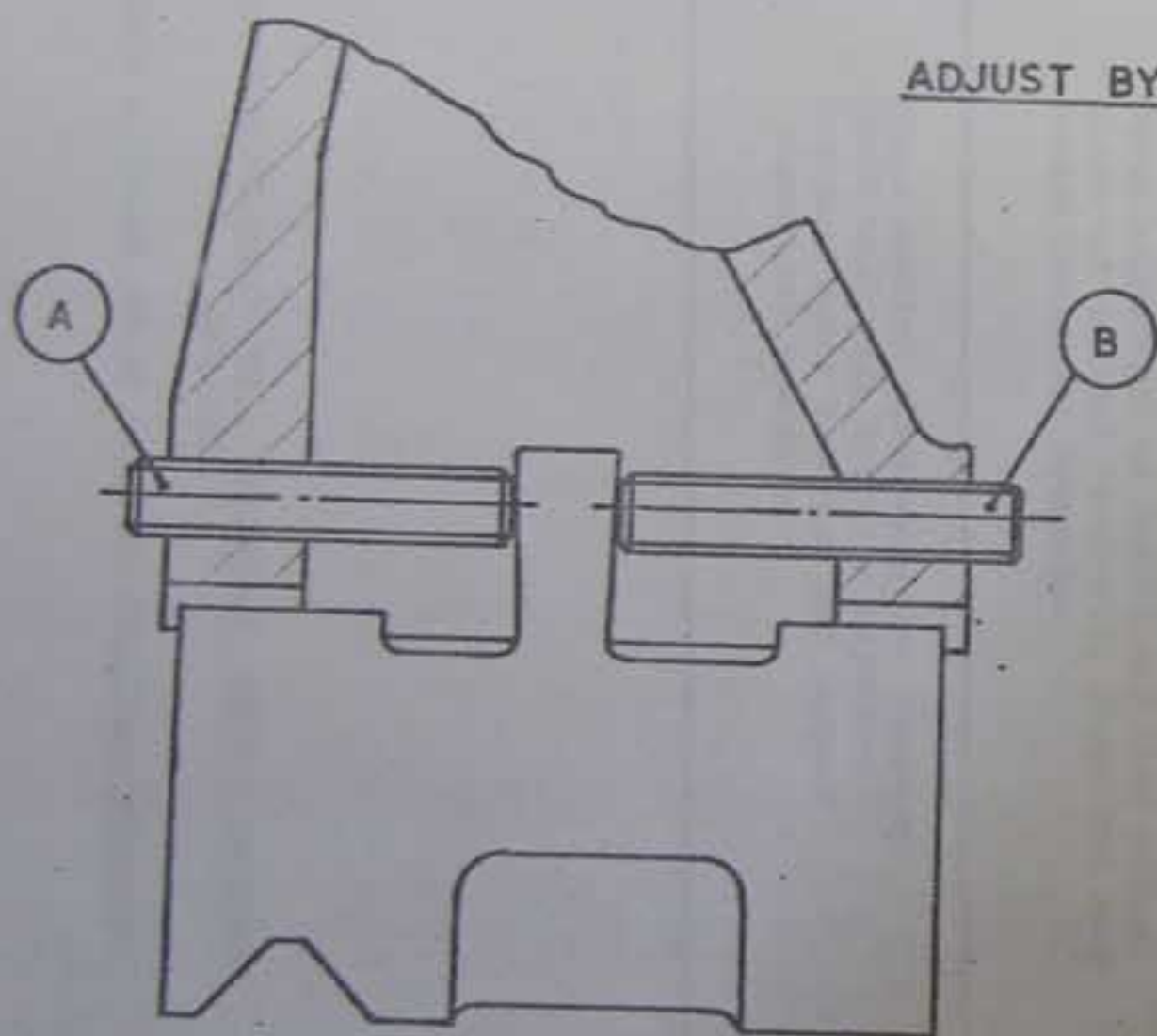
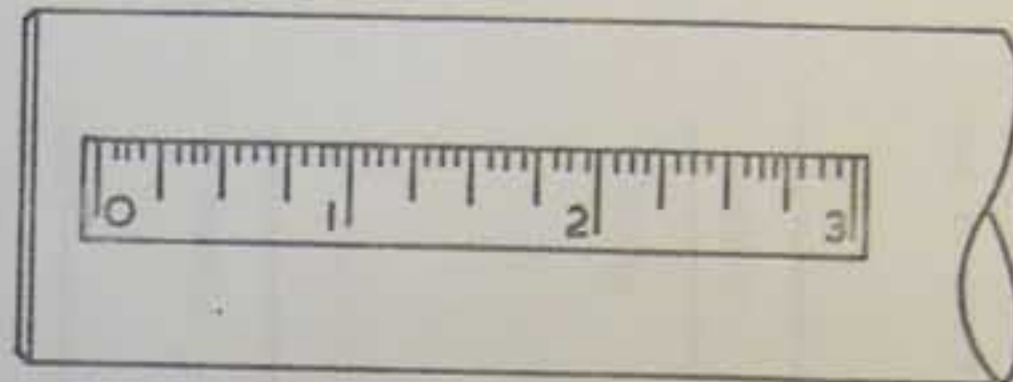
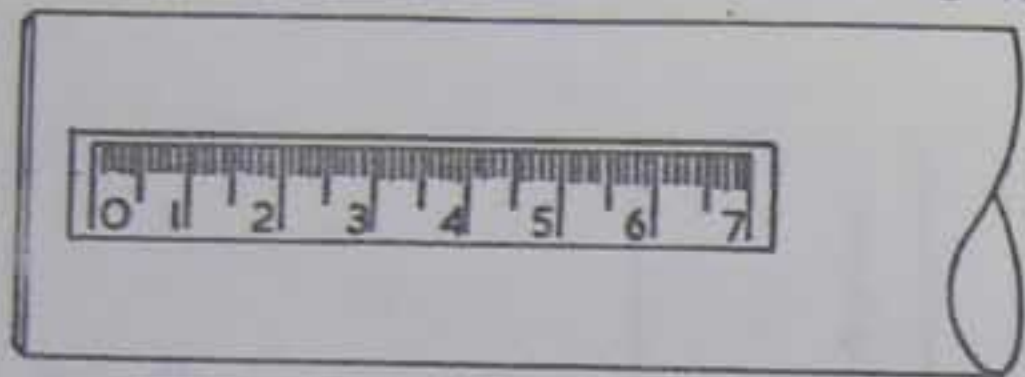


FIG 8.

METRICMM.

GRADUATIONS

ENGLISH INCHES.



ADJUST BY FACING HANDLE.

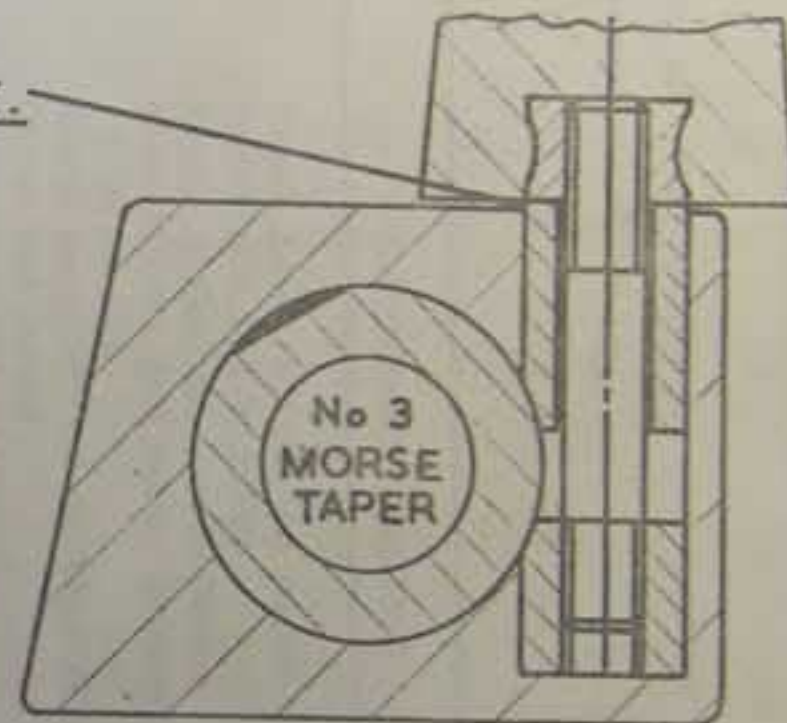


FIG 5

TAILSTOCK ADJUSTMENT.

M A I N T E N A N C E

Routine inspection and maintenance of the machine should be carried out to the following schedule :-

PERIOD	MAINTENANCE REQUIRED
Daily	Check level of oil in sight glasses Lubricate Oil Nipples Clean dials and graduations Wipe slides and ways, leaving a thin film of oil Check quantity of cutting fluid in reservoir Clean out swarf Lubricate end drive
Weekly	Clean machine thoroughly Check nuts and bolts for slackness
Six monthly	Drain apron, gearbox headstock, oil sumps and replenish with clean oil Check adjustment of saddle and side strips Clean out coolant reservoir, pipes and pump Grease headstock bearings.
Annually	Check machine alignments and accuracy Check headstock bearings adjustment Regrease motor bearings and inspect electrical equipment

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MAINTENANCE

Changewheel Shear Key

As a protection against accidental overload of the end train a shear key is fitted in the sleeve at the bottom of the quadrant train. In the event of a replacement being necessary a 3/16"sq. x 13/16"long GR1 aluminium key should be fitted. Remove the end plate by removing centre screw using 6mm allen key, pull off the gears and sleeve and remove the sheared key. Replace the key and re-assemble - see (END DRIVE ARRANGEMENT)

TOP SLIDE - STRIP ADJUSTMENT

Take up for wear on the top slide jib strip is by means of 3 socket lead screws and lock nuts. To adjust loosen the 3 lock nuts, adjust screws to give slight drag, then tighten lock nuts - see Fig.9.

CROSS SLIDE - STRIP ADJUSTMENT

As for Top Slide - see Fig. 9.

SPINDLE END PLAY (adjustment)

The taper roller main bearings have been correctly adjusted and pre-loaded on assembly and should not require any attention provided the initial setting is not disturbed. To adjust the pre-load, slacken off the lock nut on the spindle (A) Fig.10 and adjust the pre-load by turning the transducer gear (B) in small increments.

NOTE THE THREAD IS LEFT HAND After each tightening of the transducer gear (B) check that the pre-load is not excessive. The machine should run at top speed and the bearings should not exceed 65°C (150°F).

NOTE A certain amount of temperature rise must be expected when running the lathe at high speed but it should be possible to place the hand on the spindle nose after an hours running without discomfort. Check that the lock nut (A) is tight up against the transducer gear (B) after adjustment. The transducer re-set gap is 0.40".

LEADSCREW (adjustment)

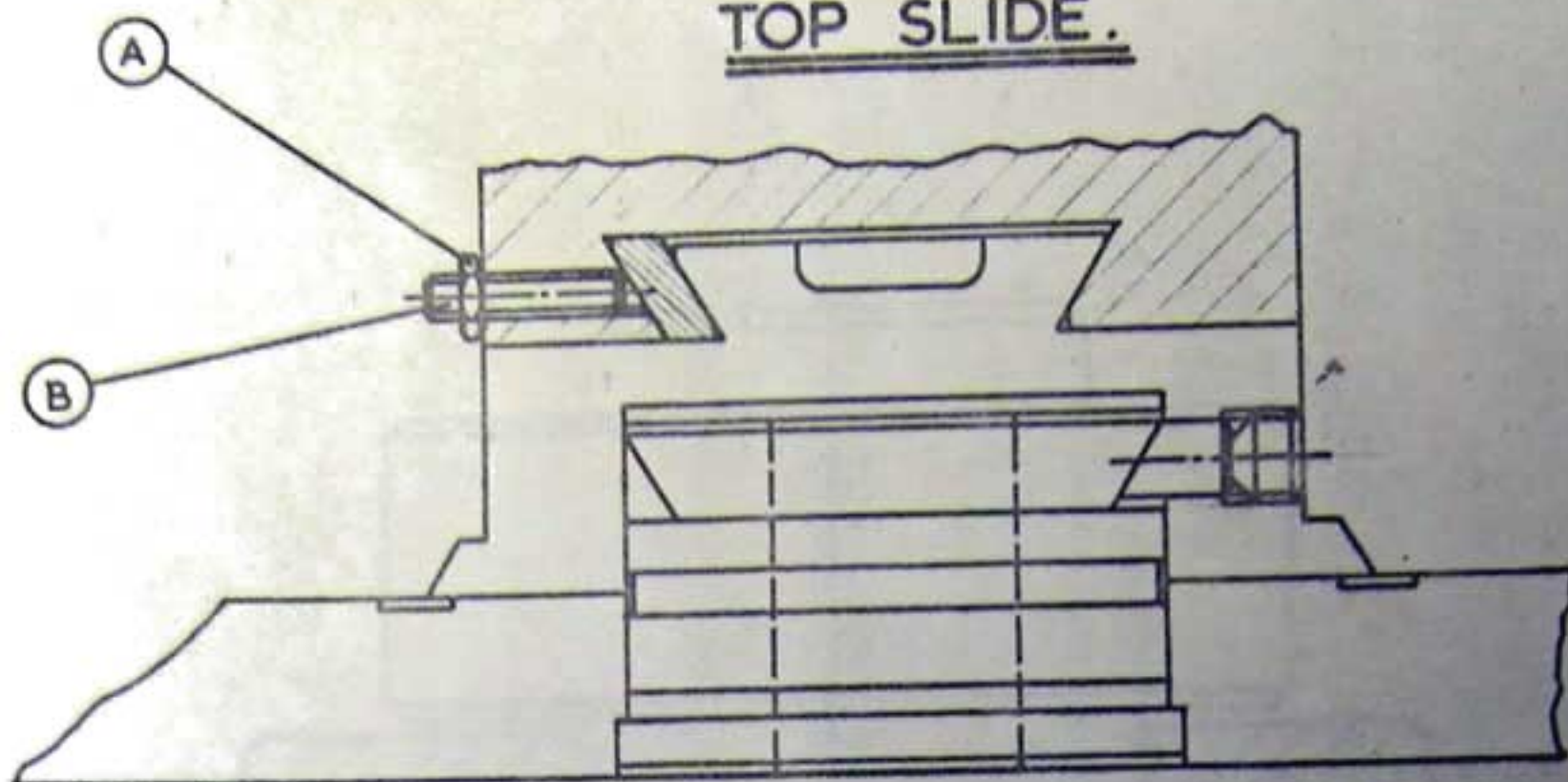
The end thrust of the leadscrew acts upon a pair of needle roller thrust washers at the tailstock end of the bed. To eliminate any end play, adjust the lock nuts at the end of the leadscrew.

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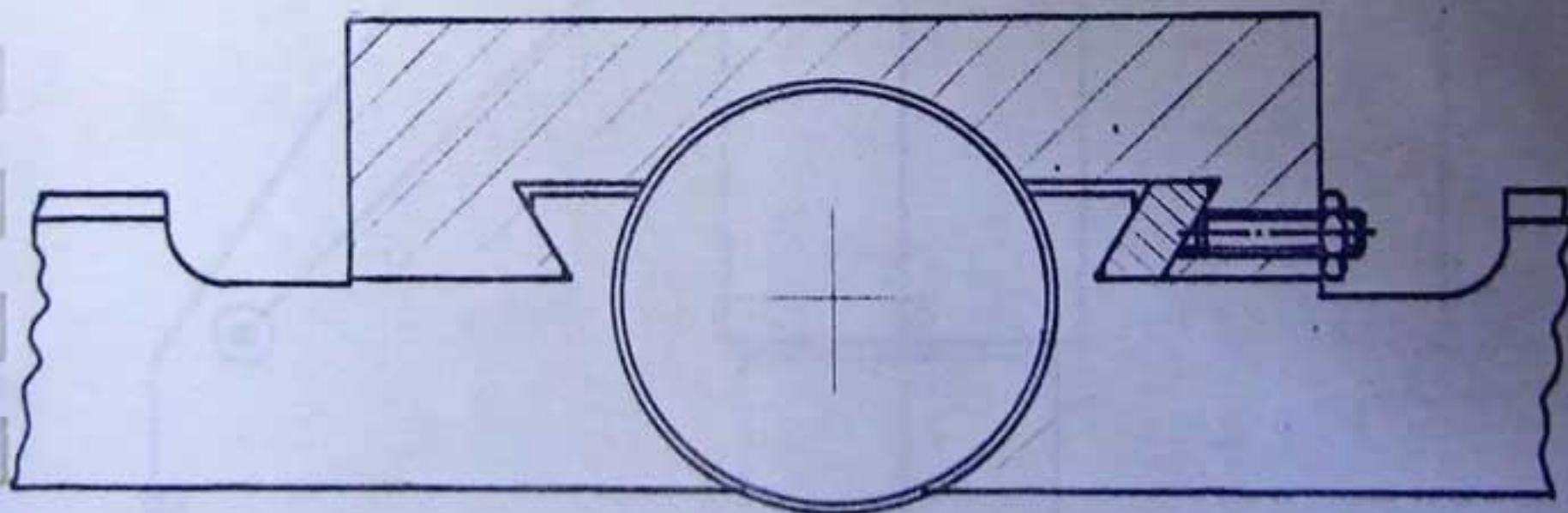
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TOP SLIDE.



TO ADJUST STRIP FOR WEAR LOOSEN NUTS, ADJUST
SCREW (B) & TIGHTEN LOCKNUTS (A).

CROSS SLIDE.



ADJUST AS FOR TOP SLIDE.

FIG 9.

GAP SETTING FOR SENSOR

.040" (1.016MM)

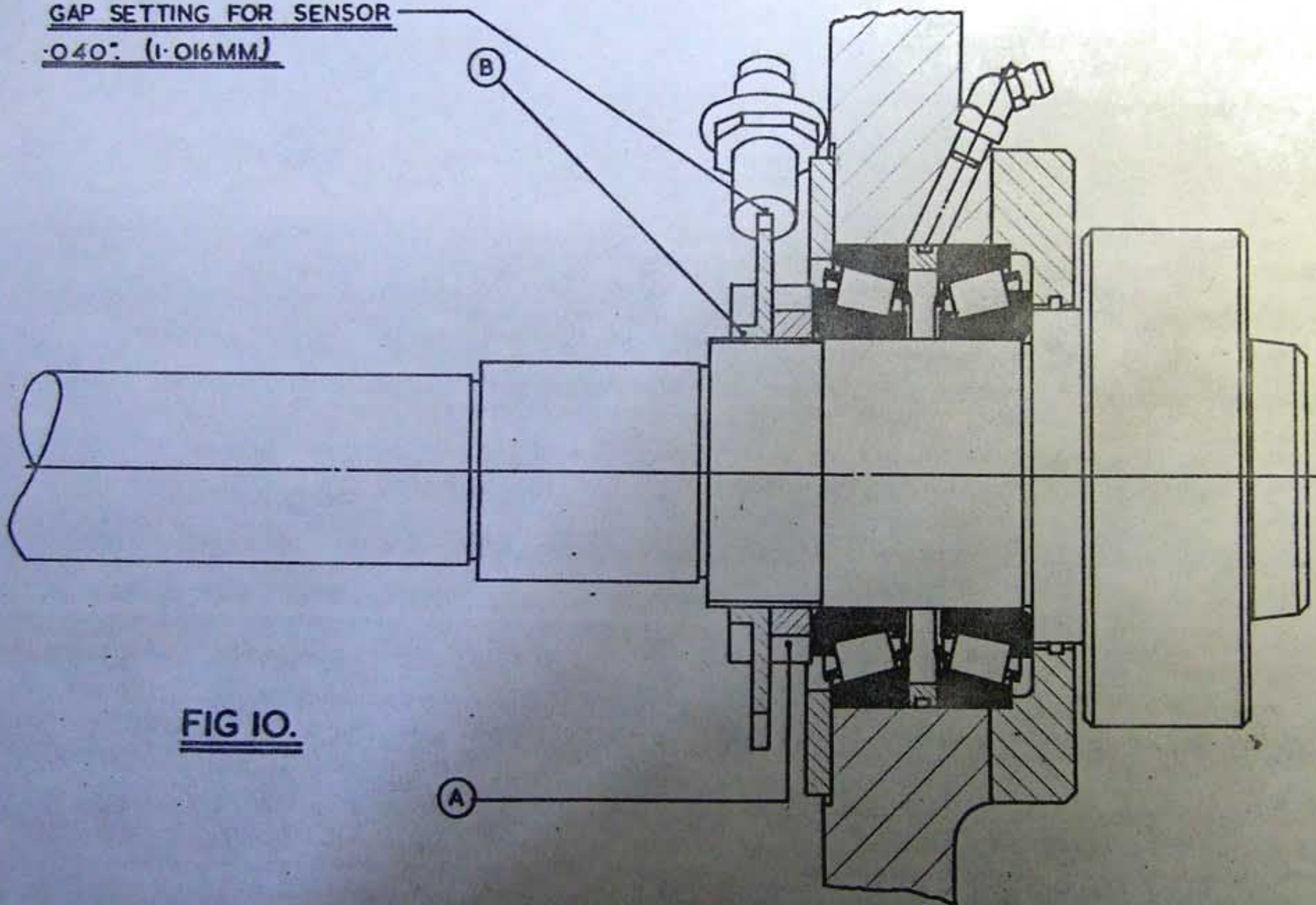


FIG 10.