Dean Smith & Grace

LIMITED

KEIGHLEY ENGLAND

OPERATOR'S INSTRUCTIONS

TYPE	LATHE	MACHINE No

GENERAL NOTES

Ample and proper lubrication is essential to ensure good results and lasting accuracy

Lubrication of the Lathe should start as soon as it has been cleaned and before any mechanisms are operated or sliding parts moved

Do not fill oil wells above the level shown on the oil sights, and use only high grade oil with an equivalent specification to that given on the chart

If difficulty is experienced in maintaining turning, facing and boring operations to within standard limits, the chances are that this is caused by the lathe being out of level. Most complaints of this nature have been found to be due to this cause, and the lathe should be carefully re-levelled, using a good sensitive level

Plain Bearing Head Lathes should not be used at the top spindle speeds until a few days' heavy work has been done on the slower speeds. After this, when using the top speeds, the lathe should be first started up on a slower speed to warm up the headstock parts.

Hammers, spanners, tools, etc., should not be placed on the bed shears or slides. This prevents scratching and other damage to the same

When removing or replacing the chuck, place a board on the bed to protect the ways from bruising.

CAUTION.—Do not change spindle speeds or feeds with the shafts revolving any faster than is necessary to engage the gears properly the lathe should be slowed down or stopped to do this. When stopped, if the gears do not mesh instantly the friction clutch should be lightly engaged to revolve the gears slowly

CHATTER.—May be due to the following causes and these should be checked over before asking for a service call —

Work extending too far from chuck, change method of chucking or support outer end in stay or with tailstock centre.

Too great a distance between centres without support; use a stay

Oil, grease or dirt in between spindle nose and flange and chuck, these parts should be cleaned before mounting chuck on the spindle

Dirt between centres and workpiece or bad fitting centres in fast headstock or tailstock

End play in spindle

Improperly adjusted compound rest and saddle slips or gib plates

Cutting edge of tool below centre of spindle.

Tool too weak or having too much overhang.

Tool insecurely clamped in tool-rest.

Irregular shaped work and fixtures causing out of balance or intermittent cutting

Incorrect selection of cutting speed and feed

The preload of the spindle bearings may be too low. This preload should be checked against the figure given on the bearing adjustment sheet, and any necessary adjustment made.

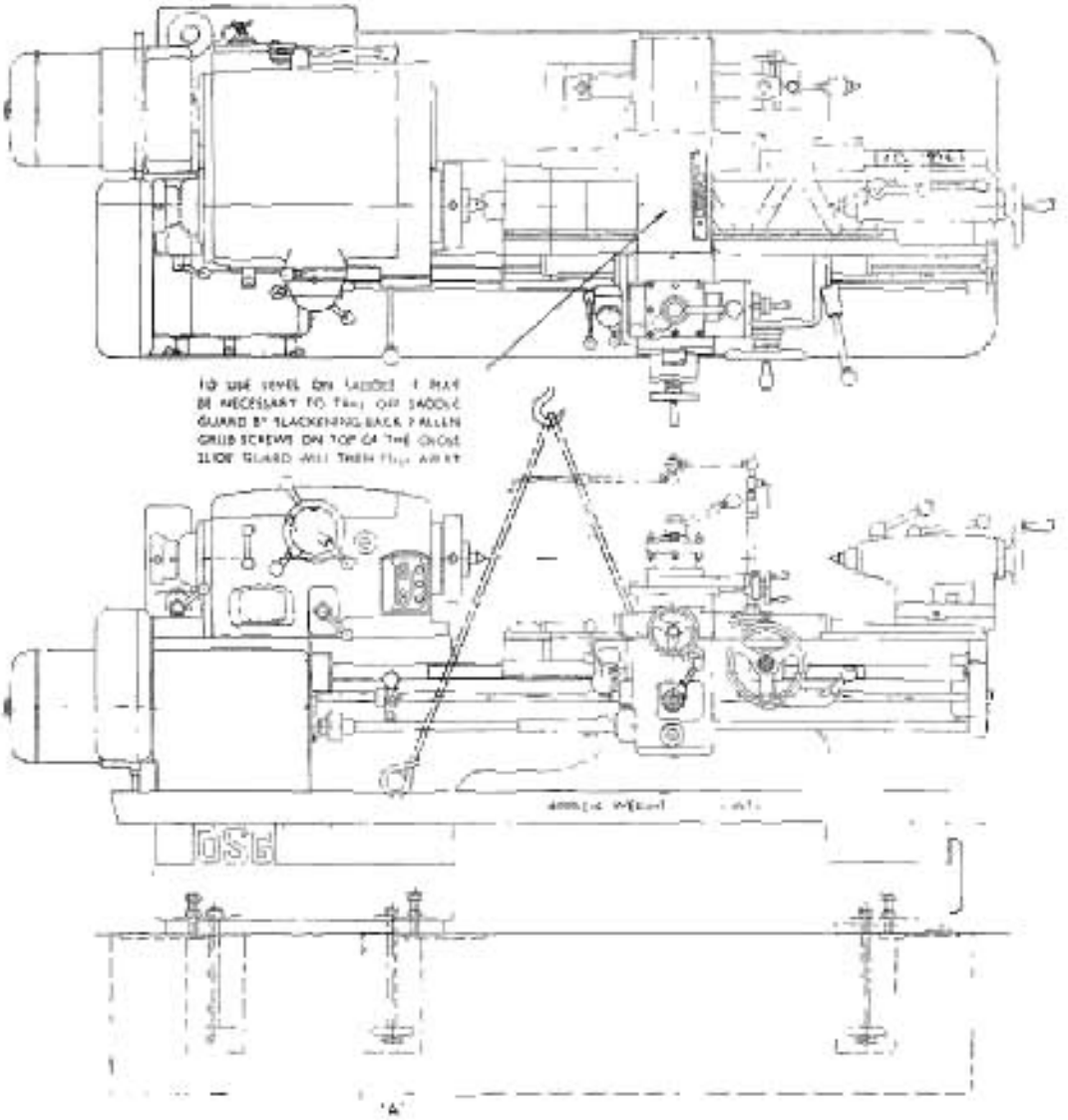
Wipers for bed shears should be cleaned frequently and adjusted or replaced as required.

SPARES.—When ordering spares, clear descriptions or sketches of parts should be given, and in all cases it is important to quote the machine number given on the lathe nameplate or end of bed shears

IMPORTANT

THIS MACHINE MUST NOT BE CLEANED DOWN BY USING AN AIRLINE. CONTRAVENTION OF THIS INSTRUCTION MAY PREJUDICE THE MACHINE WARRANTY.

LIFTING AND LEVELLING INSTRUCTIONS



LIFTING:—When lifting, a sling should be placed around one or two of the middle ribs of the bed between the guiding ways and another sling around the ends of a steel bar passing through the holes provided in the bed. The saddle should be placed in a suitable position for balancing. The slings should be packed clear of parts liable to damage, such as feedshaft, etc.

LEVELLING.—The Lathe should be set with adjusting screws resting on plates and with bolts in position, the holes then being filled in. After the concreted holes are set levelling is accomplished by means of the adjusting screws in each foot and using an accurate spirit level (.0005" in 10").

The level should be placed crosswise on saddle top and lengthwise on the back shear of the bed, the saddle being moved along the bed for checking crosswise at the different positions. The bed should be levelled initially in the crosswise direction and from end to end in the lengthwise direction using the front and rear adjusting screws at extreme ends of lathe only. Move the saddle up to the chuck, tighten the front screw at 'A' until the bobble in the level just moves i.e. (1—division if level read 0.0005" per division in 10") and bring back to level using corresponding rear screw.

Should the Lathe have extra feet then it should now be levelled with the saddle immediately over each foot in turn, in crosswise and lengthwise direction at these points.

NOTE:—LockNuts on adjusting screws should be tightened immediately after each adjustment. It is also desirable to keep the machine as near the floor as possible. Grouting is not recommended as this causes inconvenience when re-levelling. Before continuing the lathe should be fully oiled to instructions given on separate sheet.

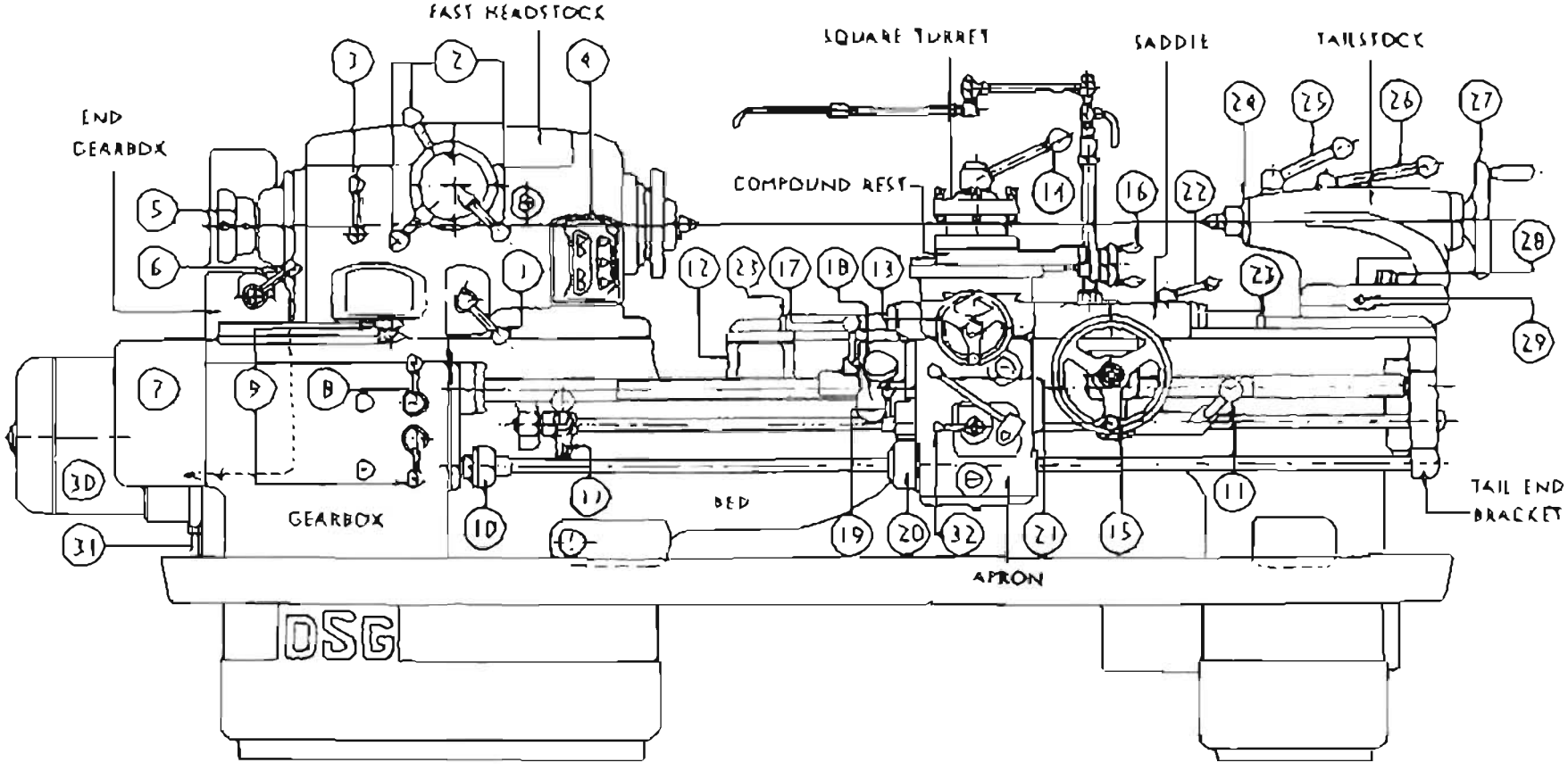
Take a finishing cut along a bar projecting 12" from the Chuck and check diameter by micrometer. The bar should be parallel to within .0004" in 9". If outside this limit, check on top and side of bar using a dial indicator from saddle as parallelism of spindle test on inspection sheet, allowing for taper of bar. Adjust levelling screws at extreme LEFT HAND END of the bed only to correct any inaccuracy. Take a further light cut to check result.

When levelling and turning tests are correct the holding down bolts should be tightened ensuring that the level is not disturbed. At no time should levelling be corrected with the holding down bolts nipped tight.

It should be realised that the whole purpose of the levelling operation is to endeavour to reproduce the conditions under which a Lathe has been built and inspected at D.S.G. works. There all fitting is done with the bed levelled but not bolted down and, therefore, free from stress. Although there is no provision for mounting a spirit level on the Fast headstock, parallelism of spindle test on Inspection Sheet fulfils this function and if repeated after installation, as explained above, should assure correct alignment of headstock and bed.

The level of the lathe should be checked periodically, say every 6 months.

IDENTIFICATION CHART



1. Feed and screw reverse lever.
2. Spindle speed change and reverse levers.
3. Coarse pitch operating lever.
4. Push-button unit.
5. Work steady for bar work.
6. Feed change lever on end-gearbox.
7. Change wheel cover.
8. Leadscrew engaging lever.
9. Feed change lever and knob.
10. Slip coupling for feedshaft.
11. Clutch and brake operating levers.
12. Removable gap piece.
13. Saddle handwheel.
14. Square turret locking and operating lever.
15. Apron handwheel.
16. Compound rest handle.
17. Operating lever for leadscrew nuts.
18. Screwcutting dial.
19. Sliding and surfacing feed change lever.
20. Apron oiling pump.
21. Feed engage and trip lever.
22. Saddle lock handle.
23. Wipers for bed shears.
24. Wiper for tailstock spindle.
25. Tailstock spindle lock handle.
26. Tailstock clamp lever.
27. Tailstock spindle hand-wheel.
28. Tailstock locking bolt.
29. Setting screws for taper work.
30. Electric driving motor.
31. Motor adjusting screws.
32. Feed reverse lever.

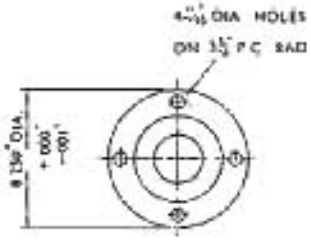
RECOMMENDED LUBRICANTS

FOR ALL TYPES OF LATHE (EXCEPT NC)

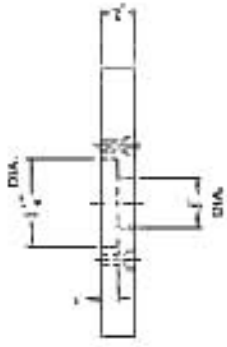
ASSEMBLY	SHELL	CASTROL	MOBIL	GULF
HEADSTOCK	TURBO 52 VITREA 27	HYSPIN AWS. 32	D.T.E. 24	HARMONY 32
THREAD & FEED GEARBOX	TONNA 33	MAGNA BD.	VACTRA NO. 2	GULFWAY 52
APRON, SADDLE & SLIDEWAYS	TONNA 33	MAGNA BD.	VACTRA NO. 2	GULFWAY 52
ELECTRICALLY OPERATED TURRET	TURBO 32 VITREA 27	HYSPIN AWS. 32	D.T.E. 24	HARMONY 32
RELIEVING UNIT, INCLUDING G/BOX	TONNA 33	MAGNA BD.	VACTRA NO. 2	GULFWAY 52
LUNZER INTEGRAL REVOLVING CENTRE	ALVANIA EP2	SPHEEROL EPL 2	MOBILPLEX 47	GULFCROWN NO. 2
HYDRAULIC COPYING UNIT	TELLUS 33	HYSPIN AWS. 68	D.T.E. 26	HARMONY 54 AW
OIL NIPPLES & OIL GUN	TONNA 33	MAGNA BD	VACTRA NO. 2	GULFWAY 52

NOTE! THE NUMBER OF OILS HAS BEEN KEPT TO A MINIMUM. QUANTITIES & REGULARITY OF CHANGES ARE LISTED FOR EACH MODEL ON SEPARATE DIAGRAM & LUBRICATION SHEET.

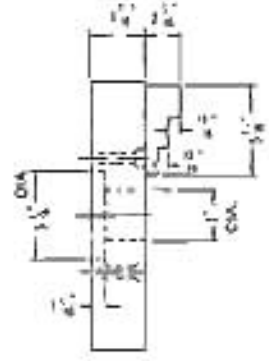
CAPACITY CHART



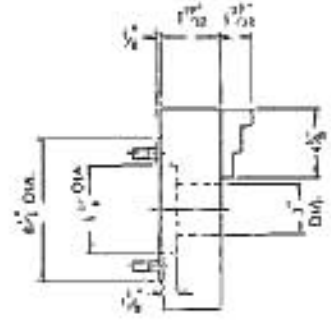
END VIEW OF SPINDLE FLANGE



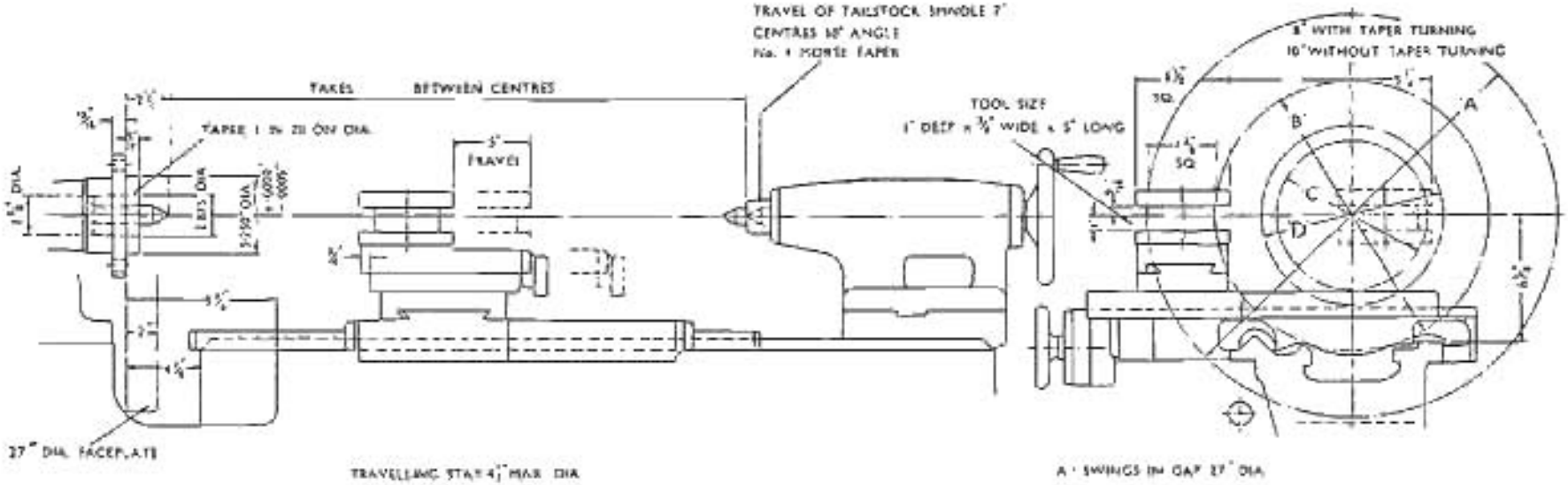
14" DIA. FACEPLATE



8" DIA. 4 JAW STEEL INDEPENDENT CHUCK



12" DIA. 3 JAW STEEL SCROLL CHUCK



TRAVELLING STAY 4" MAX. DIA.

STATIONARY STAY 5" MAX. DIA.

TAPER TURNING MAX. LENGTH 15"

TAPER TURNING MAX. ANGLE 30° INCLUDED

A - SWINGS IN GAP 27" DIA.

B - SWINGS OVER BED COVERS 18" DIA.

C - SWINGS OVER SADDLE GUARD 10" DIA.

D - SWINGS OVER SADDLE GUARD REMOVED 12 1/4" DIA.

SADDLES AND SLIDES

The saddle is locked to the bed by means of the lever on the top of the right-hand saddle wing, this should, if possible, be locked when surfacing.

The top slide can be locked by means of the square-headed screw at the front of the top slide.

Each division of the saddle-screw dial represents ·001 in. movement of the tool, likewise the tool moves ·001 in. per division of the top slide dial.

There are felt wipers at the ends of the bed shear covers and these should be renewed as required.

THE SQUARE TURRET

This is of the automatic type and anti-clockwise movement of the lever unlocks the turret, lifts the locating plunger and rotates the turret to the next station; the locking motion is of course reverse to this. The turret can be locked in intermediate positions when this is necessary. The dimensions of the turret and the tool size are given on the capacity chart.

TAILSTOCK

The position of the spindle clamping lever can be adjusted by slightly turning the nut with 2 tommy holes at the bottom of the clamping bolt.

Slight long tapers can be turned by offsetting the tailstock from its shoe with the screws provided.

To remove the centre retract the spindle fully when the centre will be automatically ejected.

The cover at the end of the tailstock carries a felt wiper for keeping the spindle and bore clean: this should be renewed when necessary.

THE MOTOR DRIVE

This is by a flanged motor and vee-rope drive. For adjustment of ropes the motor is mounted on an adaptor plate with 4 bolts engaging slots in the main motor support bracket. To adjust, it is only necessary to slacken the fixing nuts and lower by the adjusting screws provided.

THE ELECTRIC CONTROL PANEL

If necessary, this can be easily removed by disconnecting the wires at the panel from the switch and push-button station and taking out the screws in the fixing straps, when the panel will pull out. Switch off at the isolating switch before removing the cover over the panel chamber.

FAST HEADSTOCK

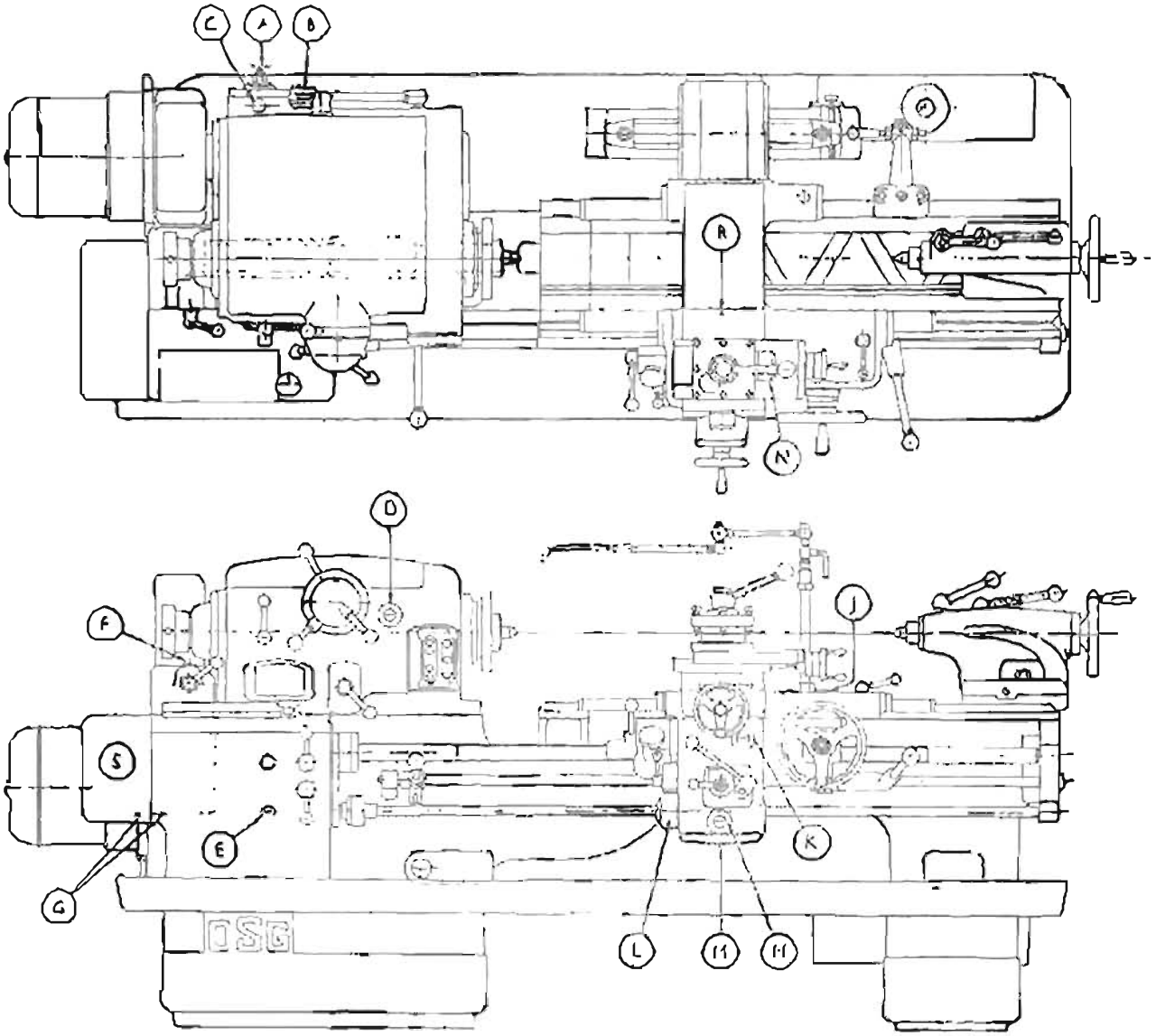
The motor is started and stopped by means of the push buttons on the control unit on the fast headstock; these operate the starting panel. Spindle speeds are obtained by means of the set of 3 operating levers at the front, the speeds being self indicating. The spindle should be stopped by means of the clutch-operating lever before changing speeds.

Feed reverse and coarse pitch operating levers are also situated at the front of the headstock.

A work steady for supporting bar work is fixed at the extreme end of the spindle and is fitted with 4 Allen grub screws for gripping the work.

The clutch and brake through which the drive is taken on the pulley shaft are self adjusting and should need no attention, if trouble however does occur our advice should be sought.

OILING DIAGRAM



Use Shell Vitrea 27 or equivalent oil. Specification as follows.

Specific gravity ·86 — Viscosity at 100°F { 150 Redwood Sec (76·5 c.) 170 Saybolt
Flash point closed 400°F. — Viscosity Index— 95

FAST HEADSTOCK OIL

Use Shell Tonna 33. Vacuum Vactra No. 2 or Equivalent oil Specification as follows

Specific Gravity ·875 — Viscosity at 100°F { 280 Redwood Sec. (69 c.) 320 Saybolt
Flash point closed 400°F. — Viscosity Index— 95
Containing non-drip, anti-wear and oiliness additives

TABLEWAY OIL FOR APRON, GEARBOX AND OIL GUN

CHANGE OIL IN FAST HEADSTOCK, AND GEARBOX EVERY 6 MONTHS.

FAST HEADSTOCK (8 Pints)

Fill and keep to centre of oil sight "B" through cap "C" when bath is stopped. Oiled by pump at "A" through filter. This combined mechanical and magnetic filter should be removed and both elements cleaned monthly, and always when changing oil.

To drain, remove the combined filter unit and pump out oil through the bracket; successively, drain by gravity through the bottom plug. To prime pump, remove hexagon plug inside the headstock.

Oil sight "D" indicates when oil pump is functioning.

GEARBOX (7 Pints)

Fill and keep to centre of oil sight "E" through cap "F" when bath is stopped. Drain at plug "G". Top oil sight indicates when pump under cover "S" is working.

APRON (2 Pints)

Fill and keep to centre of oil sight "H" through cap "J" on saddle. Oil sight "K" indicates when pump "L" is working.

Drain at plug "M".

To prime oil pump remove plug behind spring (No. 9 spare parts list).

Oil thread indicator daily through nipple below dial.

BED WAYS

Apron pump lubricates bed ways automatically and due to this, the apron requires "Topping-up" at regular intervals.

In the event of failure of supply to bed ways, check filter by removing screw plug in end of filter connector bracket at R.H. end of apron.

TOP SLIDE NUT

Oil top slide screw nut by removing cover "N".

SADDLE SCREW NUT

Oil daily through nipple "R" on top of cross slide.

SLIDE VEES

Oil daily through nipples provided on slides.

GENERAL

All other points should be oiled weekly through the nipples indicated by red washers using the oiling gun provided. There are a few oiling points under cover "S".

Note—Grease must never be used in the oil gun

INSTRUCTIONS FOR USE OF SCREWCUTTING DIAL

This is a most useful aid to screwcutting although its use is limited to certain threads and pitches. Where applicable it enables the nuts to be engaged without danger of cross threading. The dial may be used when cutting any pitch which is contained a whole number of times in a length of 8 in. From this it will be seen that the whole numbers of threads per inch can be cut, also threads per inch ending in eighths, quarters and halves, viz $2\frac{1}{8}$, $2\frac{1}{4}$, $2\frac{1}{2}$ t.p.i. One revolution of the dial is equivalent to 8 in. length of thread on the screw. As the dial is divided into 16 divisions, the alternate ones being numbered 1 to 8, then from one numbered division to the next is $\frac{1}{8}$ of a revolution and is equivalent to 1 in. of screw thread. It will be seen therefore, that when cutting a screw having a whole number of threads per inch the spindle will make a whole number of revolutions in one inch length, and as the leadscrew likewise makes a whole number of revolutions in the same distance the leadscrew nuts can be engaged at any numbered division on the dial. From this it follows that if the threads per inch in the screw to be cut is an even number, a whole number of threads is contained in $\frac{1}{2}$ in. and the nuts may be engaged at any of the 16 divisions on the dial. Similarly odd numbers can only be engaged at any numbered division, threads ending in halves engaged every quarter revolution of the dial, threads ending in quarters every half revolution, threads ending in eighths every revolution. For linear inch pitches, convert the pitch to an equivalent number of threads per inch (viz. $\frac{1}{4}$ inches pitch = $1\frac{1}{2}$ t.p.i.) and follow the above rules. If the number of t.p.i. is neither a whole number nor does not end in $\frac{1}{8}$, $\frac{1}{4}$ or $\frac{1}{2}$ then the dial cannot be used, in which case the screw must be cut completely without disengaging the nuts and by using the screw reverse mechanism, or spindle reverse to run the saddle back with the nuts engaged. There are certain other special applications of the dial and information on any particular case will be supplied by our technical department on request.

SCREWCUTTING INSTRUCTIONS

When setting the change gears it is important that there should be a small amount of backlash between each set of gears. This ensures that the drive to the screw will be smooth and that no undue stress is set up on the change gear studs which might lead to breakage. No difficulty should be met with in mounting the change gears if they are set as shown in the diagram on the plates. If the screwcutting motion has been standing for any length of time all the parts concerned should be lubricated together with the change gears.

Reverse to the screw for normal pitches is by the reverse lever on the front of the fast headstock operating a single tooth clutch running at the same speed as the spindle. Consequently the clutch may be used to run back the saddle to the starting position when cutting metric or odd pitches. This reverse lever should not be operated at speeds above 140 r.p.m.

Alternatively the spindle may be reversed by the lever on the head and the saddle traversed back at a quicker speed if desired.

Coarse pitches are obtained by means of the coarse pitch operating lever on the headstock which causes the gearbox drive to be taken from a driving shaft in the headstock instead of from the spindle. Reverse for screwcutting when using coarse pitch motion must be by reversing the spindle.

For accurate screwcutting it is essential that all slides should be adjusted properly without backlash and locked when possible.

As the leadscrew thrust is taken on ball bearings, there should be no wear, and if there is any slackness it will be caused by the checknuts becoming loose. These can easily be examined and adjusted if necessary.

When cutting very coarse leads, the nuts should be engaged and disengaged with the lathe stopped, using the driving clutch to start and stop the saddle traverse. The top slide should also be locked during each cut to obviate any digging of the tool due to the large helix angle of coarse lead screws.

As the rack pinion and handwheel shaft are mounted on ball or roller bearings no adverse effect on the screwcutting is experienced from drag of the pinion in the rack.

The leadscrew motion should be disconnected when not in use.

CLEANING OR REPLACING LEADSCREW NUTS

This is easily done by removing the thread indicator bracket from the side of the apron when the nuts will pull out.

TOTALLY ENCLOSED GEARBOX

This totally enclosed box has 24 changes, which, together with a 2 change in the rear end gearbox gives 48 changes of feed and 48 different threads without alteration to change gears. The lever at the top right-hand end is used for disconnecting the leadscrew for short intervals. NOTE.—If the screwcutting motion is not being used for a long period the change wheels should be swung out of mesh.

NOTE.—To operate the top gearbox feed change knob, the gearbox should be run slowly and the bottom feed change lever put into neutral position.

A safety spring-loaded coupling transmits the feeds through the long feed shaft to the apron. The slipping load is pre-set and cannot be adjusted.

Feeds coarser than those shown on the chart can be obtained by engaging the coarse pitch ratio. This increases the feed by the coarse pitch ratio. These very coarse feeds can only be used on the lower half of the speed range, and should be used with discretion.

Longitudinal feeds coarser than ·020 ins. or cross feeds coarser than ·010 ins. should not be used above 420 r.p.m.

Cross feeds are half the Longitudinal feed numbers, i.e., half the feed in inches. Change wheels for all standard types of thread are shown in the accompanying charts, together with the necessary formulæ for obtaining the change gears for special threads and pitches.

LUBRICATION.—See oiling chart.

TYPE 15	1	2	3	4	5	6	7	8
THREADS PER INCH	2	2½	2¾	3½	3¾	5	3¾	3½
	4	4½	5	5½	5¾	6	6½	7
	8	9	10	11	11½	12	13	14
	16	18	20	22	23	24	26	28
	32	36	40	44	46	48	52	56
	64	72	80	88	92	96	104	112
	FOR CROSS FEEDS DIVIDE THE NUMBERS BELOW BY 2							
LONGITUDINAL FEEDS IN INCHES PER REV.	·0700	·0625	·0560	·0510	·0490	·0470	·0430	·0400
	·0350	·0310	·0280	·0290	·0240	·0235	·0215	·0200
	·0175	·0160	·0140	·0125	·0120	·0116	·0107	·0100
	·0087	·0080	·0070	·0063	·0060	·0058	·0054	·0050
	·0044	·0040	·0035	·0032	·0030	·0029	·0027	·0025
	·0022	·0020	·0017	·0016	·0015	·0014	·0013	·0012

TYPE 17

CHANGE WHEELS

SCREW 40T

INTER MEDIATE 50T

STUD 1/16 SHAFT 80T

12 D.P.

CHANGE GEARS

S

R

P

N

S

P

R

N

SCREW PITCHES IN INCHES

COARSE PITCHES							NORMAL PITCHES											
SET TO T.P.I.			CHANGE GEARS				SET TO T.P.I.						CHANGE GEARS			
2	4	8	N	P	R	S	2	4	8	16	32	64	N	P	R	S
	2½	1¼	63	40	INTER	45	1	½	¼	⅛	1/16	1/32	63	35	50	45
	3½	1¾	85	45	INTER.	50	15/16	15/32					60	40	50	40
	3	(1½)	60	45	INTER.	50	7/8	7/16	3/32				63	40	50	45
	2¾	1¼	55	45	INTER.	50	13/16	13/32					85	45	INTER	40
5	2½	1¼	40	55	INTER.	40	3/4	3/8	3/16	3/32			80	50	INTER	40
4½	2½	1¼	45	55	INTER.	50	11/16	11/32					55	50	INTER	40
4	2	1	40	55	INTER	50	5/8	5/16	5/32				50	60	INTER	40
3½	1¾	15/16	45	55	INTER.	60	9/16	9/32					45	60	INTER	40

FOR PITCHES NOT SHOWN ABOVE

$\frac{N}{S}$ OR $\frac{N \times R}{P \times S}$ = $\frac{\text{PITCH REQD. x T.P.I. SET FOR}}{1 \text{ (x 10 FOR COARSE PITCH)}}$

SCREW PITCHES IN MILLIMETRES

SET LEVERS TO THESE T.P.I.									CHANGE GEARS			
4	8	16	2	4	8	16	32	64				
COARSE PITCH			NORMAL PITCHES						N	P	R	S
130	65			13	6·5	3·25			63	40	65	50
125			25	12·5	6·25				63	40	50	40
120	60	30	24	12	6	3	1·5	·75	63	40	60	50
110	55		22	11	5·5				63	40	55	50
100	50	25	20	10	5	2·5	1·25		63	45	INTER	40
90	45		18	9	4·5	2·25			63	40	45	50
80	40	20	16	8	4	2	1	·5	63	40	INTER	50
75			15	7·5	3·75				63	40	45	60
70	35		14	7	3·5	1·75			63	40	35	50

FOR PITCHES NOT SHOWN ABOVE

$\frac{N}{S}$ OR $\frac{N \times R}{P \times S}$ = $\frac{63 \times \text{PITCH REQD. x T.P.I. SET FOR}}{1600 \text{ (x 10 FOR COARSE PITCH)}}$

TOTALLY ENCLOSED GEARBOX

(Continued)

An alternative method of finding change gears for threads and pitches not on the charts is to select a thread or pitch near to the one required, from the appropriate chart, and modify the change gear ratio given on the chart in proportion to the thread or pitch required.

Ratio required =

$$\frac{\text{Gear ratio on chart} \times \text{Pitch required}}{\text{Pitch selected}} \quad \text{or} \quad \frac{\text{Gear ratio on chart} \quad \text{T.P.I. selected}}{\text{T.P.I. required}}$$

MODULE PITCHES

SET TO T.P.I.			CHANGE GEARS				SET LEVERS TO THESE T.P.I.							CHANGE GEARS			
4	6	8					2	3	4	6	8	16	32				
COARSE MODULE			N	P	R	S	NORMAL MODULE PITCHES							N	P	R	S
32		16	60	50	66	50		6	4·5	3	2·25	1·125		63	35	60	50
30	20	15	66	40	45	50	8		4		2	1	·5	63	35	55	50
28		14	55	50	63	50	7·5	5	3·75	2·5	1·875			66	40	45	40
26		13	45	60	55	35	7		3·5		1·75	·875		66	40	63	60
24	16	12	45	50	66	50	6·5		3·25		1·625			50	35	45	40
22		11	60	35	40	63	6	4	3	2	1·5	·75	·375	66	40	45	50
20		10	45	50	66	60	5·5		2·75		1·375			60	35	50	63
18	12	9	63	45	35	55	5		2·5		1·25	·625		66	40	45	60

FOR PITCHES NOT SHOWN ABOVE

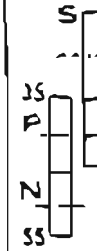
$$\frac{N}{S} \text{ OR } \frac{N \times R}{P \times S} = \frac{\text{MODULE PITCH REQUIRED} \times \text{T.P.I. SET FOR} \times 99}{800 \text{ (X 10 FOR COARSE PITCH.)}}$$

B.A. THREADS.

B.A. No.	NOM. DIAM.	T.P.I.	CHANGE GEARS			
			N	P	R	S
0	1	32	63	40	60	50
1	·9	40	63	40	45	50
2	·81	32	50	35	45	63
3	·73	32	65	45	35	55
4	·66	40	45	63	60	40
5	·59	80	65	50	60	35
6	·53	44	63	40	35	60
7	·48	40	45	55	60	65
8	·42	36	45	38	40	50
9	·35	80	60	40	45	55
10	·35	80	63	40	35	50

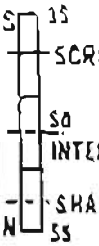
DIAMETRAL PITCH CHART

COARSE CHANGE GEARS



NORMAL DIAMETRAL PITCHES								LEVER	
4	4½	5	5½	5⅔	6	6½	7	A	D
8	9	10	11	11½	12	13	14	B	
16	18	20	22	23	24	26	28	C	
32	36	40	44	46	48	52	56	A	E
64	72	80	88	92	96	104	112	B	
COARSE DIAMETRAL PITCHES								LEVER	
⅛	9/64	5/32	11/64		¼	17/64	9/32	A	D
1	1⅛	1¼	1⅜	1⅞	1½	1⅝	1¾	B	
2	2½	2¾	2⅞	2⅞	3	3½	3⅔	C	
	1	2	3	4	5	6	7	8	THREAD INDICATOR POSITION

NORMAL CHANGE GEARS



OTHER THREADS

					CHANGE GEARS		
SET TO T.P.I.	5	10	20	40	N	INTER	S
T.P.I. OBTAINED	4⅔	9½	19	38	40	50	38
SET TO T.P.I.	2½	10	20	40	N	INTER	S
T.P.I. OBTAINED	2⅝	10½	21	42	60	40	63
SET TO T.P.I.		12	24		N	INTER	S
T.P.I. OBTAINED		13½	27		40	50	45
SET TO T.P.I.	6	12	24	48	N	INTER	S
T.P.I. OBTAINED	7½	15	30	60	40	55	50

INSTRUCTIONS FOR CUTTING MULTIPLE START SCREWS

For all multiple start screws the coarse pitch ratio must be engaged to use the following method of dividing.

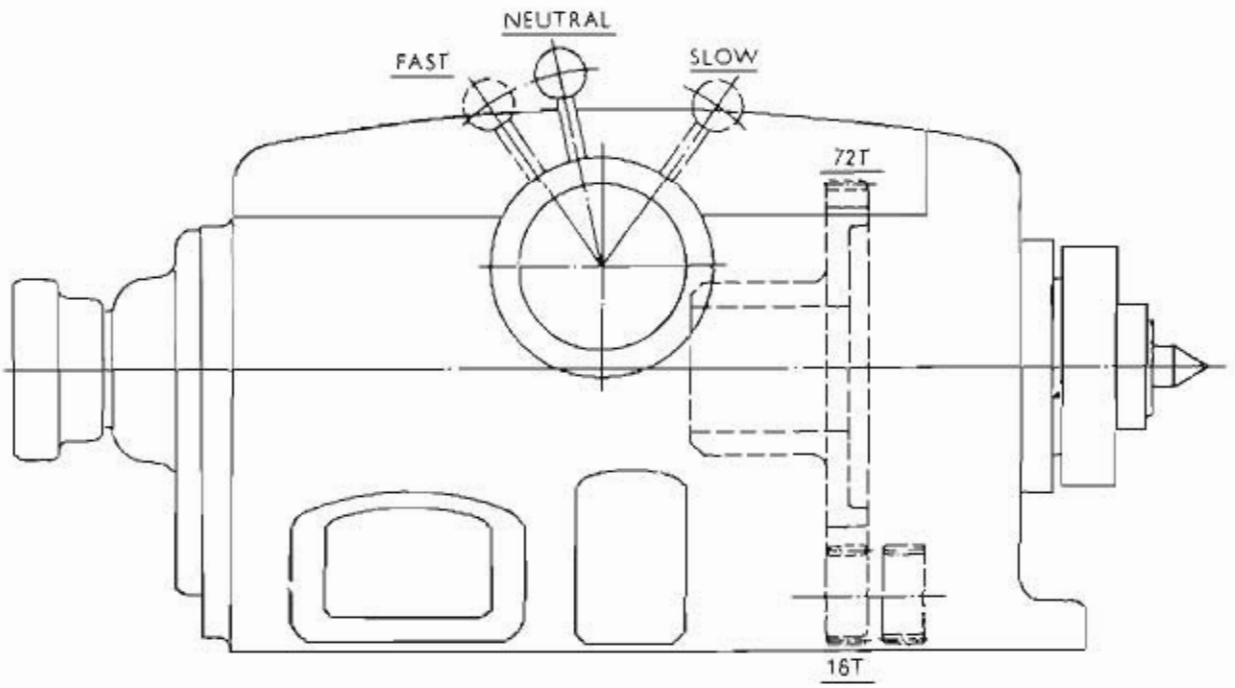
The starts can be obtained by marking the spindle or chuck flange and the main headstock, the spindle or chuck flange being divided into the number of starts required. Then 2, 3, 4, 6, or 8 starts can be obtained by pulling out of engagement the driving pinion (shown in sketch), operated by means of the lever giving fast and slow speed ranges on the fast headstock, and leaving the lever in the neutral position approximately as shown.

The spindle is then turned the requisite amount and the pinion can then be re-engaged; care should be taken not to disturb any other motion whilst this is being done. As the gear on the spindle has 72T, any number of starts which will divide into 72 can be cut in this way.

To obtain 5 or 7 leads proceed as above but disconnect gearing by moving coarse pitch lever back into neutral instead of the fast—slow spindle speed lever. This engages a 35T gear which divides by 5 or 7, as this gear runs 10 times faster than the spindle it is necessary to be accurate in marking the chuck for the number of leads required.

Before dividing, all backlash should be removed, with the work and leadscrew turning in the direction of cutting.

Information on any particular case will be supplied on request by our technical department.



When using the coarse pitch ratio for leads of 1 in. and under or 25 mm. and under, the gearbox levers should be set to 10 times the t.p.i. indicated at the top of the column containing the desired lead on the screw pitch chart.

INSTRUCTIONS FOR TAPER TURNING

This attachment will turn taper work up to 4 inches per foot on diameter or 20° included angle.

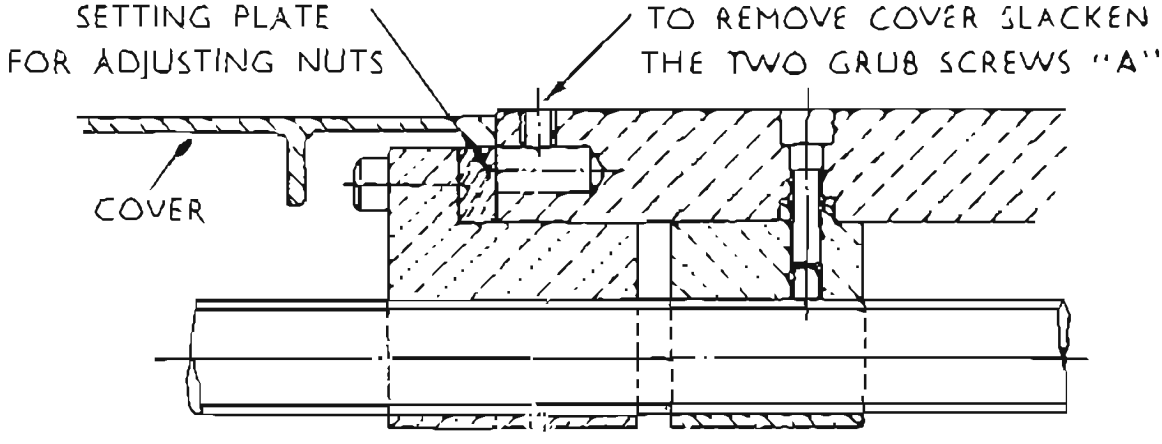
When tapering it is only necessary to set the guide bar at the required angle. The guide bar is locked by means of the 2 nuts exposed on removing the plugs from the bar. The 2 Allen socket head screws in the guide block should also be locked when tapering. The saddle screw is located in the guide block by ball thrust bearings, and being telescopic with its driving pinion pushes or pulls the cross slide with it: thus adjustment to the cut can be made in the ordinary way by means of the saddle screw handwheel and dial.

There should be no backlash on the saddle screw nuts, and adjustment to these can be made by grinding the setting plate, which is slotted to lift off, by merely slackening the 2 Allen fixing screws. Before doing this the backlash should be measured by means of the saddle screw dial, taking into account the backlash between the key and keyway of the telescopic joint. The saddle vee guard can be removed by slackening back the 2 grub screws marked (A) on diagram, which hold the guard fixing pins.

The knurled knob for setting the taper should only be used with the long guide bar approximately central with the saddle screw otherwise it will be difficult to operate.

IMPORTANT.—The swivelling guide bar and guide block must be always locked by the two end bolts and the 2 Allen screws after making any adjustment to it, even though the taper attachment is not in use, as the bar takes the thrust from the saddle screw.

If the motion has been standing see that it is well cleaned and lubricated before use.



INSTRUCTIONS FOR CUTTING MULTIPLE START SCREWS

(Continued)

For example, the levers should be set to 20 t.p.i. or 40 t p i. for $\frac{1}{4}$ in. lead or $\frac{1}{8}$ in. lead respectively and use the change wheels indicated for these leads.

When using the coarse pitch ratio for multiple start screws designated in t.p.i., for example 12 t.p.i. 3 starts, the gearbox levers should be set to the t.p.i. on chart found in the following manner:—

$$\text{t.p.i. on chart} = \frac{\text{t.p.i. of work} \times 10}{\text{Number of starts}}$$

If the t.p.i. thus found is not on the chart, convert the same t.p.i. to an equivalent inch pitch.

The change gears required, if not on the chart for screw pitches, may be found from:—

$$\frac{N}{S} \text{ or } \frac{N}{P} \times \frac{R}{S} = \frac{\text{Pitch required} \times \text{t.p.i. set for}}{1}$$

Example 1.—To cut 4 starts 8 t.p.i.:—

$$\text{t.p.i. on chart} = \frac{8 \times 10}{4} = 20 \text{ t.p.i.}$$

Therefore set levers to 20 t.p.i. and coarse pitch.

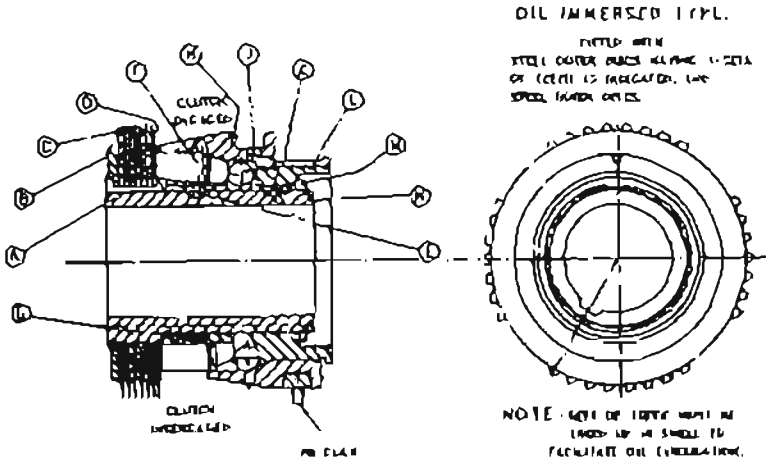
Example 2.—To cut 3 starts 8 t.p.i.:—

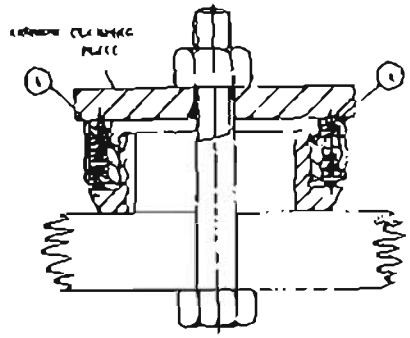
$$\text{t.p.i. on chart} = \frac{8 \times 10}{3} = \frac{80 \text{ t.p.i.}}{3} = 3/80 \text{ in. pitch.}$$

$$\text{Change gears} = \frac{3 \times (20 \text{ t.p.i. set for})}{80} = \frac{3}{4} = \frac{45}{60}$$

Therefore set levers to 20 t.p.i., also to coarse pitch and use change gears N/S = $\frac{45/60}{30/40}$ or

INSTRUCTION SHEET FOR DISMANTLING AND REASSEMBLING CROFT'S PATENT B.O.M. L TYPE CLUTCH MECHANISM





DISMANTLING
PRESSURE PIECE ASSEMBLY "F"

TO DISMANTLE CLUTCH MECHANISM

1. Withdraw mechanism complete from shaft.
2. Put clutch into "out of gear" position.
3. Remove spring ring "N" using pointed tool to lever spring out of groove.
4. Remove distance washer "M".
5. Withdraw cone reaction piece "L".
6. Remove operating balls "K".
7. Withdraw sliding collar "H".
8. Withdraw pressure distance piece assembly "F" and disengaging springs "G".
9. Withdraw driving discs "C" and "D" and backplate "B" from sleeve "A".

TO REASSEMBLE CLUTCH MECHANISM

10. Before reassembling, clean all parts carefully and lubricate slightly.
11. See that Woodruff keys "E" are in position in sleeve "A".
12. Replace backplate "B"; see that this is correct way round.
13. Fit outer driving disc "C" followed by inner driving disc "D" and so on alternately until complete number of discs are in position.
14. Inspect pressure distance piece assembly "F" and see that the correct number of disengaging springs "G" are in position, equally spaced, with the centre guide pins at the outer end of the springs. (To hold springs in position, smear them with thick ball-bearing grease.)
15. Slide pressure distance piece assembly "F" into its position on sleeve "A".
16. Replace sliding collar "H", see that gib head feather key "J" is in position on collar and in line with Woodruff keys "E" in sleeve "A".
17. Replace balls "K" and lubricate slightly.
18. Replace cone reaction piece "L" on sleeve "A".
19. Place sliding collar "H" in "out of gear" position.
20. Replace distance washer "M" on sleeve "A" and spring ring "N" in groove.
21. Align teeth on all discs and put clutch into "in gear" position.

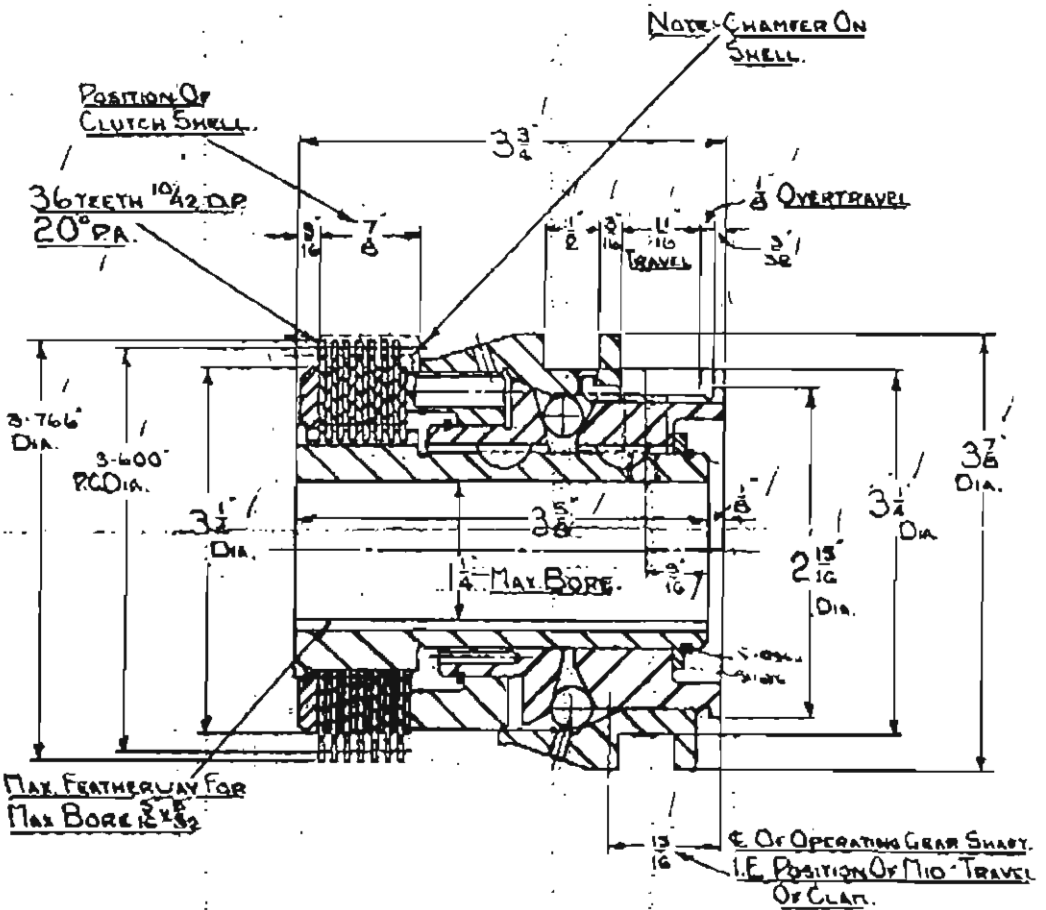
TO DISMANTLE PRESSURE PIECE ASSEMBLY "F"

Clamp the pressure distance piece assembly to a bench or vice by means of a bolt, and compress the springs "S" until the spring "R" can be removed. Remove spring ring "R" and gradually release pressure on springs by releasing clamping nut. The outer portion may then be removed and new springs fitted.

If the full number of springs are not fitted, care must be taken to see that opposite spaces are left without springs so that the pressure of the springs will be properly balanced.

The distance piece may be assembled by compressing spring with clamp as mentioned above, care being taken to see that the spring ring "R" is set down in the groove correctly.

CROFTS (ENGINEERS) LTD., BRADFORD	LIST N° 8291	FILE BEE 89



TO TRANSMIT 1·0 H.P. AT 100 R.P.M.

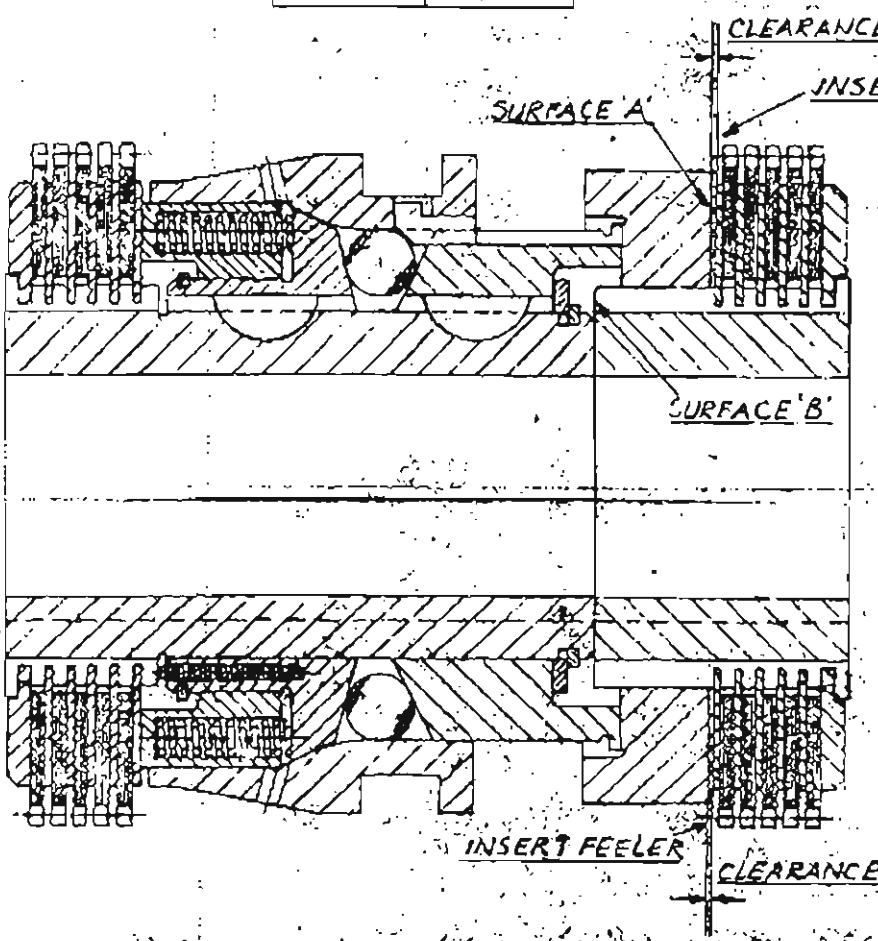
LIST N° 8291	N° 2 PATENT 'L' TYPE B.O.M. CLUTCH. OIL IMMERSED TYPE.	DATE:- 30-10-45

CROFTS (ENGINEERS) LTD.
BRADFORD.

LIST No 20671

PLS REF. 52/

SIZE OF CLUTCH	CLEARANCE
1 2 3 4	·030"
5 6 7 8	·040"



CLUTCH & BRAKE TO BE CLAMPED IN POSITION SHOWN & BRAKE PORTION TO BE TESTED FOR BRAKE CLEARANCE AS ILLUSTRATED. SURFACE 'A' OR 'B' TO BE GROUND TO SUIT CLEARANCE GIVEN IN TABLE.

ST No		DATE
20671	METHOD OF ADJUSTING DISC BRAKE ATTACHMENT FOR 'L' TYPE B.O.M. CLUTCHES.	19.5.66.

INSTRUCTIONS FOR SPINDLE BEARING ADJUSTMENT

PLAIN BEARING SPINDLE

Before starting up the spindle, the motor should be set on and left to run a few minutes to allow oil to circulate around all bearings, especially the front bearing. For the first few weeks it is advisable to run the head by steps up to the top speeds if they are required. If in any difficulty consult us for advice.

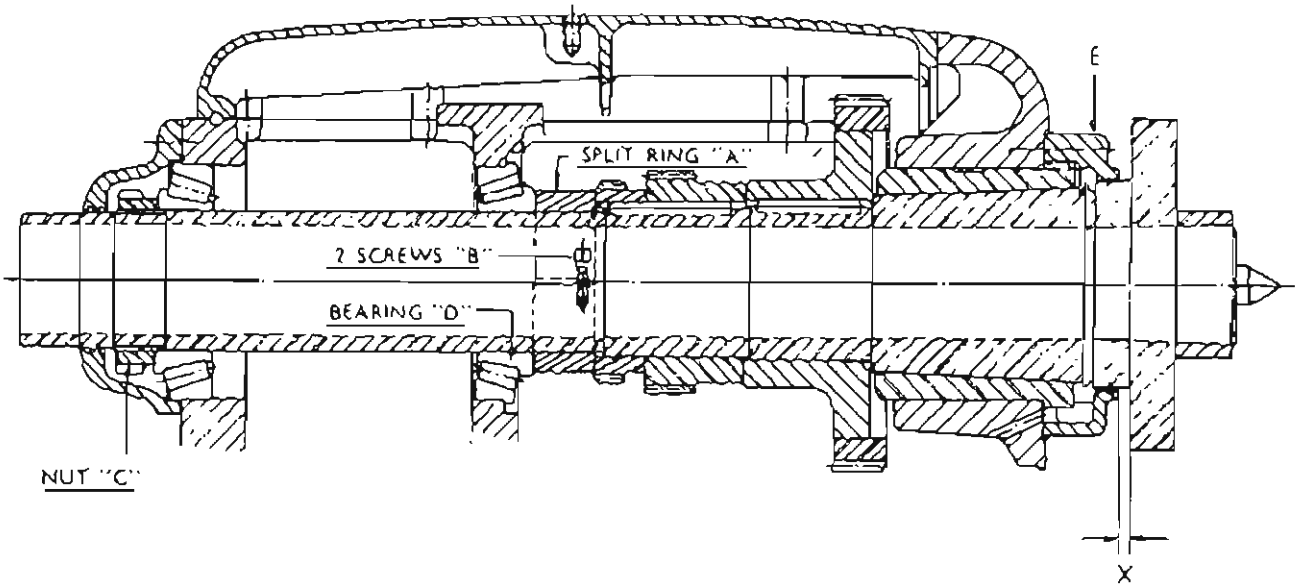
The spindle bearings should not require adjustment for some years if the oil in the head has been renewed with clean oil periodically. (See oiling diagram.)

BEARING ADJUSTMENT

1. Remove set screw in nut "C" and adjust nut until torque to turn spindle when in neutral position is 30-40 lb. in. Torque can be measured by the pull on a light spring balance attached to a string carried around the lathe chuck, turning the spindle slowly.
2. Remove chuck and measure accurately to ·001 in. distance "X" between flange of spindle and machined face of cover "E".
3. Slacken nut "C" about four turns and knock spindle forward until rollers of bearing "D" are clear of outer race.
4. Remove two halves of ring "A" after taking out screws "B". Take care not to bruise faces of ring.
5. Tighten nut "C" and at the same time turn spindle to squeeze out oil from front bearing until spindle can only just be moved by chuck key. Knock inner race of bearing "D" forward so that rollers clear outer race.
6. Measure new distance "X". Add to this size ·007 in. and subtract the sum from first measurement of "X". The remainder is the amount to be machined of the width of split ring. The ring faces must be parallel to ·0005 in.
7. Slacken nut "C" two turns and knock back the bearing "D" until split ring can be replaced and lightly fastened.
8. Replace chuck and tighten nut "C" until torque to turn spindle steadily is 40-50 lb. in. A new hole for the dog point of the set screw in nut "C" may be required. Tighten screws "B".

Note: The constant ·007 in. gives the clearance for oil film thickness of ·00037 in. in the front bearing, and correct torque ensures a proper bearing temperature.

INSTRUCTIONS FOR SPINDLE BEARING ADJUSTMENT *(Continued)*



ROLLER BEARING SPINDLE

Refer To Sheet 30

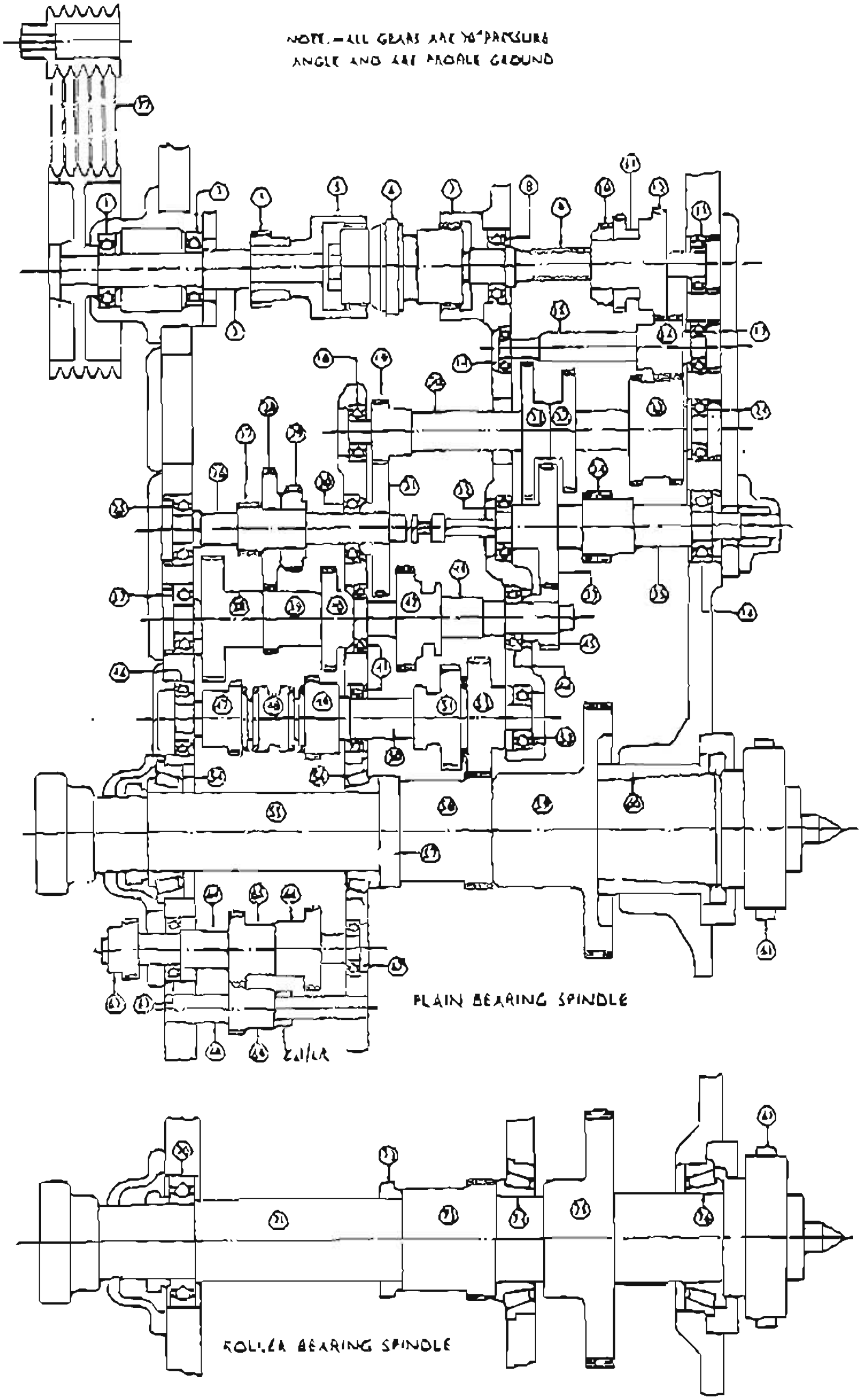
To obtain correct adjustment of taper roller bearings 74 and 76 (See spare parts sheet).

1. Remove set screw in nut 72 and adjust nut until torque to turn spindle is 40-50 lb.in. The torque can be measured by the pull on a light spring balance attached to a string carried round the lathe chuck, turning the spindle slowly.

2. A new hole for the dog point of the set screw in nut 72 may be required.

The torque given above should not be exceeded as this may cause overheating of the bearings.

SPARE PARTS LIST FOR FAST HEADSTOCK



1. Hoff. L.S.13—R. & M. L.J.13
2. Hoff. L.S.13—R. & M. L.J.13
3. Pulley shaft
4. 27T. 10 N.P. [illegible] driving gear
5. Clutch driving shaft
6. Crofts No. 2 B O H [illegible] clutch
7. Brake shaft
8. Hoff. L.S.13—R. & M. L.J.13
9. [illegible]
10. 24T. 10D.P. gear on 1st shaft
11. 41T. 10D.P. gear on 1st shaft
12. 43T. 10D.P. gear on 1st shaft
13. Hoff. L.S.11—R. & M. L.J.11
14. Hoff. L.S.9—R. & M. L.J.9
15. Reverse shaft
16. 24T. 10D.P. gear on reverse shaft
17. Hoff. 135—R. & M. L.J.35
18. Hoff. M.S.10—R. & M. M.J.10
19. Helical reduction pinion on 2nd shaft
20. 2nd shaft
21. 46T. 10D.P. gear on 2nd shaft
22. 53T. 10D.P. gear on 2nd shaft
23. 43T. double gear on 2nd shaft
24. Hoff. L.S.12—R. & M. L.J.12
25. Hoff. M.S.12—R. & M. M.J.12
26. 3rd shaft
27. 21T. 10D.P. gear on 3rd shaft
28. 32T. 10D.P. gear on 3rd shaft
29. 36T. 10D.P. gear on 3rd shaft
30. Hoff. L.S.12—R. & M. L.J.12
31. Helical reduction gear on 3rd shaft
32. Hoff. 135—R. & M. L.J.35
33. 55T. 10N.P. helical gear on 4th shaft
34. 18T. 6D.P. gear on 4th shaft
35. 4th shaft
36. Hoff. M.S.13—R. & M. M.J.13
37. Hoff. M.S.12—R. & M. M.J.12
38. 50T. 10D.P. gear on 4th shaft
39. 24T. 10D.P. gear on 4th shaft
40. 44T. 10D.P. gear on 4th shaft
41. Hoff. X.L.S.11.—R. & M. X.L.J.11
42. 31T. 10D.P. gear on 4th shaft
43. 4th shaft
44. Hoff. 135.—R. & M. L.J.35
45. 27T. 10N.P. helical gear on 4th shaft
46. Hoff. X.L.S.9—R. & M. X.L.J.9
47. 31T. 10D.P. clutch gear on 5th shaft
48. Sliding clutch on 5th shaft
49. 25T. 10D.P. clutch gear on 5th shaft
50. 5th shaft
51. 33T. 8D.P. sliding clutch gear on 5th shaft
52. 43T. 10N.P. clutch gear on 5th shaft
53. Hoff. M.S.11—R. & M. M.J.11
54. Timken brgs. 3. cone 562 cup 592B.
55. Plain bearing spindle
56. Timken brgs. 3. cone 595, cup 592B.
57. Locking collar on spindle
58. 48T. 10N.P. helical gear on spindle
59. 77T. 6½D.P. gear on spindle
60. Front neck bearing
61. Cam lock spindle nose
62. 20T. 10D.P. gear outside head
63. Hoff. 135.—R. & M. L.J.35
64. Short feed shaft
65. 31T. 10D.P. gear on short feed shaft
66. 31T. 10D.P. gear on short feed shaft
67. Hoff. L.S.11—R. & M. L.J.11
68. Feed reverse intermediate stud
69. Feed reverse intermediate gear 21T
70. Hoff. 185—R. & M. L.J.85 (precision)
71. Roller bearing spindle
72. Middle checknut on spindle
73. 48T. 10N.P. helical gear on spindle
74. Timken brgs. 3. cone [illegible], cup 672B
75. 77T. 6½D.P. gear on spindle
76. Timken brgs. 3. cone [illegible], cup 672B
77. [illegible] Symbol No. 548

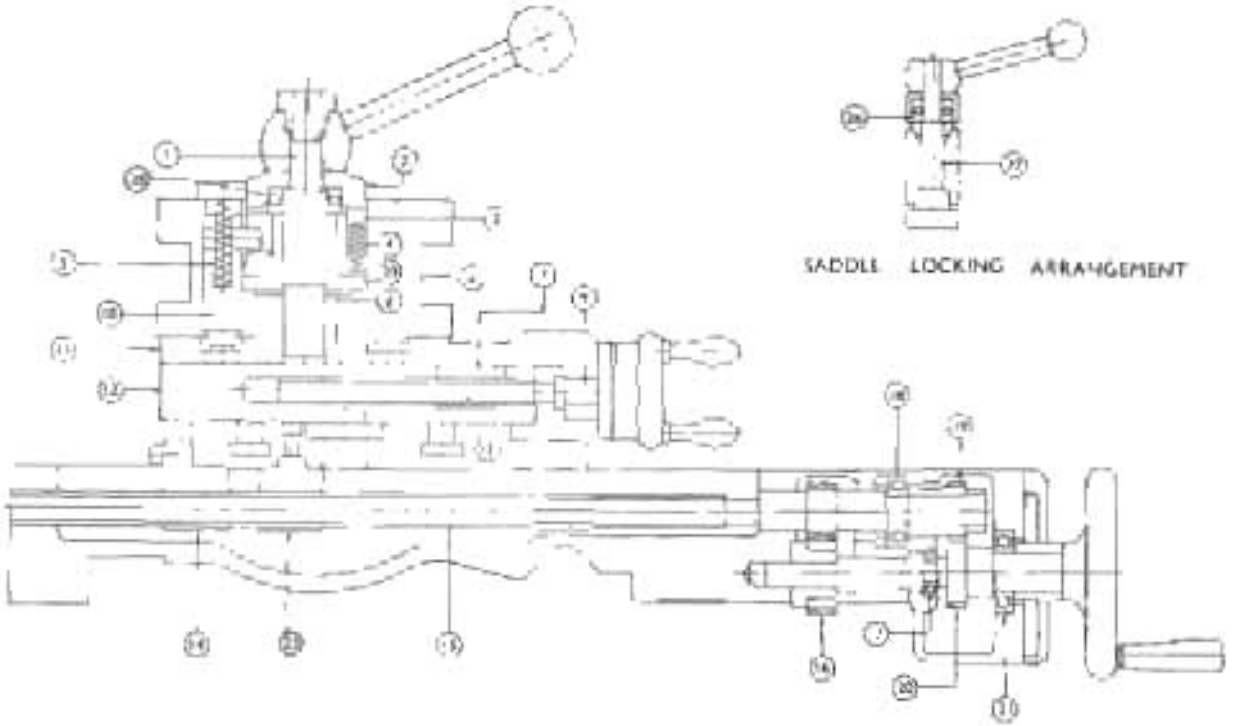
Type 17 - D1-8' Camlock

Sheet No. 30

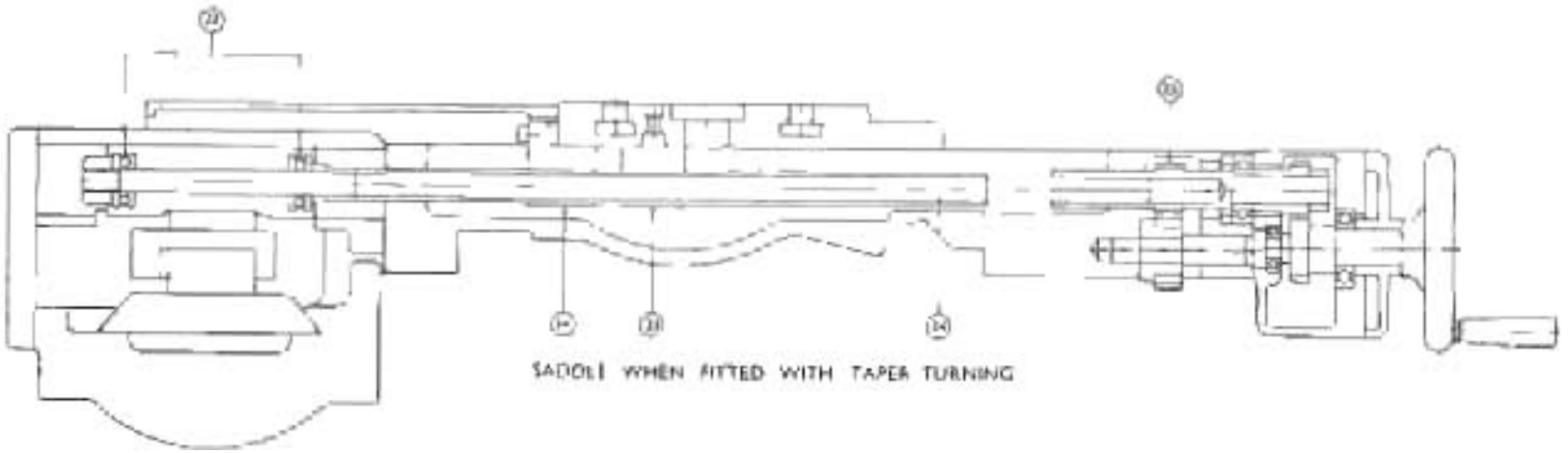
TYPES 15, 17, 17T 20SB LATHES

SPARE PARTS FOR SADDLE AND SQUARE TURRET ON COMPOUND REST

1. Turret locking bolt.
2. Ratchet plate.
3. Ratchet plunger
4. Ratchet plunger spring.
5. Locating plunger spring.
6. Square turret.
7. Compound - est screw nut.
8. Turret locking nut.
9. Compound rest screw.
10. Locating plunger
11. Turret slide.
12. Swivel slide
13. Bottom slide
14. Flanged saddle screw nut.
15. Saddle screw.
16. 25T. 13 D.P. intermediate gear
17. Hoff. 112—R. & M. L.1.12.
18. Hoff. L.B.C.D.S.—·002 in. clearance.
19. 18T. 12 D.P. gear on saddle screw
20. Handwheel pinion shaft.
21. Hoff. L.5.10—R. & M. L.5.1.
22. Hoff. W.$\frac{3}{8}$—R. & M. L.T.$\frac{3}{8}$.
23. Tongued saddle screw nut.
24. Taper turning saddle screw.
25. 16T. 12 D.P. pinion shaft.
26. Hoff W.$\frac{7}{16}$—R. & M. L.T.$\frac{7}{16}$
27. Saddle lock bolt.
28. Hoff W.$\frac{1}{4}$.
29. Thrust Ring.

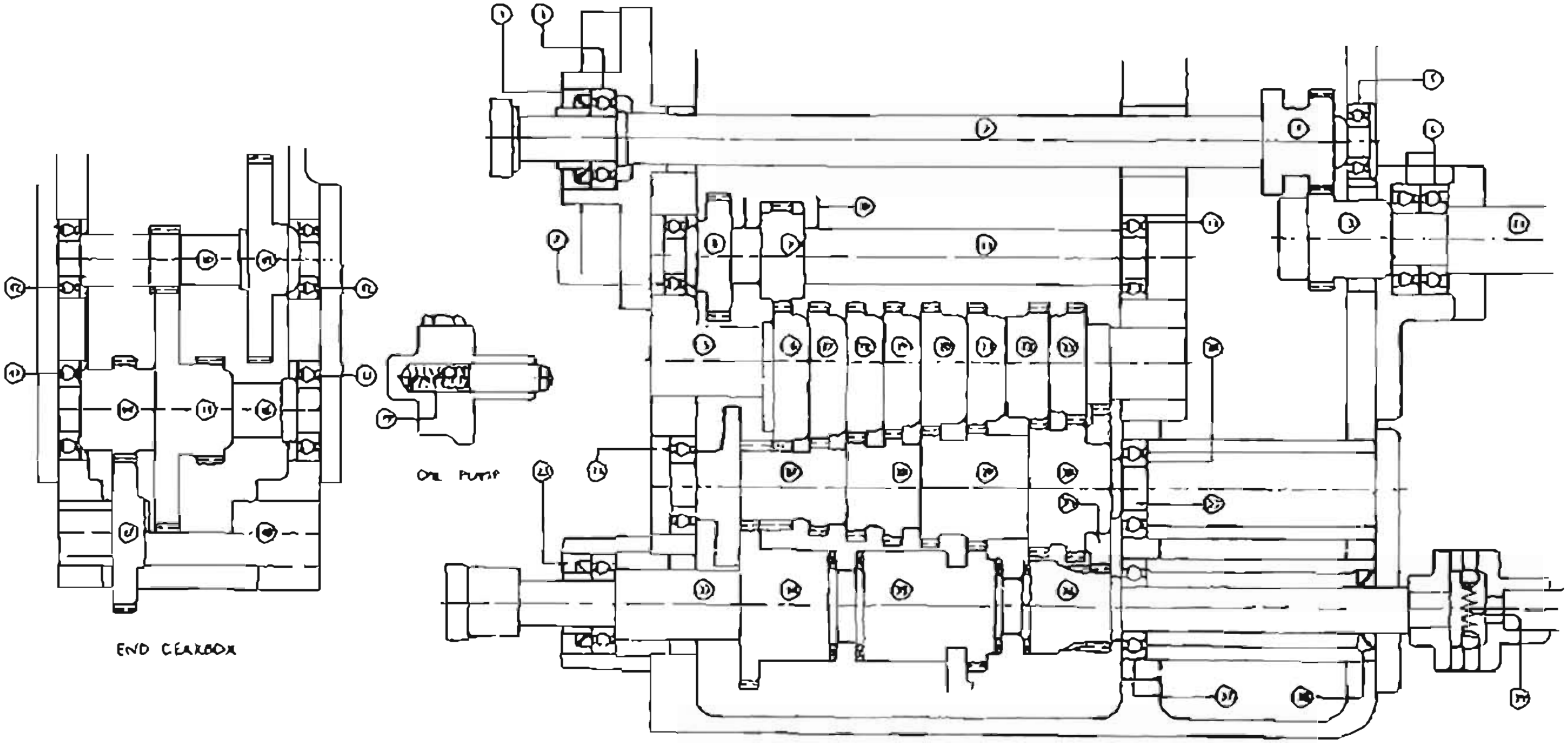


SADDLE LOCKING ARRANGEMENT



SADDLE WHEN FITTED WITH TAPER TURNING

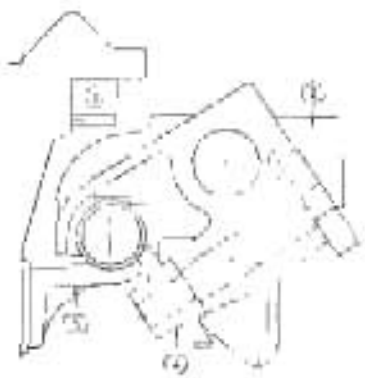
SPARE PARTS LIST FOR TOTALLY ENCLOSED GEARBOX



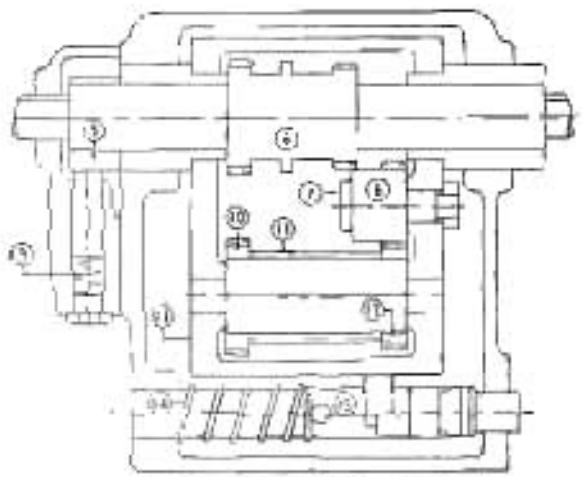
1. Circlip [illegible].
2. Hoff. L.S.11—R. & M. L.J.11.
3. 5th shaft.
4. 25T. 10D.P. gear on 5th shaft.
5. Hoff. L.S.8—R. & M. L.J.8.
6. Hoff. L.S.12A.C—R. & M. L.J.T.12. Specially wired & preloaded, back to back.
7. Hoff. L.S.8—R. & M. L.J.8.
8. 30T. 10D.P. gear on 5th shaft.
9. 20T. 8D.P. " " " "
10. 20T. 8D.P. sliding gear cluster.
11. 1st shaft.
12. Hoff. L.S.5—R. & M. L.J.5.
13. 25T. 10D.P. gear on leadscrew.
14. Leadscrew.
15. 2nd shaft.
16. 18T. 8D.P. gear on 2nd shaft.
17. 17T. 8D.P. " " " "
18. 18T. 8D.P. " " " "
19. 15T. 8D.P. " " " "
20. 11/13T. 8D.P. " " " "
21. 11T. 8D.P. " " " "
22. 12T. 8D.P. " " " "
23. 12T. 8D.P. " " " "
24. Hoff. L.S.11—R. & M. L.J.11.
25. Circlip [illegible].
26. Hoff. L.S.10—R. & M. L.J.10.
27. 14T. & 18T. 8D.P. gear on 3rd shaft.
28. 20T. & 22T. 8D.P. " " " "
29. 22T. & 24T. 8D.P. " " " "
30. 26T. & 18T. 8D.P. gears " " "
31. 32T. 8D.P. gear on 3rd shaft.
32. 3rd shaft.
33. 4th shaft.
34. 33T. 8D.P. gear on 4th shaft.
35. 24T. 8D.P. " " " "
36. 16T. 8D.P. " " " "
37. Hoff. L.S.11—R. & M. L.J.11.
38. Circlip [illegible].
39. Spring in [illegible] connector.
40. 43T. 10D.P. gear on [illegible] shaft.
41. 60T. 10D.P. gear on pinion shaft.
42. Hoff. L.S.10—R. & M. L.J.10.
43. Hoff. L.S.10—R. & M. L.J.10.
44. 34T. 10D.P. gear on spline shaft.
45. 22T. & 40T. 10D.P. gear on spline shaft.
46. Spline shaft.
47. 38T. 10D.P. gear on worm shaft.
48. Intermediate shaft.
49. Pump plunger spring.

SPARE PARTS LIST FOR APRON

OIL PUMP

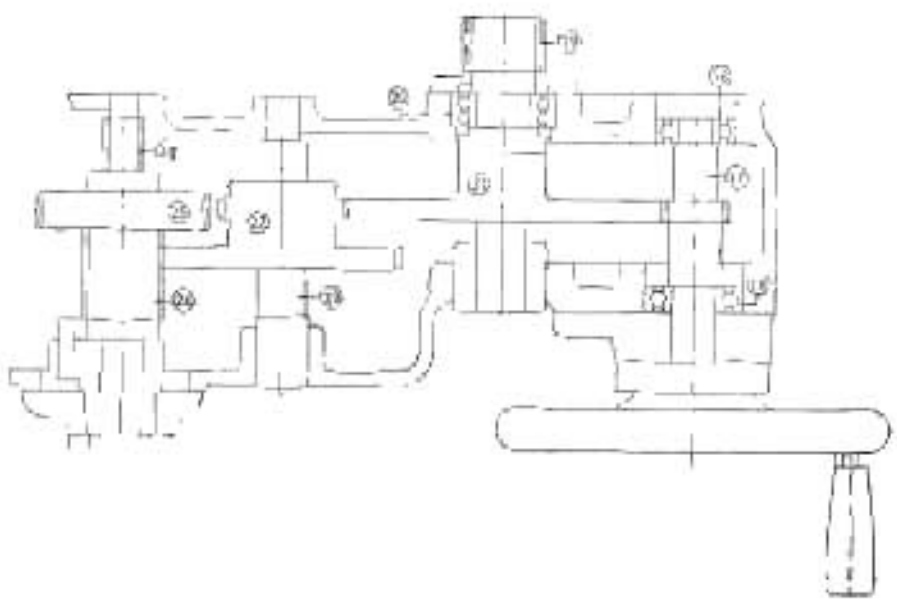


LEADSCREW NUTS & SCREWCUTTING DIAL



PUMP WORM BOX & TRIP MOTION

1. Rack
2. Leadscrew nuts.
3. Leadscrew support bracket.
4. Thread indicator wheel
5. Pump eccentric
6. 30T. & 27T. 12 D.P. sliding gear.
7. Reverse pinion stud
8. Intermediate reverse pinion 22T 12 D.P.
9. Pump plunger spring
10. 30T. 12 D.P. gear on worm
11. Feed worm 10 D.P., 2 leads, L.H.
12. 27T. 12 D.P. gear on worm
13. Worm box.
14. Spring on strip shaft
15. Sliding strip shaft
16. Half \ 5.8—R. & M. L.J.J.
17. Hand racking shaft
18. Half \ 5.10.—R. & M. L.J.J.
19. Rack pinion shaft.
20. Half. 130 D.R.—R. & M. L.D.J.30.
21. 89T. 12 D.P. gear.
22. 35T. & 65T. 12 D.P. sliding gear.
23. Shaft for 35T. & 65T. 12 D.P. sliding gear.
24. Feed reverse operating shaft
25. 38T. 10 D.P. worm wheel.
26. 21T. 12 D.P. pinion



AMERICAN SPINDLE NOSE TYPE D.I.