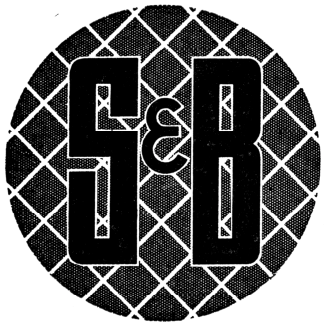


MODEL "A"

PRECISION SURFACING AND SCREWCUTTING LATHE

●

SMART & BROWN
(MACHINE TOOLS) LTD

ISSUE
58X

MODEL "A"
SURFACING AND SCREWCUTTING
LATHE

●

SMART & BROWN
(MACHINE TOOLS) LTD
BIGGLESWADE, BEDS.

SALES: 25, MANCHESTER SQUARE, LONDON, W.1
TELEPHONE: WELBECK 7941

SMART & BROWN PRECISION LATHES have an established reputation for accuracy and reliability, and the minimum of care and attention is required in installation and maintenance in order to get maximum results.

Neglect of certain essentials will however result in faulty work and may eventually lead to breakdowns.

This booklet has been prepared to enumerate those points to which attention must be paid, in order that the machine will be given a fair chance to operate at its best.

IN ANY CORRESPONDENCE RELATING TO THIS MODEL "A" SURFACING AND SCREWCUTTING LATHE PLEASE QUOTE SERIAL No. OF MACHINE TO BE FOUND ON THE R.H. END OF BED.

FOR OTHER PRODUCTS SEE PAGE 12.

INSTALLATION

PACKING LIST

A packing list, listing the accessories and equipment, is included with each machine.

The customer is advised to check up this equipment immediately on receipt, and in case of any discrepancies notification should be made at once.

The serial number, which is stamped on the right-hand end of the bed, should be quoted in any correspondence dealing with a machine.

LIFTING

This Lathe is a piece of precision equipment, carefully checked for accuracy and alignment.

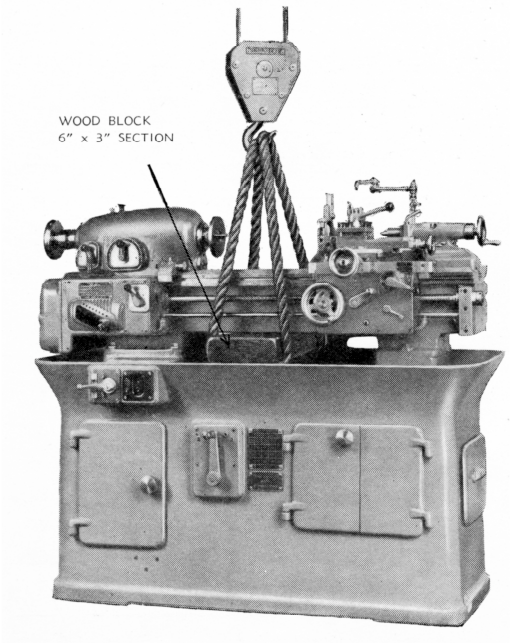
Care must therefore be taken against any act that will in any way impair the built-in accuracy of the machine.

The illustration shows how the machine should be lifted. Ropes are advised in preference to chains.

Balance by moving tailstock and carriage.

(Before the carriage or tailstock are moved, the anti-corrosive compound must be carefully wiped from all surfaces. A cloth soaked in paraffin should be used for this purpose. When the slideways have been thoroughly cleaned, a film of oil should be applied.)

MAKE CERTAIN THAT THE MACHINE IS BALANCED BEFORE LIFTING.



LEVELLING

In order that every lathe shall function accurately, it must be installed on a rigid foundation. Failure to provide a solid seating may result in the bed becoming distorted. A concrete foundation is strongly advised, but if the floor is of wood it should be rigidly supported.

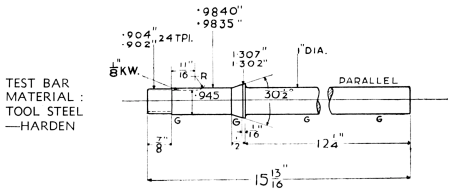
Care taken in levelling will be amply repaid in maintained accuracy. Levelling should be carried out as follows:—

An accurate precision level and a set of parallels will be required.

The parallels, one on each of the front and rear flats, with the level placed across the parallels, should be placed near the headstock. Wedges or suitable packings under the cabinet should now be adjusted until a correct reading is obtained.

The same procedure should be adopted at the tailstock end, and finally a reading taken in the centre.

The cabinet can now be bolted to the floor after which each setting must be checked again.



ALIGNMENT

If at any time it is found that the machine does not turn true, the first thing to check is the levelling, and during the first few months after installation it should be checked frequently.

Levelling of the machine lengthwise is not important so long as the bed is not twisted through faulty clamping.

Ground test bars should be used for checking alignment.

First check the alignment of the head-stock spindle with the saddle guideways, by using a test bar ground to fit accurately in the taper bore of the spindle. The bar should be pulled into position by the draw bolt, and should project 12 inches (see illustration).

Check on top and one side of test bar with dial gauge.

Alignment of the tailstock can be checked against a parallel bar held between centres, and readings taken in a similar manner.

LUBRICATION

The lathe was run several hours before despatch, and all oil then drained from the sumps (except headstock bearings).

Before running, these sumps should be refilled to correct levels with a suitable grade of oil.

The slideways, nut and apron gearing are lubricated from a pressure pump in the Apron, operated by the traverse handwheel. When doing repetition facing jobs it is recommended that the carriage be occasionally run by hand along the bed to maintain efficient oiling. An oil gun is provided for general lubrication

If the wipers on the saddle are removed and the felt pads cleaned and oiled occasionally, scoring of the bedways will be considerably reduced.

The headstock bearings are oiled by syphon through felt pads from sumps contained beneath each bearing. These sumps should occasionally be topped up with Gargoyle DTE Oil Light obtainable from Vacuum Oil Company Ltd., London and branches.

An oil sump for the headstock back gears is contained in the headstock, and oil level should be maintained by removing the two screws and lifting off the cover. Care should be taken not to overfill. Drain is below bedways.

Headstock end gears are oiled by drip from an oil chamber at the rear of the headstock. The reservoir should be kept replenished by the hand pump, which should be operated several times before starting up, and afterwards at hourly periods. Oil drains into a sump which can be filled or drained through the tee piece at the rear.

All lubricating nipples on the machine are for use with OIL. The use of grease in these nipples will seriously interfere with the correct lubrication of the various bearings, etc.

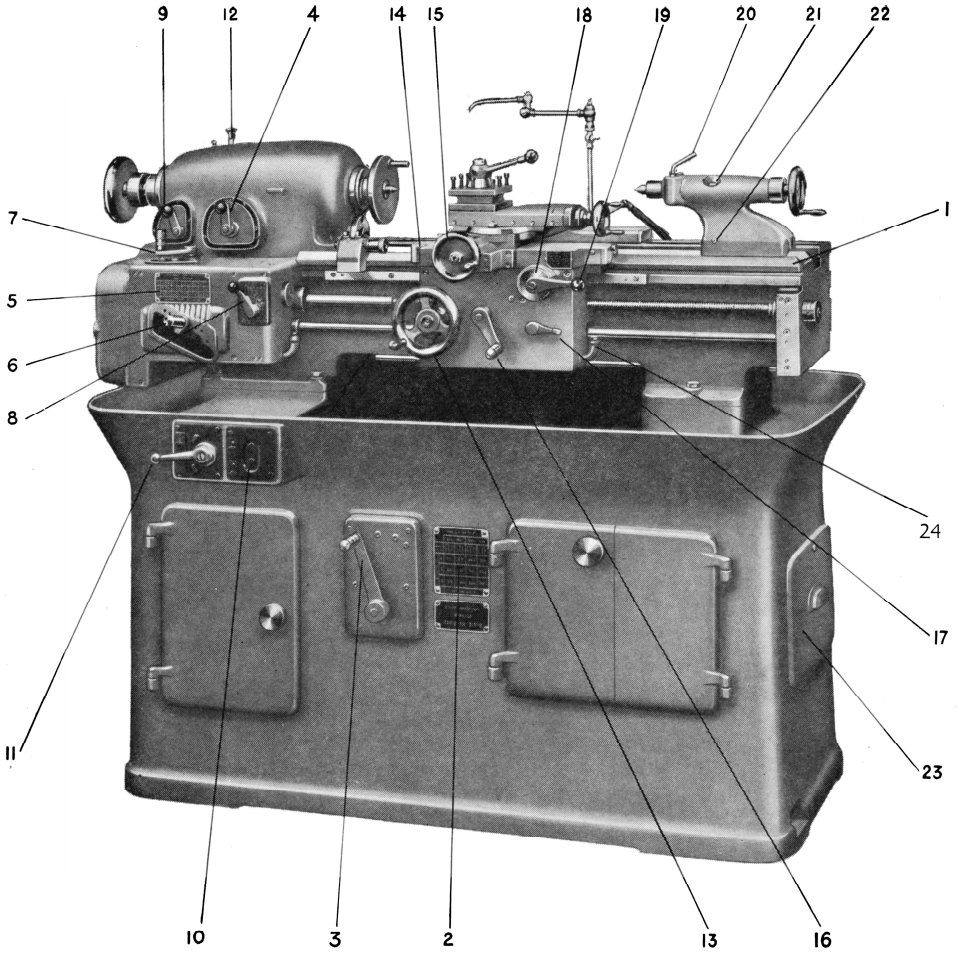
EQUIPMENT

★Draw bar
Standard Collets $\frac{1}{32}$″ to $\frac{3}{4}$″ max.
★No. 2 Morse Centre Adaptor
★No. 2 Morse Plain or Hollow Centres
★Travelling Steady
★Driving Plate
9″ Diameter Faceplate
★American Type Tool Post
★Box Type Tool Post
Changewheels
Taper Turning Attachment
5″ diameter 3-jaw Scroll Chuck
6″ diameter 4-jaw independent Chuck
4-way Tool Post with Special Top Slide
Ring Chucks $\frac{1}{2}$″ to $2\frac{1}{2}$″ × $\frac{1}{16}$″ with Expander
Disc Chucks $\frac{1}{2}$″ to $2\frac{1}{2}$″ × $\frac{1}{16}$″ with Closer
Oversize Collet Attachment $\frac{13}{16}$″ to $1\frac{1}{4}$″ diameter
Three Point Fixed Steady
Drill Chuck 0 to $\frac{3}{8}$″ capacity
★Micrometer Stop
★Spindle End Shield
★Oil Gun and Spanners

★Standard Equipment

SPECIFICATION

Swing over Bed	$9\frac{1}{4}$″
Length between Centres	20″
Swing over Carriage	$5\frac{1}{4}$″
Travel of Top Slide	3″
Taper Turning Length	9″ Max.
Max. Taper	10°R & LH.
Power Required	$1\frac{1}{2}$ H.P.
R.P.M. of Motor	1440
Section of Tool	$\frac{3}{8}$″ × $\frac{5}{8}$″
Spindle Speeds:—	
(*a*) Back Gear	39, 56, 78, 102, 144, 200 R.P.M.
(*b*) Open Belt	280, 396, 554, 723, 1026, 1430 R.P.M.
Width of Drive Belt	$1\frac{1}{4}$″
Ratio of Back Gear	7.11/1
Max. Collet Capacity	$\frac{3}{4}$″
Bore of Spindle	63/64″
Front Bearing	2″ dia. $2\frac{3}{4}$″ long
Rear Bearing	$1\frac{9}{16}$″ dia. $2\frac{1}{4}$″ long
Dia. of Faceplate	9″
Spindle Nose Diameter	$1\frac{3}{4}$″
Spindle Nose Thread	8 T.P.I.
Lead Screw Diameter	1″
Lead Screw Pitch	6 T.P.I.
No. of Changes on Norton Box	27
T.P.I. on Norton Box	8—76
Trav. Feeds Norton Box	·001″ — ·010″
Facing Feeds Norton Box	·001″ — ·010″
Dia. of Tailstock Spindle	$1\frac{1}{4}$″
Travel of Tailstock Spindle	$3\frac{1}{4}$″
Centres	No. 2 Morse
Weight of Machine with Standard Equipment	14 cwts. 2 qrs.
Overall Floor Space	58″ × 30″ — 48″ high



1. Machine Serial Number
2. Spindle Speed Plate
3. Speed Change Gearbox Lever
4. Back Gear Lever
5. Thread Index Plate
6. Tumbler Lever
7. Thread Compound Lever
8. Feed Threads Lever
9. Leadscrew Reverse Lever
10. Start and Stop Push Buttons
11. Forward-Reverse Switch
12. Hand Pump to End Gears
13. Apron Handwheel
14. Saddle Lock Stud
15. Facing Handwheel and Dial
16. Surface-facing Handle
17. Feed Engagement Lever
18. Chasing Dial
19. Leadscrew Engagement Lever
20. Tailstock Lock Handle
21. Tailstock Graduations
22. Tailstock Setover Screw
23. Change Gear Bracket
24. Oil Filler and Level Indicator

ADJUSTMENT

The spindle bearings are accurately adjusted before leaving our works, and should run for a long period without further adjustment.

When adjustment becomes necessary, this should be carried out as follows:—

FRONT BEARING

First slack off front bearing outer nut and close by tightening inner nut. After adjustment, lock up outer nut.

REAR BEARING

Pull out rear bracket filler piece. Close by tightening inner nut, and lock up outer nut after adjustment is complete. When locking up the outer nuts, care should be taken not to tighten excessively.

TO ADJUST END THRUST

End thrust is taken by a ball thrust washer and end location can be adjusted by carefully tightening the rear nut "B." (Fig. 1.)
This nut is locked by a grub screw which should be slacked off and locked after adjusting.
Note.—Adjust when warm.

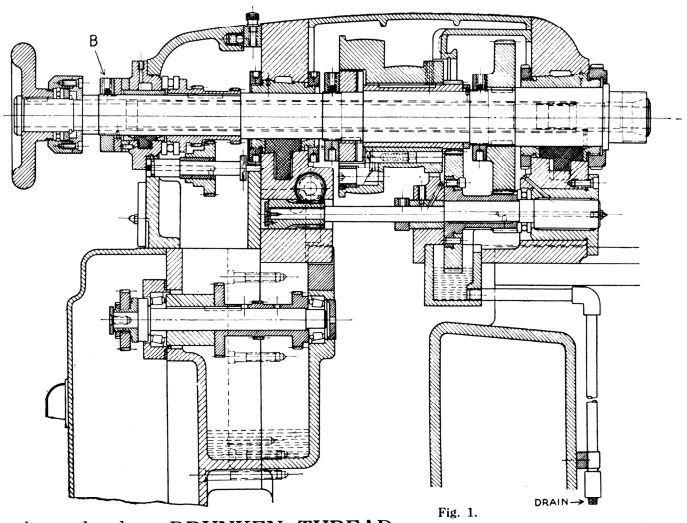
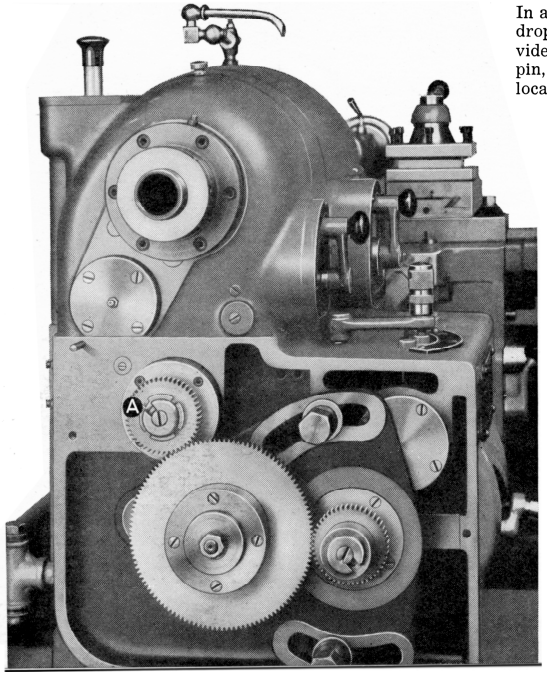


Fig. 1.

DRUNKEN THREAD

Drunken thread, or alternatively thick and thin threads can be caused due to the leadscrew thrust requiring attention. Careful adjustment of the thrust washer will usually remedy this trouble.



In addition to the safety features given by the spring-loaded drop worm when sliding or surfacing, a shear pin is provided to avoid risk of damage when screwing. The shear pin, mounted on the flange behind gear "A" (Fig. 2) locates in hardened steel bushes.

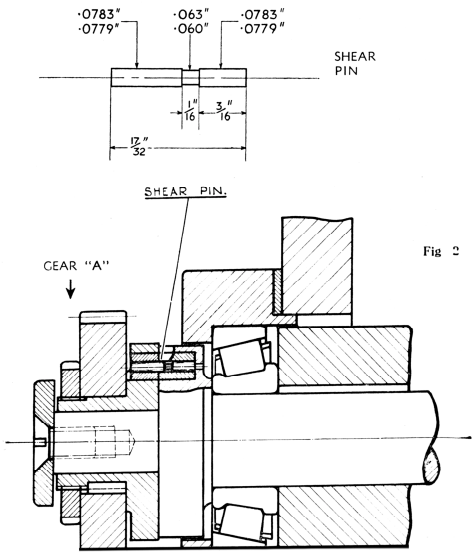


Fig 2

OPERATION OF BACK GEAR

The following procedure should be carried out to engage Back Gear:—Revolve pulley until socket "A" is at top (see Fig. 1, page 6), insert the special hexagon key provided, turn through 180° in a clockwise direction, and set Selector Lever at the front of the headstock in the " IN " position. To disengage Back Gear, set the Selector Lever at the " OUT " position, insert the special hexagon key in the socket "A" and turn through 180° in an anti-clockwise direction. The pulley must then be revolved by hand until the Driving Plunger locks in the Driving Ring. This will have taken place when the spindle begins to revolve as the pulley is turned by hand.

TAPER TURNING ATTACHMENT

The taper turning attachment is not fitted as standard equipment but attachments can be supplied and fitted after installation without difficulty, if so desired.

The taper turning slide is of special design and obviates the compounding of the saddle slides commonly used, which are a source of weakness.

The taper turning bracket is rigidly clamped to a machined face which runs the full length behind the lathe bed.

The bracket is locked into position along the bed by means of bolts which engage a tee slot.

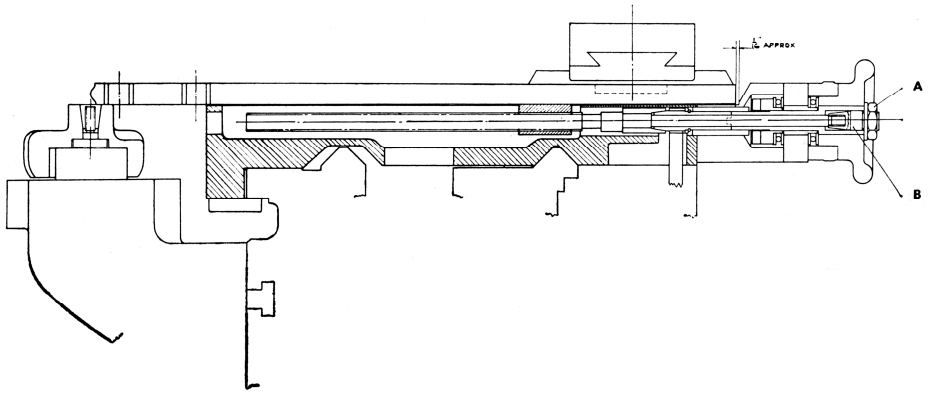
When changing over from plain to taper turning, the saddle slide must first be traversed by the front handwheel, until a gap of approximately $\frac{1}{16}$" is left between the front face of the slide and the machined face of the front handwheel bracket.

At this point the conical bolt " B " is unscrewed from the front handwheel shaft (without turning the handwheel) and the saddle slide pushed forward until one of the bushed holes at the rear of the saddle coincides with the hole in the taper slide block. Slide and block are then coupled together by inserting the conical stud. After the desired taper is obtained, slider block and saddle slide should be locked together by means of the locknut on the bolt, thus avoiding any possibility of backlash.

Of the two bushed holes in the saddle slide, the rear will be used for external tapers and the inner bush is provided for taper-boring. Depth of cut is applied by turning the top tool slide through a suitable angle, and advancing the tool by means of the top slide. The taper slide is graduated in degrees, and inches per foot, and micrometer adjustment is provided.

To revert to plain turning, simply remove the conical stud in the slider block, pull the saddle slide towards the operator as far as it will go, insert the stud in the front handwheel shaft, and lock up lightly by means of the stud lock-nut "A."

NOTE.—When taper turning it is very important that the tool cutting edge be on exactly the same height as the spindle centre. Any discrepancy will produce a convex surface on the work face.



DO NOT USE COMPRESSED AIR FOR CLEANING

SCREWCUTTING

The chasing dial will be found useful for cutting ¼, ½ or odd threads.

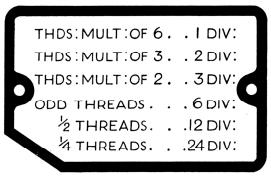
The dial which is mounted on the hub of the nut engagement lever has 24 divisions.

When cutting ¼ threads—say 19¼, the nut can be engaged at the same graduation each time only (i.e., every 24 divisions).

For ½ threads every 12 divisions, for odd threads every six divisions, and so on, as given in the attached chart.

For fractional threads other than those stated, the chasing dial should not be used.

An electrical switch for reversing the machine is provided for cutting these and other m/m or diametral pitch threads. In this case the nut is left in engagement and the carriage is traversed backwards and forwards by means of the switch.



CHASING DIAL CHART

When cutting double, triple, or multiple screw threads, it is necessary to be able to index the work round after finishing one complete thread, through 1/2, 1/3, or a fraction of a rev. depending on the multiple of the thread to be cut, without altering the position of the cutting tool. It is usual practice when an indexing fixture is not available, to index the spindle round the required fraction by pulling gear "A" out of mesh with gear " B," and turning the shaft on which "A" is mounted through the required number of teeth.

The number of teeth in "A" must therefore be an exact multiple of the number of starts required.

It will be seen that when the gearing ratio from spindle to change gears is unity, to cut say a 2 start thread, the wheel "A" must be turned 1/2 rev., for a 3 start 1/3 rev., for a 4 start 1/4 rev., and so on. On the "A" Model, however, care must be taken when cutting multiple threads, that the three-speed feed change box, which is placed **between** the spindle and the quadrant gearing is not overlooked.

There are three positions, viz., " A," " B," and " C " on the feed box giving ratios 1 : 1, 1 : 2 and 1 : 4 respectively.

With the lever in position "A" the usual conditions apply. On position " B " we get a reduction of 1 : 2, and therefore the wheel must be indexed through twice the usual fraction, i.e. for a 2 start thread index through one rev., 3 start 2/3 rev., 4 start 1/2 rev., 6 start 1/3 rev., etc. Position " C " gives 1 : 4 reduction and indexing is for a 2 start 2 revs., 3 starts 4/3 rev., 4 start 1 rev., 6 start 2/3 rev., etc. When indexing by this method on the "A" model, the gear "A" must therefore be a multiple of the product of the ratio of the box and the number of starts, e.g. 5 starts 32 T.P.I. would give position " C " on the feedbox lever which we know has a 1 : 4 ratio. The product therefore = No. of starts × the reciprocal of the ratio = 5 × 4 = 20. "A" must therefore be a multiple of 20, i.e., 40T or 60T and at the same time, wheel " D " must be changed to the same number of teeth as " A." The standard gear of 48T will be found to divide equally for 2, 3, 4 or 6 starts. For other multi starts, extra gears will be required.

The foregoing holds good for all inch pitches, but for Metric, B.A. and Diametral threads it will in most cases be found necessary to use a dividing plate on the spindle. No attempt has been made on a machine of this size to incorporate Metric pitches in the standard feed box.

Metric, B.A., or involute pitches are obtained by the use of changewheels in the quadrant gearing.

The quadrant is a substantial bracket and is secured by two hexagon nuts which are easy of access. The intermediate gear is mounted on roller bearings.

A Metric version of the " A " model is available.

STANDARD METRIC PITCHES

Pitch in m/m	A	Inter Stud B	Inter Stud C	D	N
·2	48	120		127	48
·25	60	120		127	48
·3	48	120		127	32
·35	70	120		127	40
·4	48	120		127	24
·45	45	120		127	20
·5	60	120		127	24
·6	48	120		127	16
·7	70	120		127	20
·75	60	120		127	16
·8	48	120		127	12
·9	45	120		127	10
1·0	60	120		127	12
1·1	77	120		127	14
1·2	48	120		127	8
1·25	50	120		127	8
1·3	52	120		127	8
1·4	70	120		127	10
1·5	60	120		127	8
1·6	60	50	100	127	15
1·75	70	120		127	8
1·8	81	120		127	9
2·0	60	50	100	127	12
2·2	77	50	100	127	14
2·4	60	50	100	127	10
2·5	60	48	100	127	10
2·8	70	50	100	127	10
3·0	60	50	100	127	8
3·5	70	50	100	127	8
4·0	81	45	100	127	9
4·5	81	45	100	127	8
5·0	70	35	100	127	8

Table covers Lowenhertz and International Threads up to 5 m/m Pitch.

B.A. PITCHES

B.A. No.	Pitch m/m	35A	Inner Stud B	Inner Stud C	D	N
0	1	60	120		127	12
1	·90	45	120		127	10
2	·81	81	120		127	20
3	·73	73	120		127	20
4	·66	77	100	60	127	14
5	·59	59	120		127	20
6	·53	53	120		127	20
7	·48	48	120		127	20
8	·43	43	120		127	20
9	·39	39	120		127	20
10	·35	35	120		127	20
11	·31	31	120		127	20
12	·28	35	100	60	127	15
13	·25	60	120		127	48
14	·23	46	120		127	40
15	·21	35	100	60	127	20

STANDARD DIAMETRAL PITCHES

Diam. Pitch	A	Inter Stud B	Inter Stud C	D	N
16	77	50	102	100	8
18	77	50	102	100	9
20	77	50	102	100	10
22	77	50	102	100	11
24	77	50	102	100	12
26	77	50	102	100	13
28	77	50	102	100	14
30	77	50	102	100	15
32	77	50	102	100	16
36	77	50	102	100	18
40	77	50	102	100	20
48	77	50	102	100	24

Complete set of extra change gears to cut all the foregoing threads:— 31, 35, 39, 43, 45, 46, 50, 52, 53, 59, 60, 70, 73, 77, 81, 100, 102, 127.

Min. teeth on A = 30 Max. teeth on C = 127

Max. teeth on A = 81 Min. teeth on A & B = 108

FORMULA FOR METRIC PITCHES

$$\text{Pitch in m/m} = \frac{A}{B} \times \frac{C}{D} \times \frac{25{\cdot}4}{N}$$

Where N = No. on thread plate to which Tumbler is set

$$= \frac{A}{B} \times \frac{C}{127} \times \frac{25{\cdot}4}{N}$$

Therefore pitch in m/m x 5N $= \frac{AC}{B}$ for compound train

Pitch in m/m x 5N = A for simple train. Where D = 127 constant.

Example. Required wheels for 3½ m/m Pitch:—

$$3{\cdot}5 \times 5N = \frac{AC}{B}$$

$$17{\cdot}5N = \frac{AC}{B}$$

Let N = 8

then 140 $= \frac{AC}{B}$

We have a 70T Wheel ∴ Let A = 70

then $2 = \frac{C}{B}$ or C = 100 & B = 50

FORMULA FOR DIAMETRAL PITCHES

$$\text{Axial Pitch} = \frac{\pi}{DP}$$

$$\therefore \frac{\pi}{DP} = \frac{77}{B} \times \frac{102}{D} \times \frac{1}{N}$$

$$= \frac{7854}{BDN}$$

$$\& \; BDN = \frac{7854}{3{\cdot}1416} \times DP \text{ where } \pi = 3{\cdot}1416$$

BDN = 2500 DP (exact)

where A = 77 and C = 102 constant

Example. Required wheels for 16 DP

Assume N = 8

BDN = 2500 x 16 = 40,000

BD = 5000

Say 50 x 100

which are included in set of gears.

MOTOR

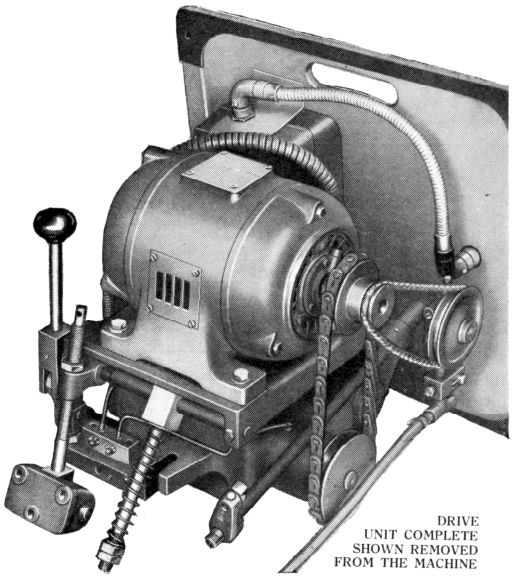
The Standard Foot Mounted Motor can be supplied for standard voltage, or for Direct Current. In the latter case, however, ¾ H.P. is the maximum that can be accommodated.

A vee belt takes the drive from the motor to a three-speed box, and the whole assembly is hinged to give adequate belt adjustment.

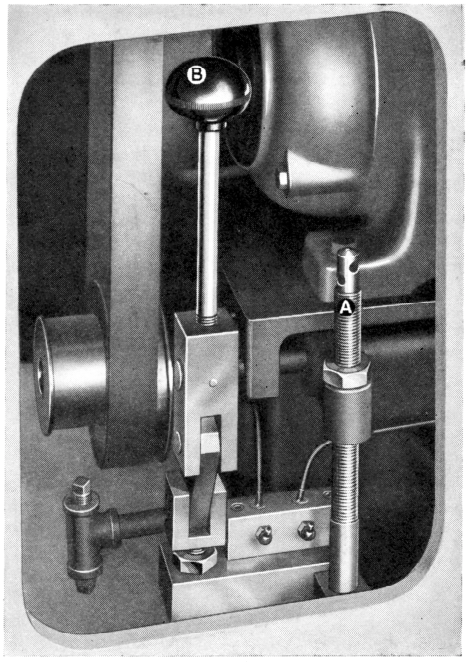
Drive to the spindle is taken from a two-step cone pulley on the gearbox via flat belt, and all adjustments are very accessible. Belt changing is facilitated by slacking the belt by means of a lever.

Shafts in the three-speed box run on taper roller bearings, and in order that no transmission vibrations shall be transmitted to the cabinet, the complete drive unit is mounted on rubber bushes. The drive unit is carried on the rear cover and can be removed complete.

The cabinet is a light rigid casting, suitably drained, into which is mounted the drive unit, suds tank and electric pump, a large tool cupboard, change wheel bracket, and electric control gear.



DRIVE UNIT COMPLETE SHOWN REMOVED FROM THE MACHINE



Suds drain into a sump contained in the cabinet, and thence to a suds tank, which can be lifted out at the back of the machine for cleaning.

No volt and thermal overload protection is given to the motor by the B.T.H. contactor starter which is mounted at the back of the cabinet.

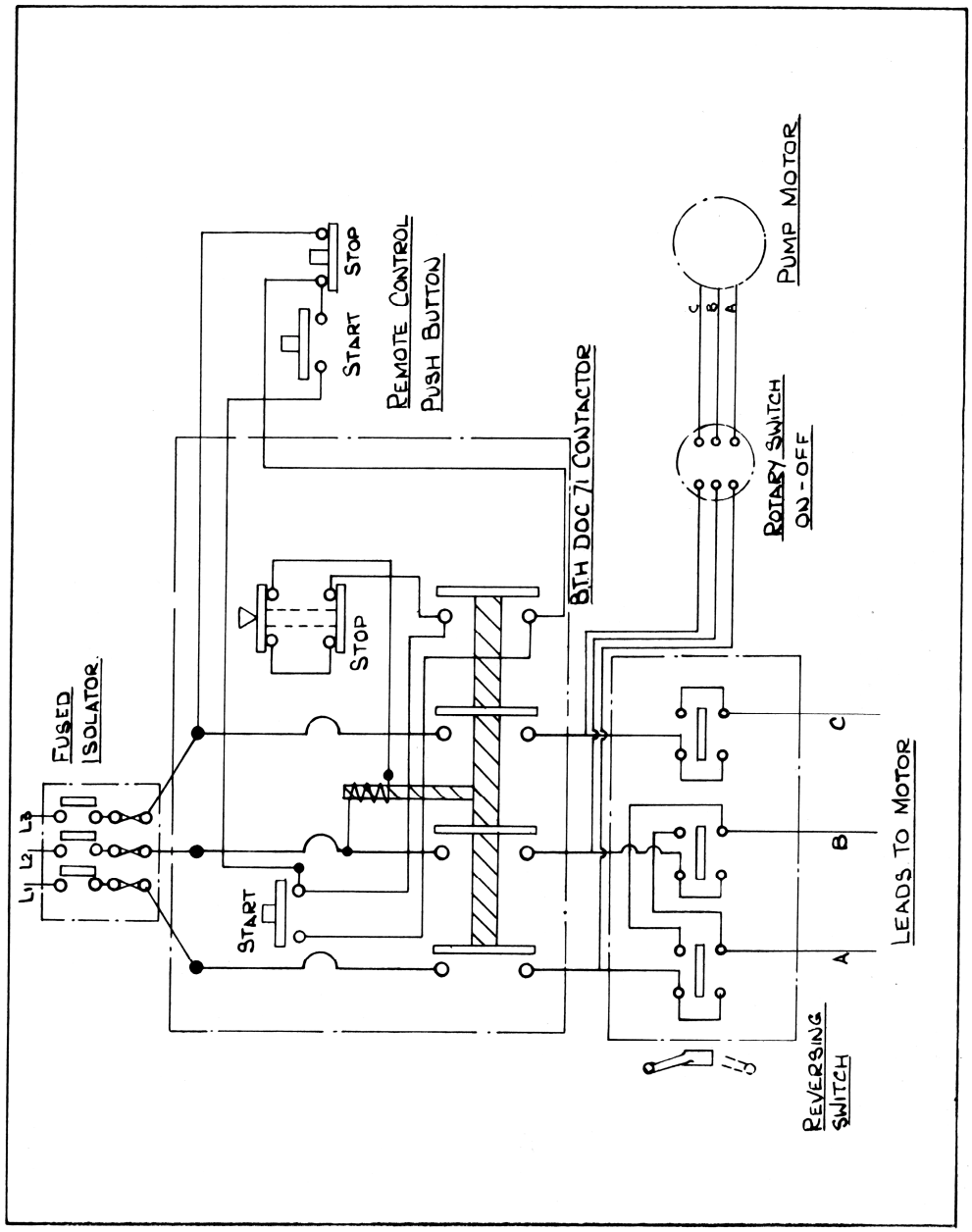
A reversing switch and remote control are located on the front of the machine, and the wiring is so arranged that the circuit is energized by pressing the start button. Forward or Reverse rotation of the spindle is obtained by the reverse switch which has a middle "off" position. No-volt release is given by the "Stop" button which should be used as a safety measure when changing chucks or adaptors.

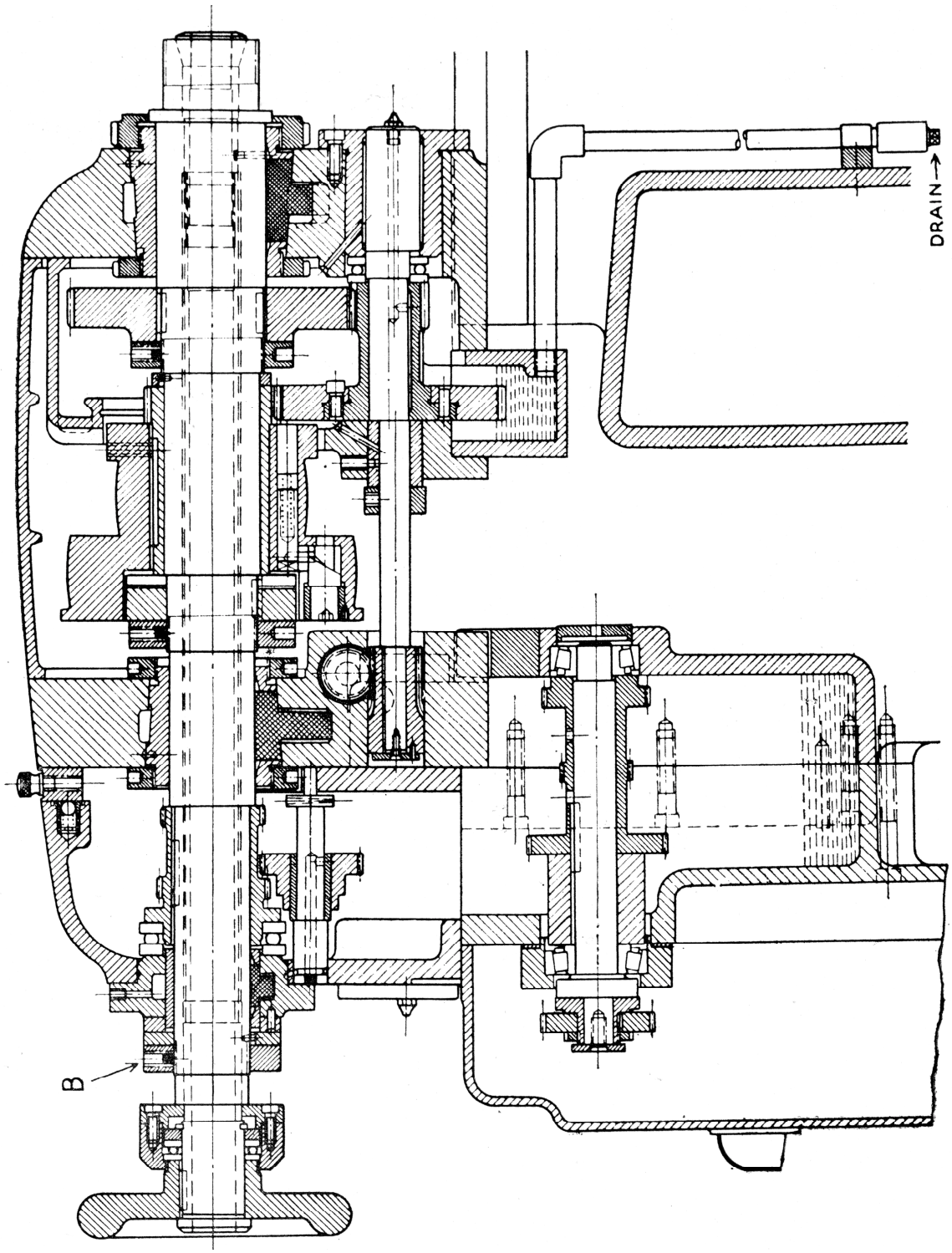
NOTE.—The reversing switch is not provided for reversing at high speeds. Its main purpose is to give reversal to the machine when cutting non-standard screw threads, in order that the lead screw nut need not be disengaged, and if used fairly will give long, trouble-free service.

The switch will also be found useful for braking the spindle when running on high speeds.

SCREW "A" ADJUSTS MAIN BELT. PULL FORWARD LEVER "B" TO SLACKEN BELT FOR SPEED CHANGING.

WIRING DIAGRAM




DRAIN
B

MODEL "A"

SLIDING, SURFACING AND SCREWCUTTING

LATHE

●

SMART & BROWN
(MACHINE TOOLS)

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IN ANY CORRESPONDENCE RELATING TO THIS MODEL "A" SURFACING AND SCREWCUTTING LATHE PLEASE QUOTE SERIAL No. OF MACHINE TO BE FOUND ON THE R.H. END OF BED.

FOR OTHER PRODUCTS SEE PAGE 12.

INSTALLATION

IN ALL CORRESPONDENCE PLEASE QUOTE SERIAL NUMBER TO BE FOUND ON R.H. END OF BED.

PACKING LIST

A packing list, of the accessories and equipment is included with each machine.

The customer is advised to check this equipment immediatly on receipt, and in case of discrepancies notification should be made at once.

The serial number, which is stamped on the right-hand end of the bed, should be quoted in all correspondence.

LIFTING

This Lathe is a piece of precision equipment, carefully checked for accuracy and alignment.

Care must therefore be taken against any act that will in any way impair the built-in accuracy of the machine.

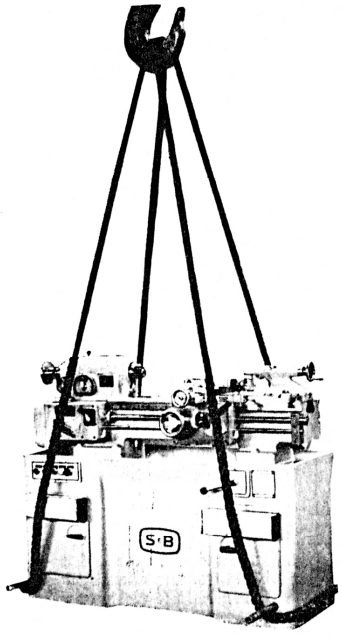
The illustration shows how the machine should be lifted. Ropes are advised in preference to chains.

The use of wood packing blocks is recommended as shown on photograph.

Balance by moving tailstock and carriage.

(Before the carriage or tailstock is moved, the anti-corrosive compound must be carefully wiped from all surfaces. A cloth soaked in paraffin should be used for this purpose. When the slideways have been thoroughly cleaned, a film of oil should be applied.)

MAKE CERTAIN THAT THE MACHINE IS BALANCED BEFORE LIFTING.



LEVELLING

In order that the lathe shall function accurately, it must be installed on a rigid foundation. Failure to provide a solid seating may result in the bed becoming distorted. A concrete foundation is strongly advised, but if the floor is of wood it must be rigidly supported. supported.

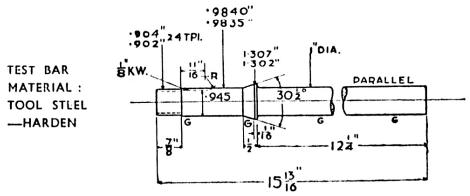
Care taken in levelling will be amply repaid in maintained accuracy. Levelling should be carried out as follows :—

An accurate precision level and a set of parallels will be required.

The parallels, one on each of the front and rear flats, of the bed with the level placed across the parallels, should be placed near the headstock. Wedges or suitable packings under the cabinet should now be adjusted until a correct reading is obtained.

The same procedure should be adopted at the tailstock end, and finally a reading taken in the centre.

The cabinet can now be bolted to the floor after which each setting must be checked again.



ALIGNMENT

If at any time it is found that the machine does not turn true, the first thing to check is the levelling, and during the first few months after installation it should be checked frequently.

Levelling of the machine lengthwise is not important so long as the bed is not twisted through faulty clamping.

Ground test bars should be used for checking alignment.

First check the alignment of the head-stock spindle with the saddle guideways, by using a test bar ground to fit accurately in the taper bore of the spindle. The bar should be pulled into position by the draw bolt, and should project 12 inches (see illustration).

Check on top and one side of test bar with dial gauge.

Alignment of the tailstock can be checked against a parallel bar held between centres, and readings taken in a similar manner.

LUBRICATION

The lathe was run several hours before despatch, and all oil then drained from the sumps (except headstock bearings).

Before running, these sumps should be refilled to correct levels with a suitable grade of oil.

The slideways, nut and apron gearing are lubricated from a pressure pump in the Apron, operated by the traverse handwheel. When doing repetition facing jobs it is recommended that the carriage be occasionally run by hand along the bed to maintain efficient oiling. An oil gun is provided for general lubrication.

If the wipers on the saddle are removed and the felt pads cleaned and oiled occasionally, scoring of the bedways will be considerably reduced.

The headstock bearings are oiled by syphon through felt pads from sumps contained beneath each bearing. These sumps should occasionally be topped up with DTE Light Oil, obtainable from Mobil Oil Company Ltd., London and branches.

An oil sump for the headstock back gears is contained in the headstock, and oil level should be maintained by removing the two screws and lifting off the cover. Care should be taken not to overfill. Drain is below bedways.

Headstock end gears are oiled by drip from an oil chamber at the rear of the headstock. The reservoir should be kept replenished by the hand pump, which should be operated several times before starting up, and afterwards at hourly periods. Oil drains into a sump which can be filled or drained through the tee piece at the rear.

All lubricating nipples on the machine are for use with OIL. The use of grease in these nipples will seriously interfere with the correct lubrication of the various bearings, etc. Recommended oils as follows :— Headstock Bearings and Apron, DTE Light; Headstock End Gears and 3-speed Gearbox, Castrol XL.

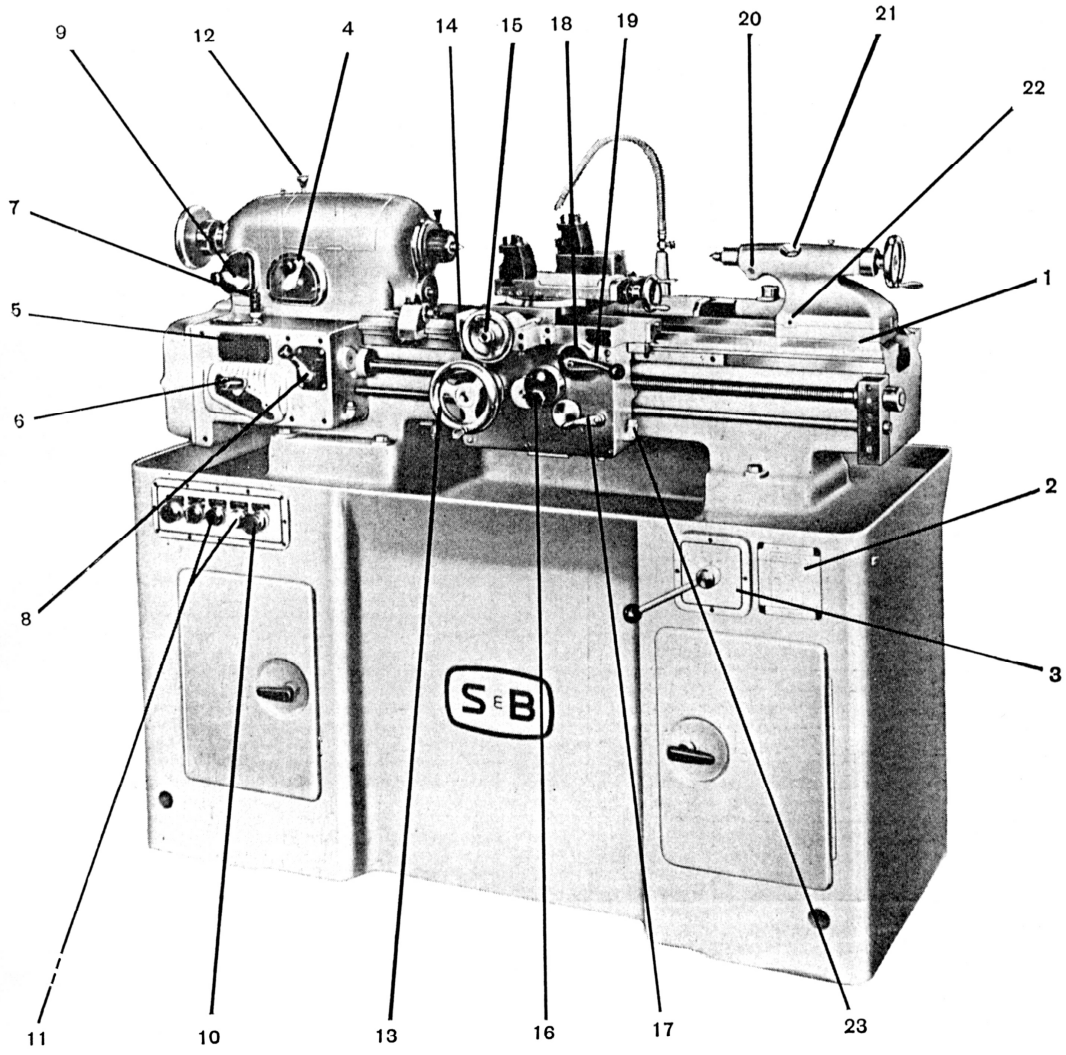
EQUIPMENT

Rear Tool Post
*Draw bar
Collets $\frac{1}{32}$" to $\frac{3}{4}$" max.
*No. 2 Morse Centre Adaptor
*No. 2 Morse Plain or Hollow Centres
*Travelling Steady
*Driving Plate
9" Diameter Faceplate
*American Type Tool Post
*Box Type Tool Post
Changewheels
Taper Turning Attachment
5" diameter 3-jaw Scroll Chuck
6" diameter 4-jaw independent Chuck
4-way Tool Post with Special Top Slide
Ring Chucks $\frac{1}{2}$" to $2\frac{1}{2}$" × $\frac{1}{16}$" with Expander
Disc Chucks $\frac{1}{2}$" to $2\frac{1}{2}$" × $\frac{1}{16}$" with Closer
Oversize Collet Attachment $\frac{13}{16}$" to $1\frac{1}{2}$" diameter
Three Point Fixed Steady
Drill Chuck $\frac{1}{2}$" capacity
*Oil Gun and Spanners
*Micrometer Stop
*Spindle End Shield

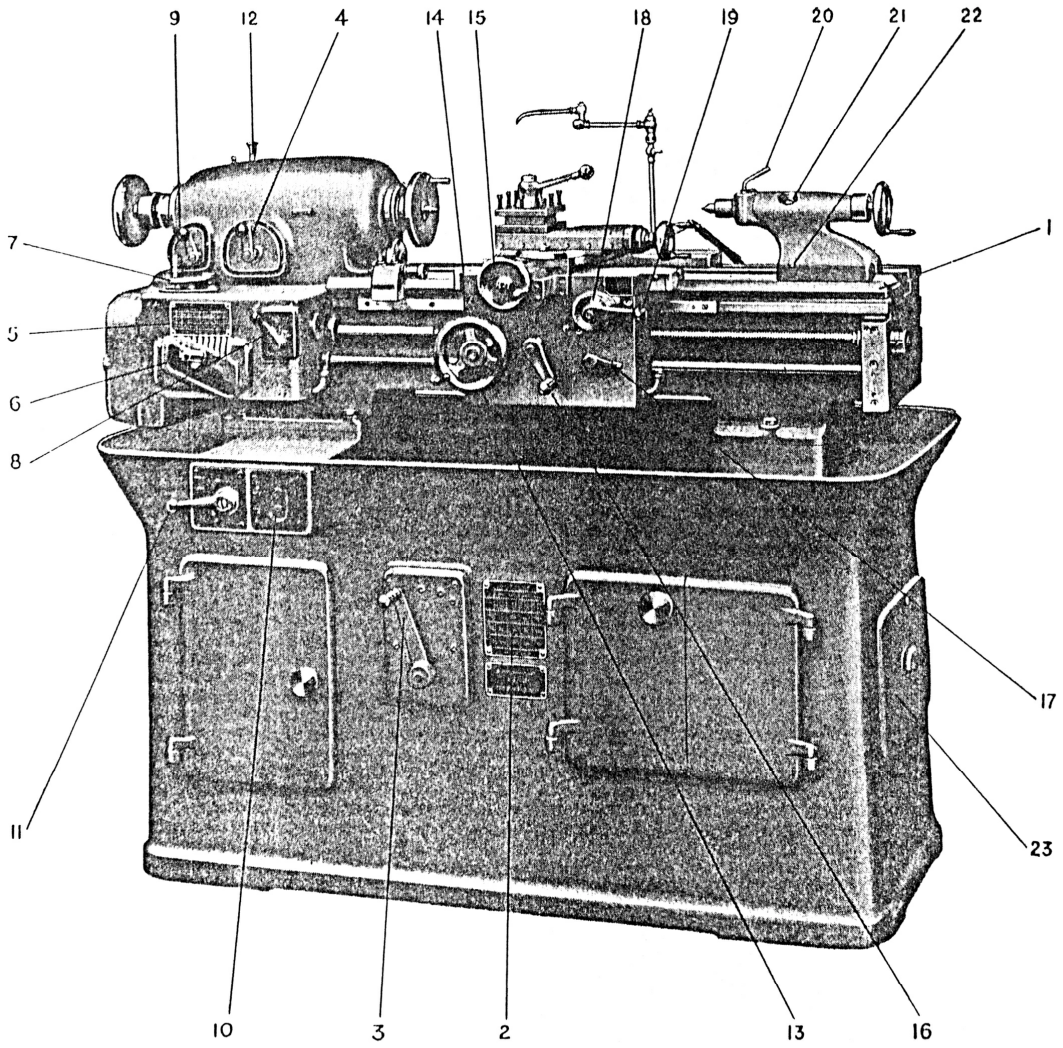
*Standard Equipment

SPECIFICATION

Swing over Bed	$9\frac{1}{4}$"
Length between Centres	20"
Swing over Carriage	$5\frac{1}{4}$"
Travel of Top Slide	3"
Taper Turning Length	9" max.
Max. Taper	10°RH & LH.
Motor	$1\frac{1}{2}$ H.P. × 1440 R.P.M.
Section of Tool	$\frac{3}{8}$" × $\frac{5}{8}$"
Spindle Speeds :—	
(a) Back Gear	40, 57, 79, 128, 181, 253 R.P.M.
(b) Open Belt	284, 402, 561, 910, 1290, 1800 R.P.M.
Width of Drive Belt	$1\frac{1}{4}$"
Ratio of Back Gear	7.11/1
Max. Collet Capacity	$\frac{3}{4}$"
Bore of Spindle	63/64"
Front Bearing	2" dia. $2\frac{3}{4}$" long
Rear Bearing	$1\frac{11}{16}$" dia. $2\frac{1}{4}$" long
Dia. of Faceplate	9"
Spindle Nose	$1\frac{3}{4}$" × 8 T.P.I
Lead Screw	1" × 6 T.P.I.
No. of Changes on Norton Box	27
T.P.I. on Norton Box	8—76
Trav. Feeds Norton Box	.001" — .010"
Facing Feeds Norton Box	.001" — .010"
Dia. of Tailstock Spindle	$1\frac{1}{4}$"
Travel of Tailstock Spindle	$3\frac{1}{4}$"
Centres	No. 2 Morse
Weight	1850 lbs.
Floor Space	58" × 30"



1. Machine Serial Number
2. Spindle Speed Plate
3. Speed Change Gearbox Lever
4. Back Gear Lever
5. Thread Index Plate
6. Tumbler Lever
7. Thread Compound Lever
8. Feed Threads Lever
9. Leadscrew Reverse Lever
10. Stop Push Button
11. Forward Reverse Push Buttons
12. Hand Pump to End Gears
13. Apron Handwheel
14. Saddle Lock Stud
15. Facing Handwheel and Dial
16. Surface-Facing Handle
17. Feed Engagement Lever
18. Chasing Dial
19. Leadscrew Engagement Lever
20. Tailstock Lock Handle
21. Tailstock Graduations
22. Tailstock Setover Screw
23. Oil Filler and Level Indicator.



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7. Thread Compound Lever
8. Feed Threads Lever
9. Leadscrew Reverse Lever
10. Start and Stop Push Buttons
11. Forward-Reverse Switch
12. Hand Pump to End Gears
13. Apron Handwheel
14. Saddle Lock Stud
15. Facing Handwheel and Dial
16. Surface-facing Handle
17. Feed Engagement Lever
18. Chasing Dial
19. Leadscrew Engagement Lever
20. Tailstock Lock Handle
21. Tailstock Graduations
22. Tailstock Setover Screw
23. Change Gear Bracket

ADJUSTMENT

The spindle bearings are accurately adjusted before leaving our works, and should run for a long period without further adjustment.

When adjustment becomes necessary, this should be carried out as follows :—

FRONT BEARING

First slack off front bearing outer nut and close by tightening inner nut. After adjustment, lock up outer nut.

REAR BEARING

Pull out rear bracket filler piece. Close by tightening inner nut, and lock up outer nut after adjustment is complete. When locking up the outer nuts, care should be taken not to tighten excessively.

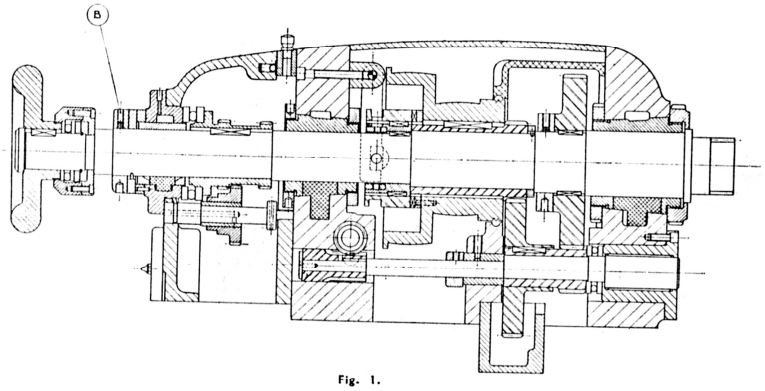


Fig. 1.

TO ADJUST END THRUST

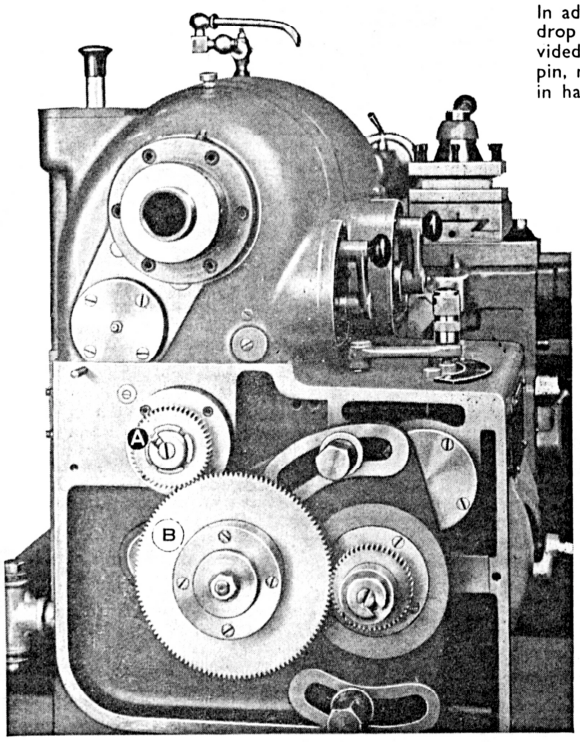
End thrust is taken by a ball thrust washer and end location can be adjusted by carefully tightening the rear nut "B". (Fig. 1).

This nut is locked by a grub screw which should be slacked off and locked after adjusting.

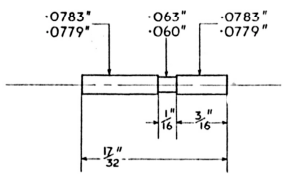
Note.—Adjust when warm.

DRUNKEN THREAD

Drunken thread, or alternatively thick and thin threads can be caused due to the leadscrew thrust requiring attention. Careful adjustment of the thrust washer will usually remedy this trouble.



In addition to the safety features given by the spring-loaded drop worm when sliding or surfacing, a shear pin is provided to avoid risk of damage when screwing. The shear pin, mounted on the flange behind gear "A" (Fig. 2) locates in hardened steel bushes.



Standard Changewheels
2 off 48T
1 off 120T

SHEAR PIN

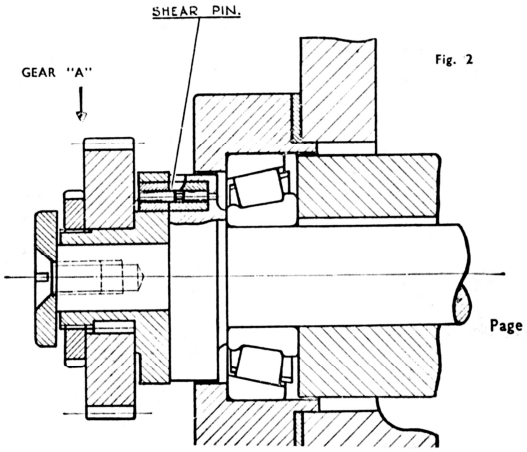


Fig. 2

OPERATION OF BACK GEAR

Backgear is engaged and direct drive disengaged by lever 4, shown on page 5.

To engage backgear from direct drive position, move lever 4 to the right. If the gears do not engage first time, do not force the lever but repeat the action. To engage direct drive from backgear position, lift the cowl and revolve the pulley by hand, at the same time moving the operating lever to its L.H. position. Again, do not force the lever but feel the dog clutch teeth into position. If the main spindle revolves in unison with the pulley during this operation, release the belt tension by means of lever B (photograph on P. 10).

STOP MACHINE BEFORE CHANGING GEAR.

TAPER TURNING ATTACHMENT

The taper turning attachment is not fitted as standard equipment but attachments can be supplied and fitted after installation without difficulty, if so desired.

The taper turning slide is of special design and obviates the compounding of the saddle slides commonly used, which are a source of weakness.

The taper turning bracket is rigidly clamped to a machined face which runs the full length behind the lathe bed.

The bracket is locked into position along the bed by means of bolts which engage a tee slot.

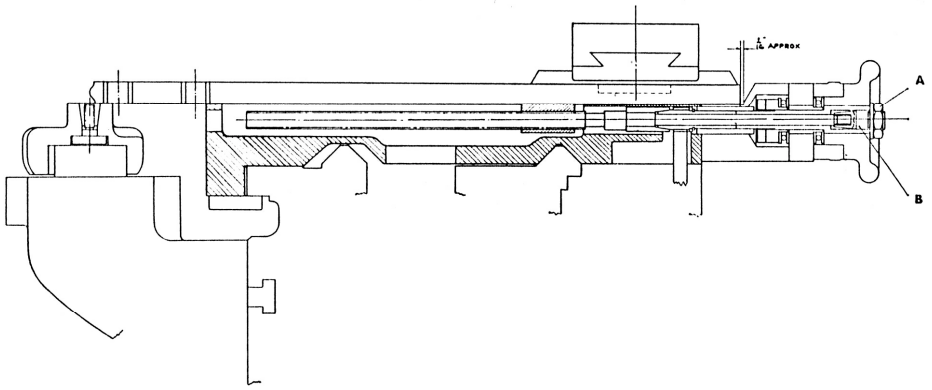
When changing over from plain to taper turning, the saddle slide must first be traversed by the front handwheel, until a gap of approximately $\frac{1}{16}$" is left between the front face of the slide and the machined face of the front handwheel bracket.

At this point the conical bolt "B" is unscrewed from the front handwheel shaft (without turning the handwheel) and the saddle slide pushed forward until one of the bushed holes at the rear of the saddle coincides with the hole in the taper slide block. Slide and block are then coupled together by inserting the conical stud. After the desired taper is obtained. slider block and saddle slide should be locked together by means of the locknut on the bolt, thus avoiding any possibility of backlash.

Of the two bushed holes in the saddle slide, the rear will be used for external tapers and the inner bush is provided for taper-boring. Depth of cut is applied by turning the top tool slide through a suitable angle, and advancing the tool by means of the top slide. The taper slide is graduated in degrees, and inches per foot, and micrometer adjustment is provided.

To revert to plain turning, simply remove the conical stud in the slider block, pull the saddle slide towards the operator as far as it will go, insert the stud in the front handwheel shaft, and lock up lightly by means of the stud lock-nut "A".

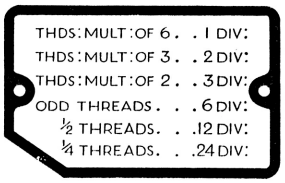
NOTE.—When taper turning it is very important that the tool cutting edge be on exactly the same height as the spindle centre. Any discrepancy will produce a convex surface on the work face.



DO NOT USE COMPRESSED AIR FOR CLEANING

The chasing dial will be found useful for cutting $\frac{1}{4}$, $\frac{1}{2}$ or odd threads.
The dial which is mounted on the hub of the nut engagement lever has 24 divisions.
When cutting $\frac{1}{4}$ threads—say $19\frac{1}{4}$, the nut can be engaged at the same graduation each time only (i.e., every 24 divisions).

For $\frac{1}{2}$ threads every 12 divisions, for odd threads every six divisions, and so on, as given in the attached chart.
For fractional threads other than those stated, the chasing dial should not be used.
An electrical switch for reversing the machine is provided for cutting these and other m/m or diametral pitch threads. In this case the nut is left in engagement and the carriage is traversed backwards and forwards by means of the switch.



CHASING DIAL CHART

When cutting double, triple, or multiple screw threads, it is necessary to be able to index the work round after finishing one complete thread, through 1/2, 1/3, or a fraction of a rev. depending on the multiple of the thread to be cut, without altering the position of the cutting tool. It is usual practice when an indexing fixture is not available, to index the spindle round the required fraction by pulling gear "A" out of mesh with gear "B", and turning the shaft on which "A" is mounted through the required number of teeth.
The number of teeth in "A" must therefore be an exact multiple of the number of starts required.
It will be seen that when the gearing ratio from spindle to change gears is unity, to cut say a 2 start thread, the wheel "A" must be turned 1/2 rev., for a 3 start 1/3 rev., for a 4 start 1/4 rev., and so on.
On the "A" Model, however, care must be taken when cutting multiple threads, that the three-speed feed change box, which is placed **between** the spindle and the quadrant gearing is not overlooked.
There are three positions, viz., "A", "B", and "C" on the feed box giving ratios 1 : 1, 1 : 2 and 1 : 4 respectively.
With the lever in position "A" the usual conditions apply. On position "B" we get a reduction of 1 : 2, and therefore the wheel must be indexed through twice the usual fraction, i.e. for a 2 start thread index through one rev., 3 start 2/3 rev., 4 start 1/2 rev., 6 start 1/3 rev., etc. Position "C" gives 1 : 4 reduction and indexing is for a 2 start 2 revs., 3 starts 4/3 rev., 4 start 1 rev., 6 start 2/3 rev., etc. When indexing by this method on the "A" model, the gear "A" must therefore be a multiple of the product of the ratio of the box and the number of starts, e.g. 5 starts 32 T.P.I. would give position "C" on the feedbox lever which we know has a 1 : 4 ratio. The product therefore = No. of starts × the reciprocal of the ratio = $5 \times 4 = 20$. "A" must therefore be a multiple of 20, i.e., 40T or 60T and at the same time, wheel "D" must be changed to the same number of teeth as "A". The standard gear of 48T will be found to divide equally for 2, 3, 4 or 6 starts. For other multi starts, extra gears will be required.
The foregoing holds good for all inch pitches, but for Metric, B.A. and Diametral threads it will in most cases be found necessary to use a dividing plate on the spindle. No attempt has been made on a machine of this size to incorporate Metric pitches in the standard feed box.
Metric, B.A., or involute pitches are obtained by the use of changewheels in the quadrant gearing.
The quadrant is a substantial bracket and is secured by two hexagon nuts which are easy of access. The intermediate gear is mounted on roller bearings.
A Metric version of the "A" model is available.

STANDARD METRIC PITCHES

Pitch in m/m	A	Inter Stud B	Inter Stud C	D	N
·2	48	120		127	48
·25	60	120		127	48
·3	48	120		127	32
·35	70	120		127	40
·4	48	120		127	24
·45	45	120		127	20
·5	60	120		127	24
·6	48	120		127	16
·7	70	120		127	20
·75	60	120		127	16
·8	48	120		127	12
·9	45	120		127	10
1·0	60	120		127	12
1·1	77	120		127	14
1·2	48	120		127	8
1·25	50	120		127	8
1·3	52	120		127	8
1·4	70	120		127	10
1·5	60	120		127	8
1·6	60	50	100	127	15
1·75	70	120		127	8
1·8	81	120		127	9
2·0	60	50	100	127	12
2·2	77	50	100	127	14
2·4	60	50	100	127	10
2·5	60	48	100	127	10
2·8	70	50	100	127	10
3·0	60	50	100	127	8
3·5	70	50	100	127	8
4·0	81	45	100	127	9
4·5	81	45	100	127	8
5·0	70	35	100	127	8

Table covers Lowenhertz and International Threads up to 5 m/m Pitch.

SCREWCUTTING

When cutting double, triple, or multiple screw threads, it is necessary to be able to index the work round after finishing one complete thread, through 1/2, 1/3, or a fraction of a rev. depending on the multiple of the thread to be cut, without altering the position of the cutting tool. It is usual practice when an indexing fixture is not available to index the spindle round the required fraction by pulling gear "A" out of mesh with gear "B", and turning the shaft on which "A" is mounted through the required number of teeth.

The number of teeth in "A" must therefore be an exact multiple of the number of starts required. It will be seen that when the gearing ratio from spindle to change gears is unity, to cut say a 2 start thread, the wheel "A" must be turned 1/2 rev., for a 3 start 1/3 rev., for a 4 start 1/4 rev., and so on. On the "A" Model, however, care must be taken when cutting multiple threads, that the three-speed feed changebox, which is placed between the spindle and the quadrant gearing is not overlooked. There are three positions, viz., 1, 2, and 3 on the feed box giving ratios 1 : 1, 1 : 2 and 1 : 4 respectively. With the lever in position 1 the usual conditions apply. On position 2, we get a reduction of 1 : 2, and therefore the wheel must be indexed through twice the usual fraction, i.e. for a 2 start thread index through one rev., 3 start 2/3 rev., 4 start 1/2 rev., 6 start 1/3 rev., etc. Position 3 gives 1 : 4 reduction and indexing is for a 2 start 2 revs., 3 starts 4/3 rev., 4 start 1 rev., 6 start 2/3 rev., etc.

English, B.A., or Metric Module pitches are obtained by the use of changewheels in the quadrant gearing.

The quadrant is a substantial bracket and is secured by two hexagon nuts which are easy of access. The intermediate gear is mounted on roller bearings.

ENGLISH PITCHES						
T.P.I.	A	Inter Stud B.	Inter Stud C.	D	Norton Box	
3	80	120	127	40	1	A
4	60	120	127	40	1	A
5	60	120	127	50	1	A
6	80	120	127	40	2	A
7	60	120	127	70	1	A
8	30	120	127	40	1	A
9	30	120	127	45	1	A
10	30	120	127	50	1	A
11	30	120	127	55	1	A
12	30	120	127	60	1	A
13	30	120	127	65	1	A
14	30	120	127	70	1	A
15	30	120	127	75	1	A
16	30	120	127	40	2	A
18	30	120	127	45	2	A
19	30	120	127	95	1	A
20	30	120	127	50	2	A
22	30	120	127	55	2	A
24	30	120	127	60	2	A
26	30	120	127	65	2	A
28	30	120	127	70	2	A
30	30	120	127	75	2	A
32	30	120	127	40	3	A
36	30	120	127	45	3	A
38	30	120	127	95	2	A
40	30	120	127	50	3	A
44	30	120	127	55	3	A
48	30	120	127	60	3	A
52	30	120	127	65	3	A
56	30	120	127	70	3	A
60	30	120	127	75	3	A
76	30	120	127	95	3	A

B.A. PITCHES

B.A. No.	Pitch m/m	35A	Inner Stud		D	N
			B	C		
0	1	60	120		127	12
1	·90	45	120		127	10
2	·81	81	120		127	20
3	·73	73	120		127	20
4	·66	77	100	60	127	14
5	·59	59	120		127	20
6	·53	53	120		127	20
7	·48	48	120		127	20
8	·43	43	120		127	20
9	·39	39	120		127	20
10	·35	35	120		127	20
11	·31	31	120		127	20
12	·28	35	100	60	127	15
13	·25	60	120		127	48
14	·23	46	120		127	40
15	·21	35	100	60	127	20

STANDARD DIAMETRAL PITCHES

Diam. Pitch	A	Inter Stud		D	N
		B	C		
16	77	50	102	100	8
18	77	50	102	100	9
20	77	50	102	100	10
22	77	50	102	100	11
24	77	50	102	100	12
26	77	50	102	100	13
28	77	50	102	100	14
30	77	50	102	100	15
32	77	50	102	100	16
36	77	50	102	100	18
40	77	50	102	100	20
48	77	50	102	100	24

Complete set of extra change gears to cut all the foregoing threads :— 31, 35, 39, 43, 45, 46, 50, 52, 53, 59, 60, 70, 73, 77, 81, 100, 102, 127.
Min. teeth on A = 30 Max. teeth on C = 127
Max. teeth on A = 81 Min. teeth on A & B = 108

FORMULA FOR METRIC PITCHES

$$\text{Pitch in m/m} = \frac{A}{B} \times \frac{C}{D} \times \frac{25.4}{N}$$

Where N = No. on thread plate to which Tumbler is set

$$= \frac{A}{B} \times \frac{C}{127} \times \frac{25.4}{N}$$

Therefore pitch in m/m x 5N $= \frac{AC}{B}$ for compound train

Pitch in m/m x 5N = A for simple train. Where D = 127 constant.

Example. Required wheels for $3\frac{1}{2}$ m/m Pitch :—

$$3.5 \times 5N = \frac{AC}{B}$$

$$17.5N = \frac{AC}{B}$$

Let N = 8

$$\text{then } 140 = \frac{AC}{B}$$

We have a 70T Wheel ∴ Let A = 70

$$\text{then } 2 = \frac{C}{B} \text{ or } C = 100 \text{ \& } B. = 50$$

FORMULA FOR DIAMETRAL PITCHES

$$\text{Axial Pitch} = \frac{\pi}{DP}$$

$$\frac{\pi}{DP} = \frac{77}{B} \times \frac{102}{D} \times \frac{1}{N}$$

$$= \frac{7854}{BDN}$$

$$\text{\& } BDN = \frac{7854}{3.1416} \times DP \text{ where } \pi = 3.1416$$

BDN = 2500 DP (exact)

where A = 77 and C = 102 constant

Example. Required wheels for 16 DP

BDN = 2500 x 16 = 40,000

Assume N = 8 BD = 5000

Say 50 x 100

which are included in set of gears.

B.A. PITCHES						
B.A. No.	Pitch M/M	A	Inter Stud B	C	D	Norton Box
0	1.00	30	120		120	1 A
1	.90	30	120		120	2 H
2	.81	60	100	90	80	3 B
3	.73	60	100	73	90	3 E
4	.66	30	120		100	3 J
5	.59	60	100	59	90	3 E
6	.53	60	100	53	90	3 E
7	.48	30	120		100	3 F
8	.43	75	100	43	90	3 B
9	.39	30	120		100	3 C
10	.35	30	120		120	3 D
11	.31	31	120		100	3 A
12	.28	40	100	70	120	3 B
13	.25	30	120		120	3 A
14	.23	50	100	46	120	3 B
15	.21	30	120	60	100	3 D

METRIC MODULE						
Metric Module	A	Inter Stud B	C	D	Norton Box	
.20	55	70	80	120	3	B
.25	55	120		70	3	A
.375	55	120		70	3	E
.40	55	70	80	120	2	B
.50	55	120		70	2	A
.75	55	120		70	2	E
1.00	55	120		70	1	A
1.25	55	120		56	1	A
1.50	55	120		70	1	E
1.75	55	120		40	1	A
2.00	55	70	120	90	1	E

SCREW-CUTTING FORMULAE

A = Stud Gear
B = Driven Inter Gear
C = Driving Inter Gear
D = Screw-cutting Box Gear
N = Screw-cutting Box Ratio
T.P.I = Threads per inch

SCREW-CUTTING BOX RATIO (N)									
Gearbox Lever	A	B	C	D	E	F	G	H	J
1	1.6	1.2	1.3	1.4	1.5	1.6	1.7	1.8	2.2
2	.5	.6	.65	.7	.75	.8	.85	.9	1.1
3	.25	.3	.325	.35	.375	.4	.425	.45	.55

To find changewheels required to cut Metric Pitches not listed on Screw-cutting Box -

$$\frac{A}{B} \times \frac{C}{D} = \frac{\text{Pitch in M/M}}{4.N}$$

To find changewheels required to cut English Pitches

$$\frac{A}{BD} = \frac{1}{\text{T.P.I} \times 20 \times N} \quad \text{when C = 127}$$

METRIC ONLY

CHANGEWHEELS

Supplied with machine 30T, 75T, 120T

Ball bearing intermediate gear 120T

Extra for Cutting English pitches and Metric Module Pitches.

40T, 45T, 50T, 55T, 56T, 60T, 65T, 70T, 80T, 90T, 95T,127T.

Extra for Cutting B.A. Pitches

31T, 40T, 43T, 46T, 50T, 53T, 59T, 60T, 70T, 73T, 90T, 100T.

The Standard Foot Mounted Motor can be supplied for standard voltage, or for Direct Current. In the latter case, however, ¾ H.P. is the maximum that can be accommodated.

A vee belt takes the drive from the motor to a three-speed box, and the whole assembly is hinged to give adequate belt adjustment.

Drive to the spindle is taken from a two-step cone pulley on the gearbox via flat belt, and all adjustments are very accessible. Belt changing is facilitated by slacking the belt by means of a lever.

Shafts in the three-speed box run on taper roller bearings, and in order that no transmission vibrations shall be transmitted to the cabinet, the complete drive unit is mounted on rubber bushes. The drive unit from the rear of the machine can be removed complete.

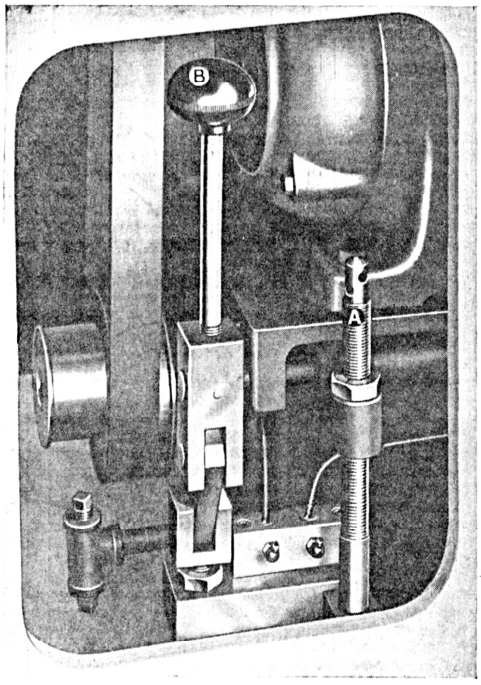
The cabinet is a light rigid casting, suitably drained, into which is mounted the drive unit, suds tank and electric pump, a large tool cupboard and electric control gear.

REPLACING HEADSTOCK DRIVE BELT

Replacing belt to main spindle. The belt coupling the drive to the headstock spindle is a plastic leather laminated belt. In the event of the belt needing replacement procedure is as follows :—

Cut through the old belt and remove. Offer the new belt to the headstock pulley (with the arrow pointing to run in the forward direction) from the cabinet base, allowing the free ends to protrude from the top of the headstock. Place the bonding press across the headstock and lay one end of the belt with top chamfer on the press, then lay the other end to mate with the diagonal register line. The belt should then be clamped in position for alignment leaving the ends free. Lift the upper end away ; apply leather cement to leather portion on both ends, **keeping the ends apart.** Apply plastic solvent to each plastic portion and allow to dry for 60 seconds Apply a further coat of plastic solvent by dabbing and allow to dry for 30 seconds. Now bring the ends firmly together and clamp down. Periodically increase the pressure over a period of 30 minutes, then leave under pressure for 8 hours. The press can then be removed and the edges of the belt dressed.

A bonding press will be supplied 'on loan'



Suds drain into a sump contained in the cabinet, and thence to a suds tank, which can be lifted out at the back of the machine for cleaning.

Overload and reduced voltage protection is built into the starter housed inside the L.H. compartment of the machine base. Remote control push buttons, forward, reverse and stop are carried in the control panel at the front of the machine base.

The front control panel also carries the suds pump switch and a "Power On" warning lamp.

Fuses are housed in the isolating switch at the rear of the machine.

SCREW "A" ADJUSTS MAIN BELT. PULL FORWARD LEVER "B" TO SLACKEN BELT FOR SPEED CHANGING.

MOTOR

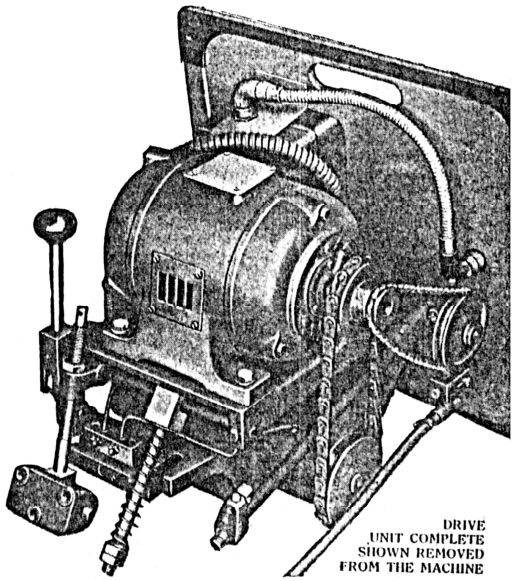
The Standard Foot Mounted Motor can be supplied for standard voltage, or for Direct Current. In the latter case, however, ¾ H.P. is the maximum that can be accommodated.

A vee belt takes the drive from the motor to a three-speed box, and the whole assembly is hinged to give adequate belt adjustment.

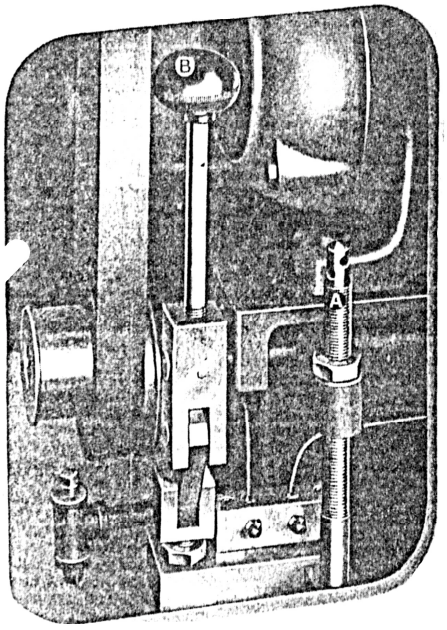
Drive to the spindle is taken from a two-step cone pulley on the gearbox via flat belt, and all adjustments are very accessible. Belt changing is facilitated by slacking the belt by means of a lever.

Shafts in the three-speed box run on taper roller bearings, and in order that no transmission vibrations shall be transmitted to the cabinet, the complete drive unit is mounted on rubber bushes. The drive unit is carried on the rear cover and can be removed complete.

The cabinet is a light rigid casting, suitably drained, into which is mounted the drive unit, suds tank and geared pump, a large tool cupboard, change wheel bracket, and electric control gear.



DRIVE UNIT COMPLETE SHOWN REMOVED FROM THE MACHINE



Suds drain into a sump contained in the cabinet, and thence to a suds tank, which can be lifted out at the back of the machine for cleaning.

No volt and thermal overload protection is given to the motor by the B.T.H. contactor unit which is mounted at the back of the cabinet.

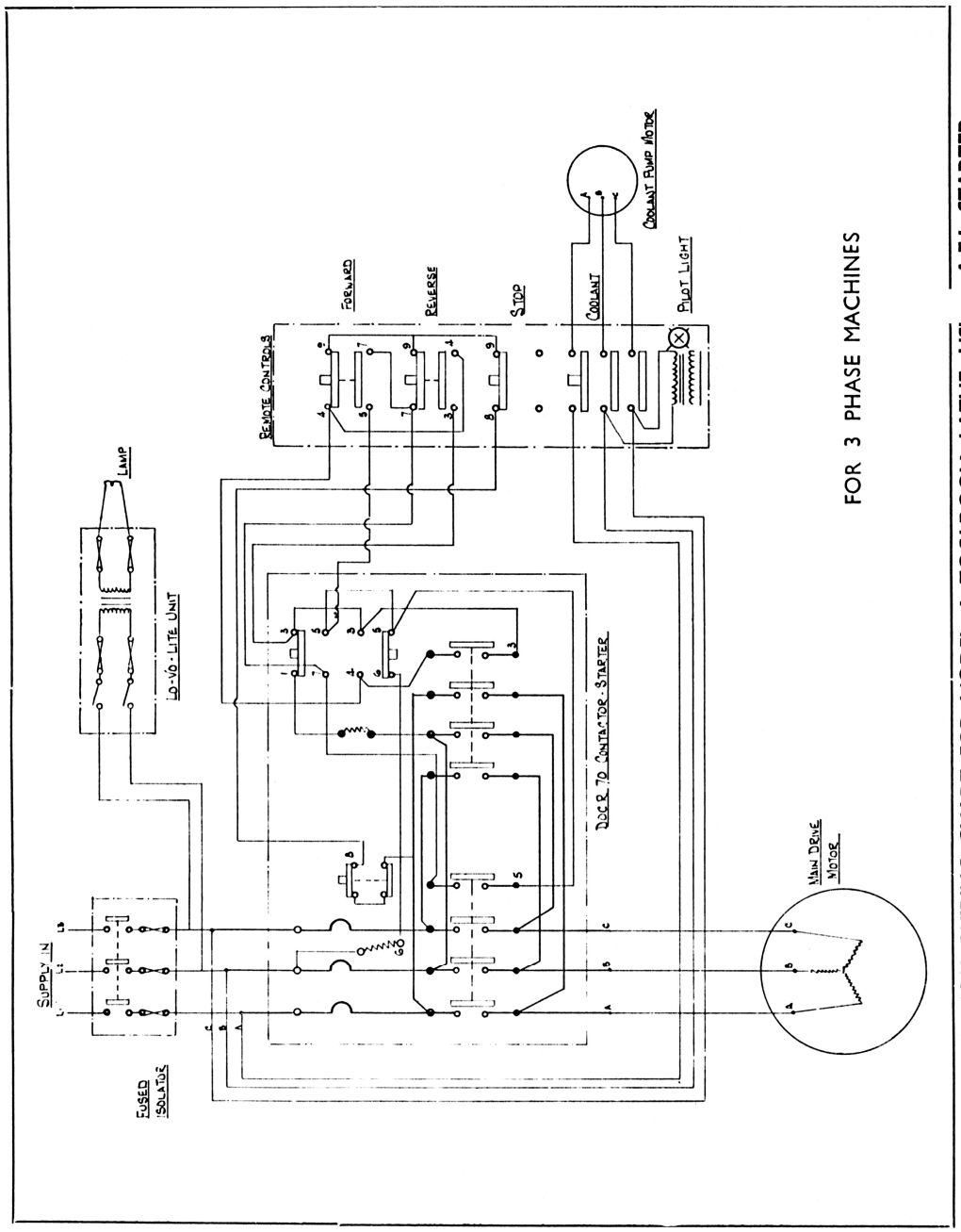
A reversing switch and remote control are located on the front of the machine, and the wiring is so arranged that the circuit is energized by pressing the start button. Forward or Reverse rotation of the spindle is obtained by the reverse switch which has a "neutral" position. No-volt release is given by the "Stop" button which should be used as a safety measure when changing chucks or adaptors.

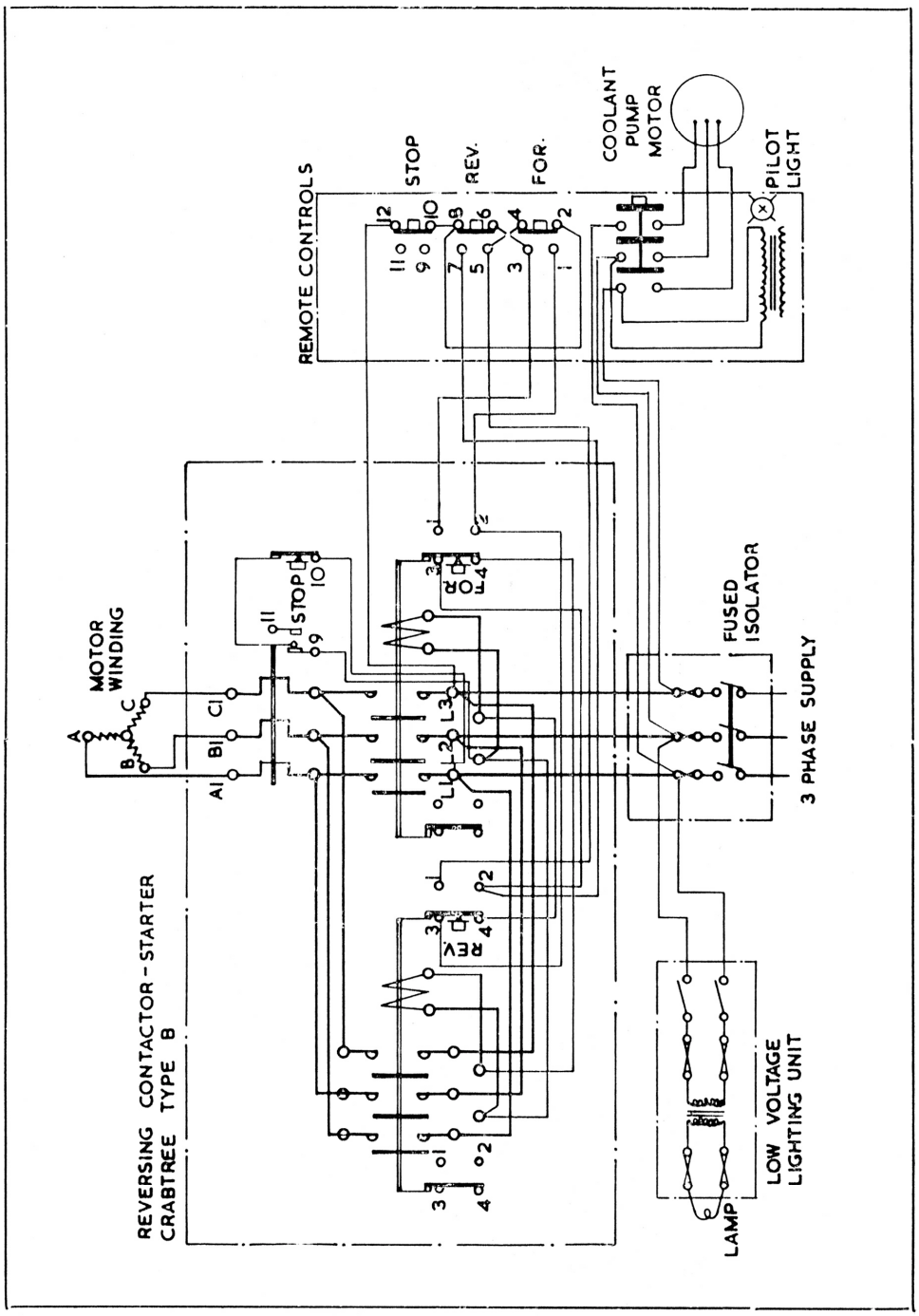
NOTE.—The reversing switch is not provided for reversing at high speeds. Its main purpose is to give reversal to the machine when cutting non-standard screw threads, in order that the lead screw nut need not be disengaged, and if used fairly will give long, trouble-free service.

The switch will also be found useful for braking the spindle when running on high speeds.

SCREW "A" ADJUSTS MAIN BELT. PULL FORWARD LEVER "B" TO SLACKEN BELT FOR SPEED CHANGING.

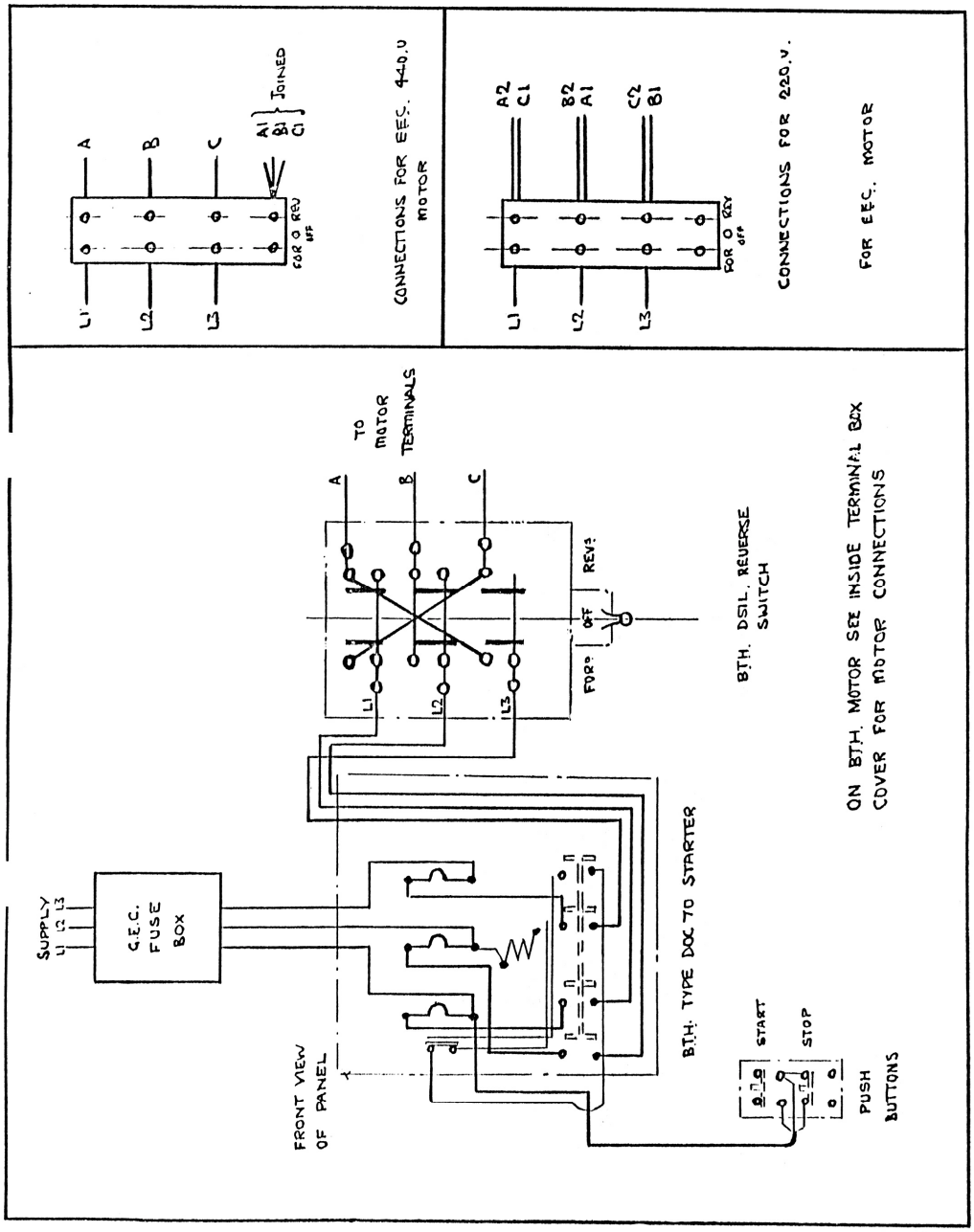
WIRING DIAGRAM





ELECTRICAL WIRING CHART FOR MODEL 'A' TOOLROOM LATHE, USING CRABTREE TYPE B STARTER

WIRING DIAGRAM



JULY, 1955

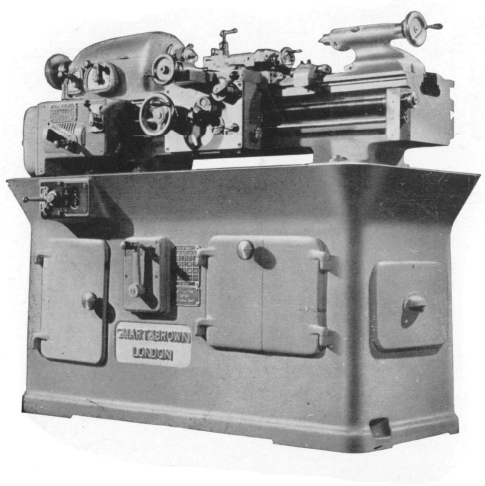
MODEL 'A'

SLIDING · SURFACING & SCREWCUTTING LATHE

SMART & BROWN (MACHINE TOOLS) LTD.

(HEAD OFFICE & SALES) 25, MANCHESTER SQUARE, LONDON, W.1.

Telephone: WELbeck 7941. Cables: SMARTOOL, LONDON



• A ROBUST MACHINE

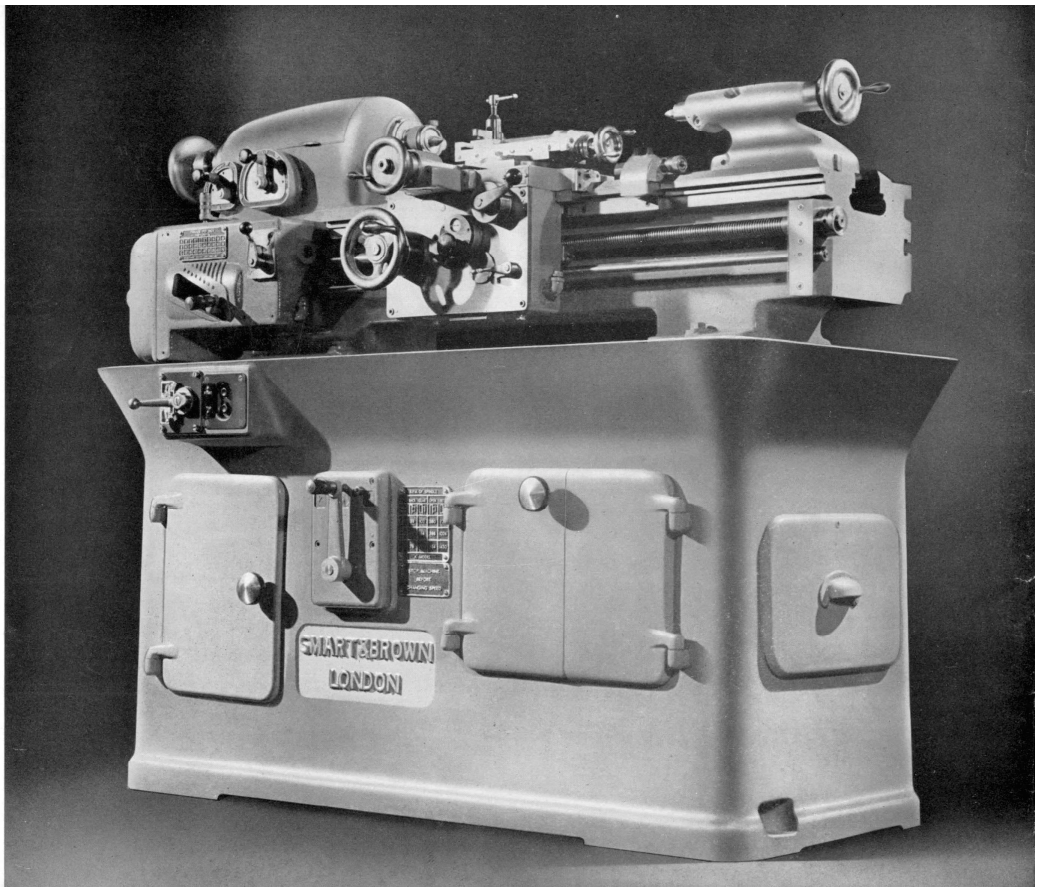
S&B

MODEL 'A' 4½" CENTRE

SLIDING • SURFACING AND SCREWCUTTING LATHE

• PRECISION-BUILT FOR ACCURATE TOOLROOM PROTOTYPES

FOR REPETITION WORK OF THE HIGHEST QUALITY


SMART & BROWN
LONDON

EXPERIENCE has shown that money invested in high precision Machine Tools means a greater accuracy in the making of gauges, jigs and fixtures. And this in turn ensures a vital reduction in the amount of time required for hand fitting operations during final assembly.

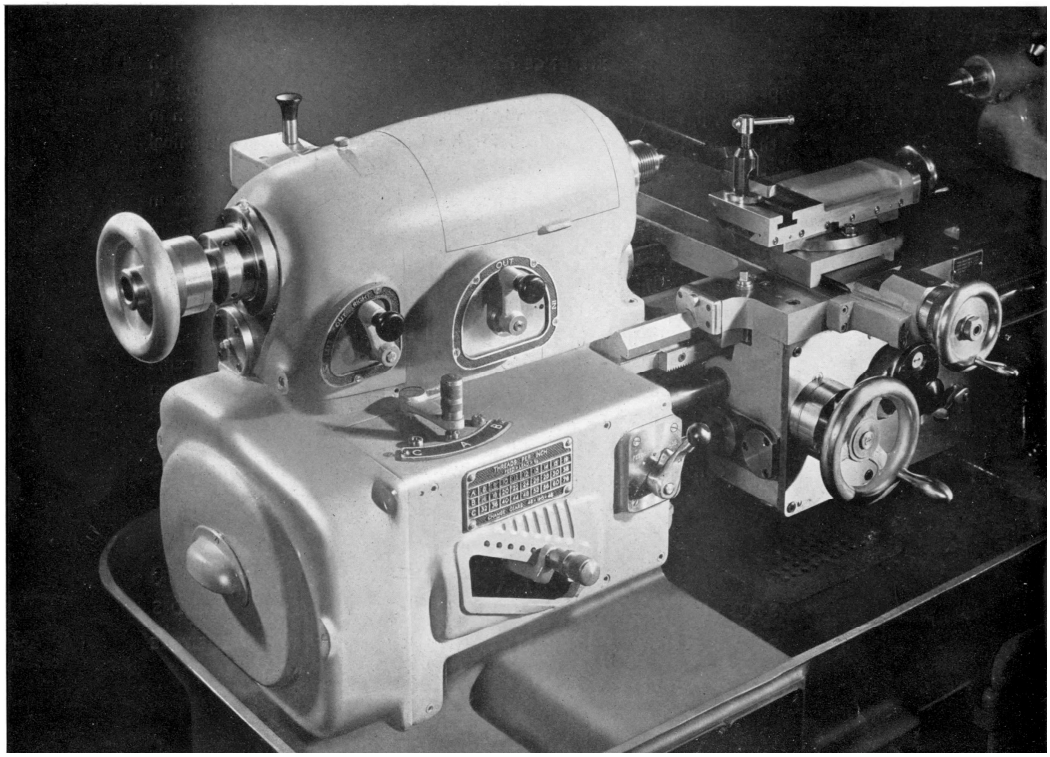
It is to the manufacturer, therefore, who takes a special pride in the quality of his product and in the high standard of workmanship from his Toolroom, that the Smart & Brown Model 'A' Lathe will appeal.

Here is a machine worthily upholding the best traditions of British craftsmanship. A careful study of the specification will show that it lacks nothing which the most exacting engineer requires to enable him to attain the highest limits of precision. Yet, in spite of its extreme sensitivity and the exceptional limits of tolerance to which it has been built, it is a machine for hard wear and long life. Indeed many users have installed these Lathes for production and prototype work where their convenient size permits fast working and high uniform output.

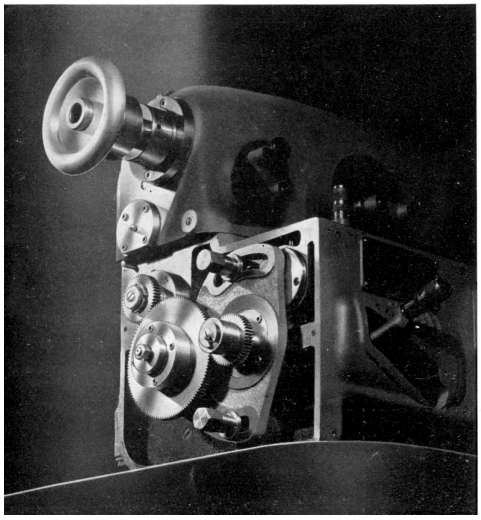
SMART & BROWN (MACHINE TOOLS) LTD
SABEL WORKS · BIGGLESWADE · BEDS

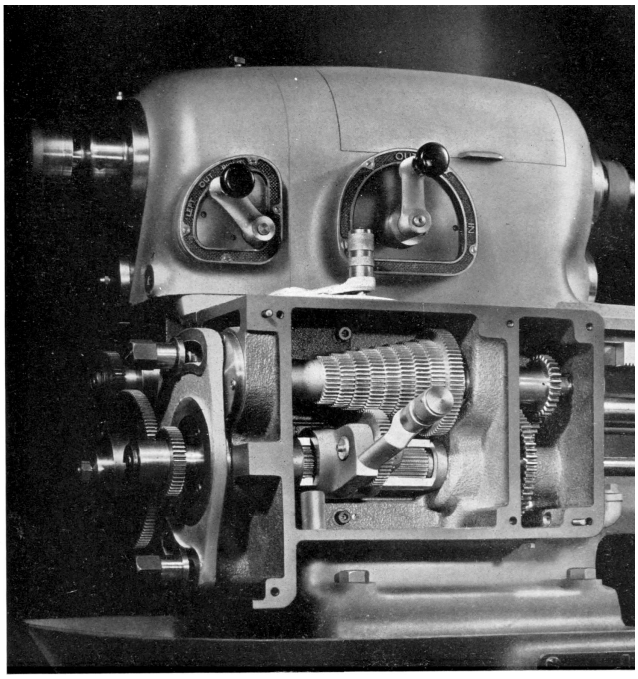
Telephone: BIGGLESWADE, 2361 (PBX) *Telegrams: SMARTOOL, BIGGLESWADE*

. HEADSTOCK AND NORTON BOX



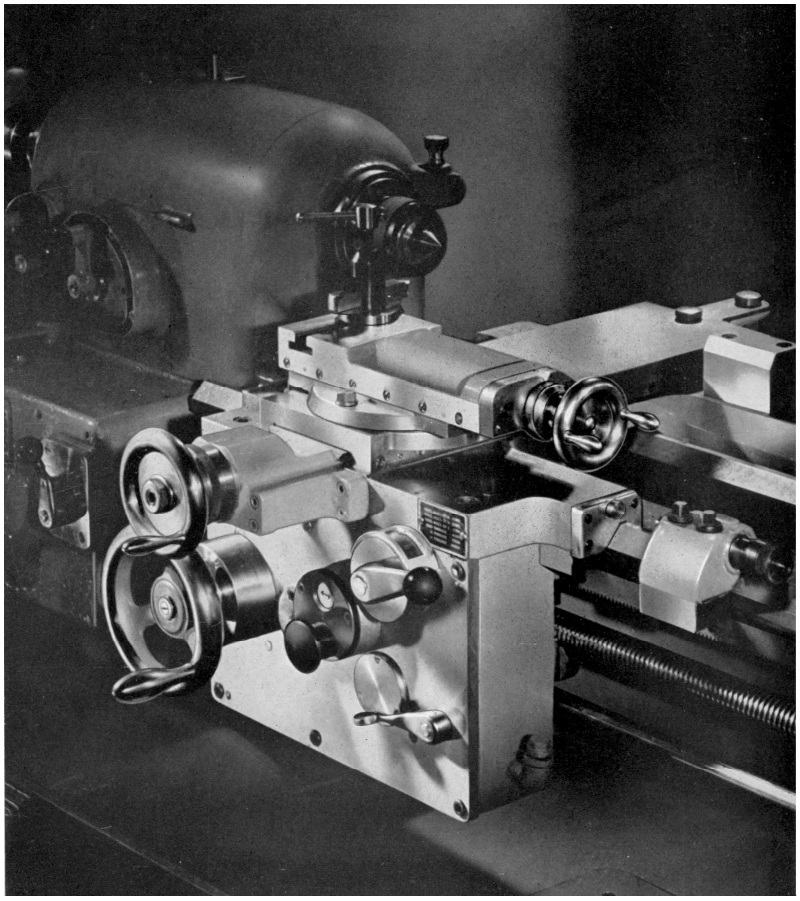
- Large diameter hardened, ground and lapped nickel steel hollow spindle.
- Bored for standard handwheel operated S. & B. collets and centres.
- Two long parallel adjustable phosphor bronze bearings with ball thrust end washer.
- Twelve spindle speeds from 39 to 1430 R.P.M.
- Precision profile ground helical back gears, oil immersed, for ripple-free finish.





(*Above*) The layout of the Norton gear box and selector mechanism with drive from Headstock "pick-off" end gears on left. Twenty-seven changes of threads or feeds are available.

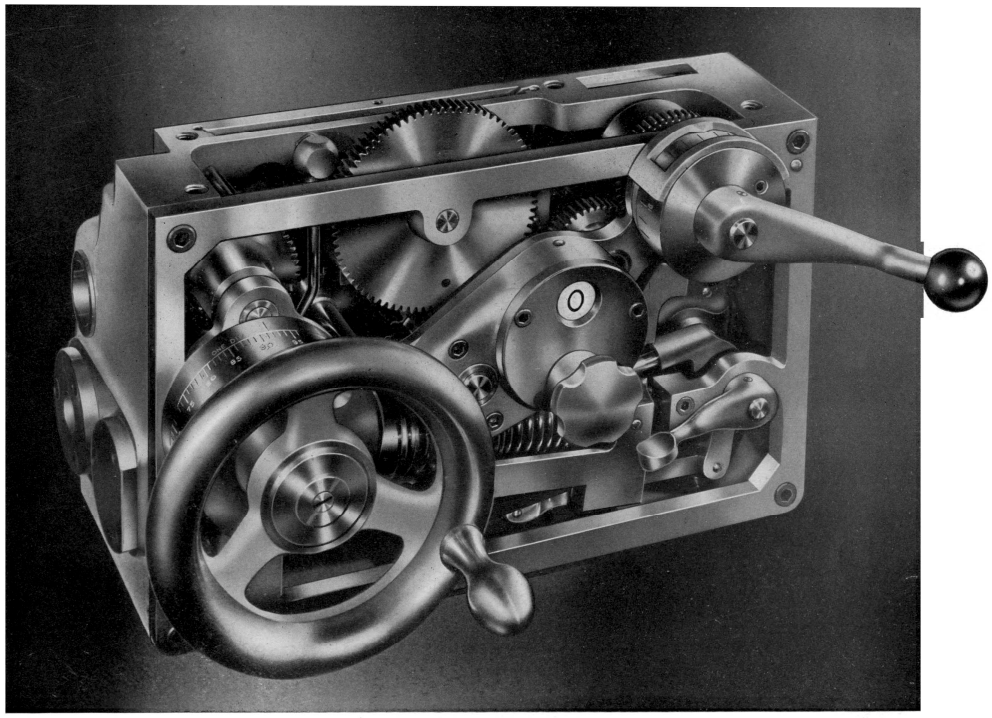
(*Left*) Metric, B.A. and Diametral pitch threads are obtained by inserting appropriate changewheels on the quadrant of the Headstock end gears.



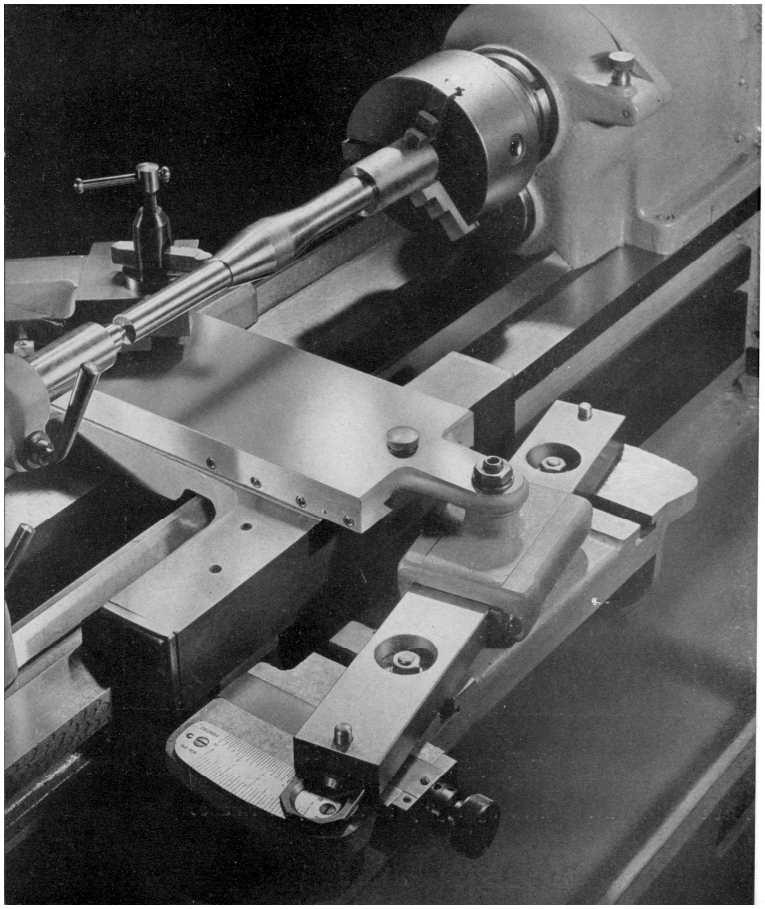
• SADDLE AND APRON

The saddle is broad-based to ensure extreme rigidity under all conditions. It may be locked in any position along the bed and has end wipers to prevent swarf abrasion of bed ways. The full capacity surfacing slide is screw operated and fitted with ball thrust. Top slide swing 70° clockwise and 90° anticlockwise. Both slides have adjustable micrometer graduated thumb-dials.

The apron is a robust and compact unit housing motion control gear with double bearings to all shafts. Large diameter chasing and distance dials are fitted. Selection of sliding or surfacing traverse is by knob and visually indicated, with finger-tip engagement. The Phosphor bronze split nut of generous length is mounted on substantial slide with taper jib. Oil immersed drop worm is automatically tripped by contact with adjustable stop or when overloaded.



The saddle and apron provide a fine example of precision in machine tool manufacture, and give that sensitivity of control of tool motion wherein lies life-long highly accurate performance



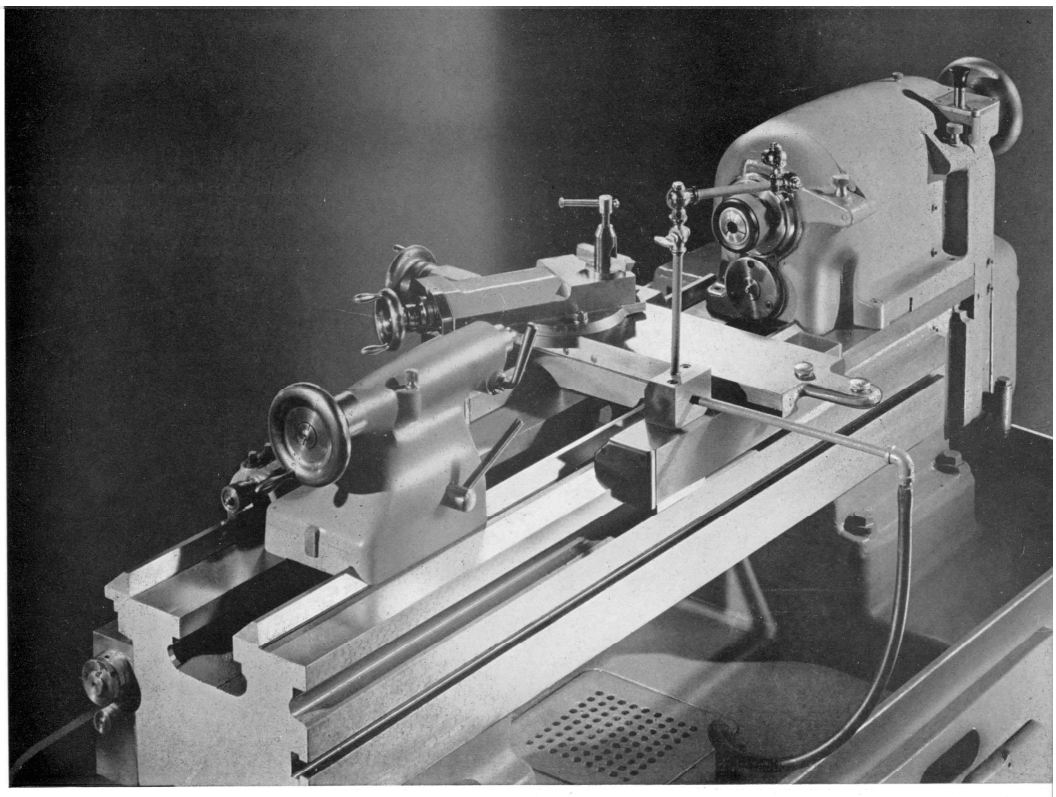
• TAPER TURNING ATTACHMENT

This slide can be supplied as an extra when ordering or at any time subsequently.

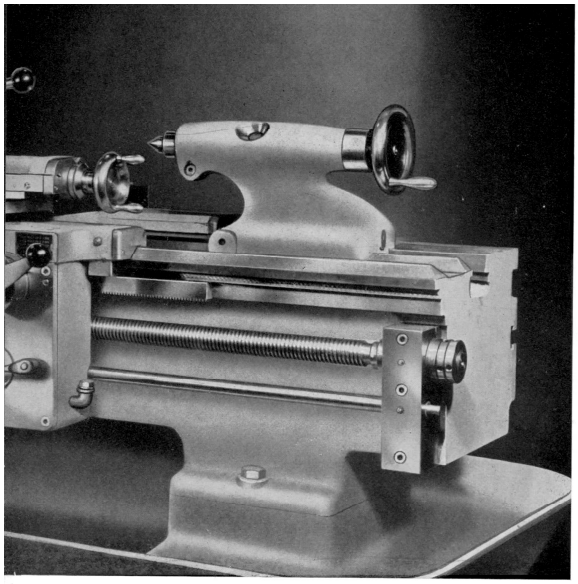
The bracket is located on the machined back face of the bed and is locked in any position by means of bolts engaging in the tee slot. No additional traverse screw is necessary. Several unique features of design obviate the compounding of the saddle slides and eliminate attendant weaknesses.

• BED

A deep and wide, rigid box-like casting, well ribbed internally forms the bed. An inner inverted vee and flat align the Headstock and Tailstock and an outer inverted vee and flat provide location for the saddle. Leadscrew and feedshaft lie along the front of the bed.



• VERSATILE, SENSITIVE & HIGHLY ACCURATE

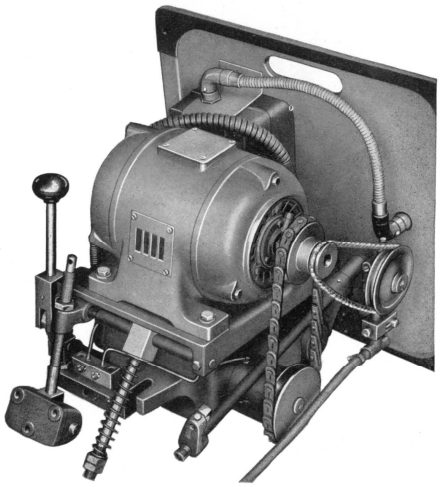


TAILSTOCK

This is sufficiently overhung to permit the full 20in. traverse of the carriage, and is locked in any position along the bed by a lever-operated eccentric clamp. The spindle is graduated, bored No. 2 Morse taper and tang slotted.

MOTOR

The motor drive is self contained with a two-step cone pulley mounted on a separate drive shaft. Belt tensioning is by single nut. Belt changing is facilitated by a belt slackening device operated by lever.



SPECIFICATION AND EQUIPMENT

Swing over bed	9¼″ dia.	235mm
Length between centres	20″	508mm
Swing over carriage	5¼″ dia.	133mm
Taper turning length	9″ (max.)	229mm
Max. taper	10° R. & L.H.	
Max collet capacity	¾″	19mm
Hollow spindle bore	0.753″	25mm
Spindle front bearing	2″ dia x 2⅜″	51mm dia x 70mm
Spindle rear bearing	1 9/16″ dia x 2¼″	40mm dia x 57mm
Spindle nose diameter	1¾″	44.45mm
Spindle nose thread	8 T.P.I	
Diameter of face plate	9″	229mm
Travel of top Slide	3″	76mm
Section of tool	⅜″ x ⅝″	10mm x 16mm
Travel of tailstock spindle	3¼″	82.5mm
Dia. of tailstock spindle	1¼	31.8mm
Centres	No. 2 Morse	
Leadscrew diameter	1″	25.4mm
Leadscrew pitch	6 T.P.I.	
Changes with Norton box	27	

Threads by Norton box : 8, 9, 10, 11, 12, 13, 14, 15, 16, 18, 19, 20, 22, 24, 26, 28, 30, 32, 36, 38, 40, 44, 48, 52, 56, 60, 76, per inch.

Traverse and Facing feeds by Norton Box : 0.001″ to 0.010″ (.025 to .25mm)

Motor R.P.M. forward and reverse 1440

Spindle speeds back gear 39, 56, 78, 102, 144, 200 R.P.M.

Spindle speeds open belt 280, 396, 554, 723, 1026, 1430 R.P.M.

Ratio of back gear	7.11-1	
Width of drive belt	1¼″	32mm
Standard Motor	1½ H.P 50 cycles 3 phase	
Standard Motor Voltages	220/380, 400/440 volts	
Overall dimensions	58″ x 30″ x 48″ (147 x 76 x 122cms)	
Weight with standard equipment	1736 lbs.	789 kilos
Shipping weight (packed)	2185 lbs	993 kilos
Crate dimensions	66″ x 40″ x 58″ (163 x 102 x 152cms)	
Cable code	MTALT	

Metric dimensions are approximate and for comparative purposes only.

EQUIPMENT

STANDARD

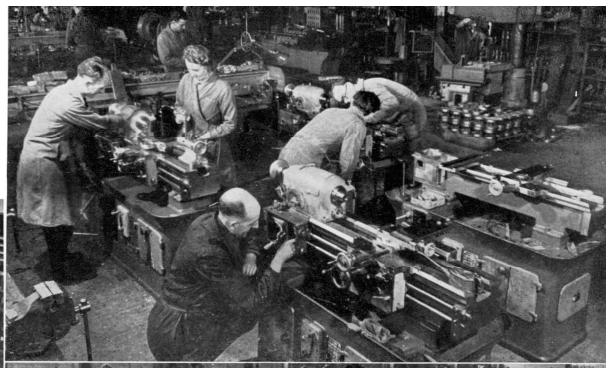
Travelling steady.
Driving Plate with Driver.
No. 2 Morse Plain Centre. (2).
No. 2 Morse Centre Adaptor.
Drawbar.
American Type Tool Post.
Box Type Toolholder.
Oil Gun and Set of Spanners.
Micrometer Dead Stop.
Change Wheel Stud.
Shear Pin.
Spindle End Shield.
Geared Suds Pump, Tank and Fittings.
Lever operated Collet Mechanisim
No. 2 Morse Hollow Centre.
Additional Changewheels for Metric, B.A. or Dia. pitches.
Taper Turning Attachment.
Standard Collets 1/32″ to ¾″ max.
5″ dia. 3-jaw Scroll Chuck.
6″ dia. 4-jaw independent Chuck.
Four-Station Indexing Tool Slide.
Ring Chucks ½″ to 2⅜ × 1/16″ with Expander.
Disc Chucks ½″ to 2½″ × 1/16″ with Closer.
Oversize Collet Attachment 1/16″ to 1½″ diameter.
Three Point Fixed Steady.
Drill Chuck 0-⅜″ capacity.

OPTIONAL

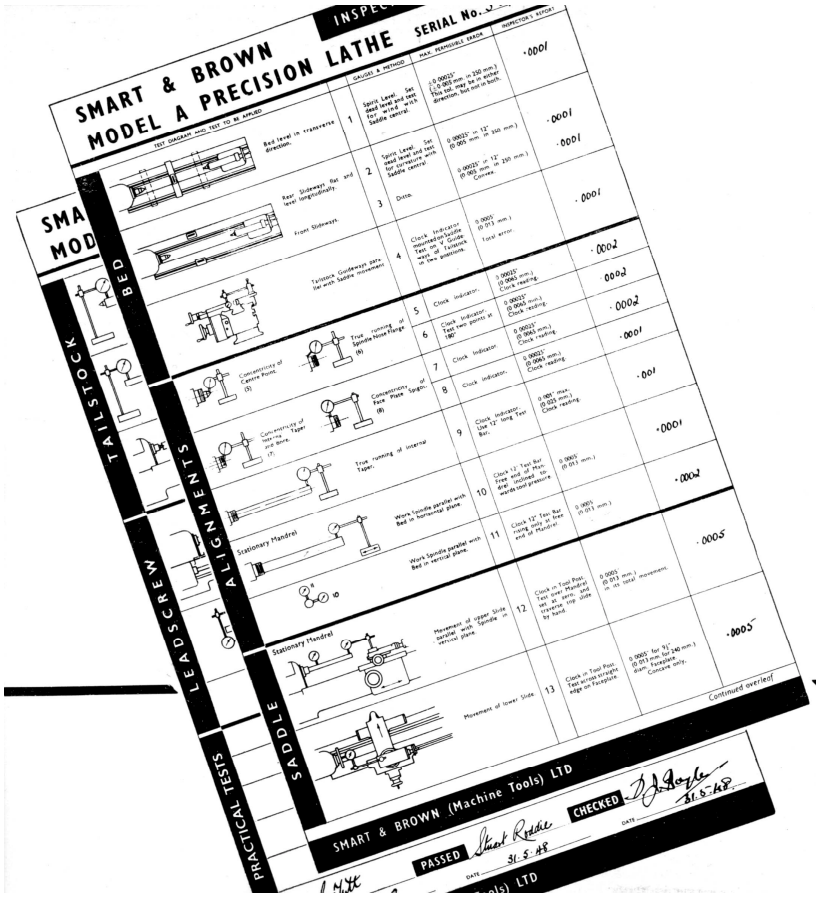
Faceplate 9″ diameter (229mm.)
1″ Lathe Carrier.
Milling Attachment.
Grinding Attachment.

A Metric version of this Lathe is available—full details on request.

Users tell us that the most valuable characteristic of a Smart & Brown Lathe is its **maintained** accuracy. These photographs taken at the Biggleswade Works show something of the individual attention to which each machine is subjected during every stage in its assembly. Smart & Brown Lathes are not mass produced down to a price, but built to the highest standards by engineers long skilled in the use and appreciation of precision equipment.



Smart & Brown Lathes have achieved a world wide reputation for quality, dependability and ruggedness of construction. Whether used in the Toolroom or on precision repetition work their standard of performance will satisfy the most exacting requirements. In addition to the Model 'A' featured in this catalogue, other models are available. These include Centre Lathes for Toolroom and Second operation, also S.S./S.C. Lathes, and Bench Lathes.



The High performance which is built into every Smart & Brown Model 'A' Lathe is only attained by the most meticulous attention to detail. At each stage in its construction and assembly a most rigid system of check tests ensures that there is no deviation from the pre-determined standards.

Shown here is a typical Inspection Certificate as issued with every machine. No less than 24 actual tests are carried out. In addition, test samples are furnished to demonstrate the high standard of work actually performed by the Lathe.

Only by such means is it possible to convince purchasers that, according to Smart & Brown engineers, precision is not merely a desirable aim but a factual achievement.