

OPERATORS HANDBOOK
FOR THE
BOX-FORD
8" SHAPING MACHINE

**Boxford Machine Tools Ltd., Wheatley,
Halifax, Yorkshire, HX3 5AF, England.
Tel. 0422 58311
Grams. Boxford Halifax.**

CONTENTS

DESCRIPTION	2
LUBRICATION	8
OPERATION —	
Mounting the workpiece	10
Setting the tool	12
Operating the machine	13
General instructions	15
SPECIFICATION	16

INSTALLATION

Correct installation and maintenance of the machine is of vital importance, if the maximum performance is to be obtained.

Carefully clean the machine when received, using paraffin on a brush to remove protective grease, wipe dry with a cloth and lightly oil all unpainted metal surfaces to prevent rusting.

Preferably the Shaper should be bolted down to a level concrete floor, the machine being levelled, using steel wedges between the pads on the cabinet base and the floor until a precision level placed along and across the top of the table indicates that the machine is level.

The electric supply should be connected to the Isolator at the rear of the cabinet, after ensuring that the supply is suitable for the motor and electrical equipment supplied.

The motor and countershaft pulley should rotate in a clockwise direction when viewed through the drive compartment door.

Machines for single phase electric supply are correctly wired before despatch.

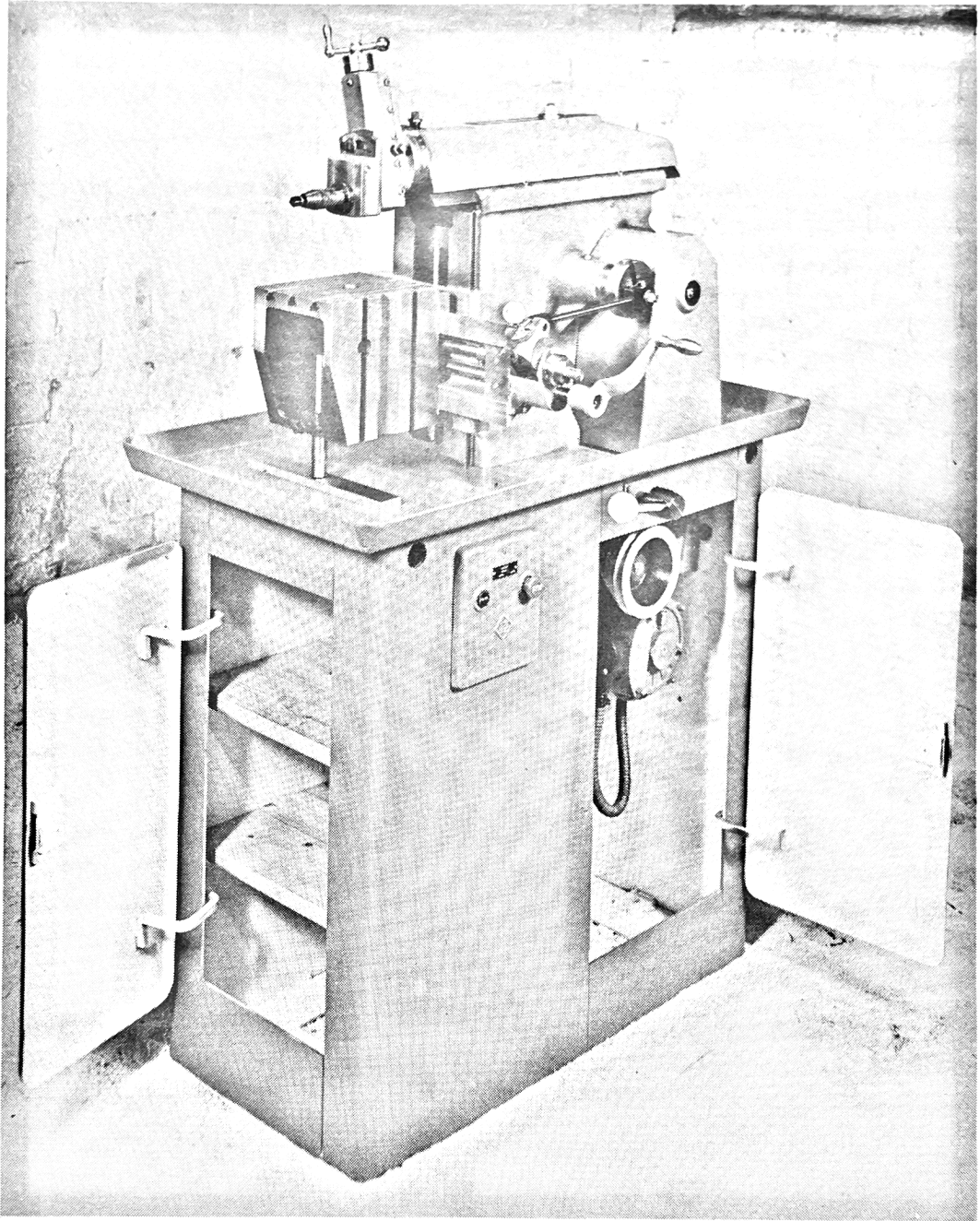
Machines for 3 phase supply can be reversed if necessary by changing over any two leads from the supply.

METRIC EQUIVALENTS

To the dimensions shown in this Handbook

Page Number

- | | | |
|----|--|---|
| 2 | For 8" read 200mm. | |
| 3 | Rocker arm scale for 0, 2", 4", 6", 8"
read 0, 50, 100, 150, 200mm. | |
| 4 | Tool slide micrometer dial | English .001" divisions
Metric 0.02mm divisions |
| 5 | Table tee slots to take | English $\frac{5}{16}$ " Whitworth
Metric 8mm Bolts |
| 6 | Table micrometer dial | English .001" divisions
Metric 0.02mm divisions |
| 7 | Feed increments | English .0025 per division
Metric 0.06mm per division |
| 10 | Table tee slots. See page 5 above.
Vice capacity
Work up to | English 4". Metric 100mm.
8" English or 200mm Metric |
| 12 | Slot cutting tool diagram | English 1 $\frac{1}{2}$ "R.
Metric 38mmR. |
| 13 | Stroke allowance extra to workpiece length
Ram setting. Cutting tool beyond workpiece. | English $\frac{3}{4}$ "
Metric 19mm.
English $\frac{1}{4}$ "
Metric 6mm. |
| 14 | Ram position. Extra to rear of workpiece.
Machine drive pulley
Large step. Strokes 8" to 6" or 200 to 150mm.
Third step. Strokes 6" to 4" or 150 to 100mm.
Second step. Strokes 4" to 2" or 100 to 50mm.
Small step. Strokes 2" to 0" or 50 to 0mm. | English $\frac{1}{2}$ "
Metric 13mm. |
| 15 | Depth of cut. English up to .125". Metric up to 3mm.
Fine finish. English .005" to .002". Metric 0.1 to 0.05mm. | |



BELT SIZES
PRIMARY / A645

Fig. 1

SECONDARY /

BOX-FORD 8" SHAPING MACHINE

INTRODUCTION

The Box-ford Shaping Machine can be used for producing flat surfaces in the horizontal or vertical planes and to produce angular plane surfaces, odd and irregular shapes, rack teeth, keyways and a great variety of shapes difficult to produce by any other means.

DESCRIPTION

The Box-ford 8" Shaping Machine has an infinitely variable ram stroke from 0" to 8", the ram stroke position also being adjustable. It is powered by a $\frac{1}{2}$ h.p. motor mounted in the cabinet base of the machine and controlled by push button no volt release and thermal overload starter mounted on the operator's side of the cabinet. An electrical isolator is fitted to the rear of the cabinet, the machine being electrically wired to this isolator when despatched.

A vee belt from the motor drives the countershaft and a four step pulley provides a four speed drive to the shaper drive pulley from this by vee belt. An external lever fitted to the cabinet base adjacent to the operating position of the machine, when moved backwards through 180° , releases tension on the drive belt, enabling the belt to be easily changed and the speed selected. This belt change lever is spring loaded and can be used in an emergency to stop the machine; if this lever is knocked downwards, the spring takes control and releases all tension on the drive belt, stopping the machine.

The drive belts are very accessible when the drive compartment door on the cabinet base is unlocked and opened, and the hinged guard opened away from the machine. Belt tension for the drive belts is adjusted either by moving the motor on its platform or by the adjusting nut in the belt tension linkage.

The cabinet base has also a tool compartment fitted with shelves. Locks and keys are provided for both the driving compartment and tool compartment doors.

The ram of the machine works in dovetail guide ways with gib adjustment and is rigidly supported throughout its full cutting range. Stroke adjustment of the ram is made on the crank gear eccentric, accessible when the door on the body of the machine is unlatched and opened; this door will be found on the side of the machine remote from the operating position.

A special square headed box key is provided for making this adjustment, the same key being used for other square headed locking screws on the machine

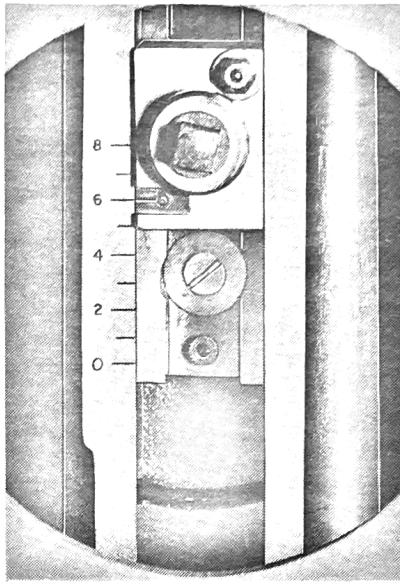


Fig. 2

The rocker arm is engraved and the sliding block is marked to indicate the length of stroke set.

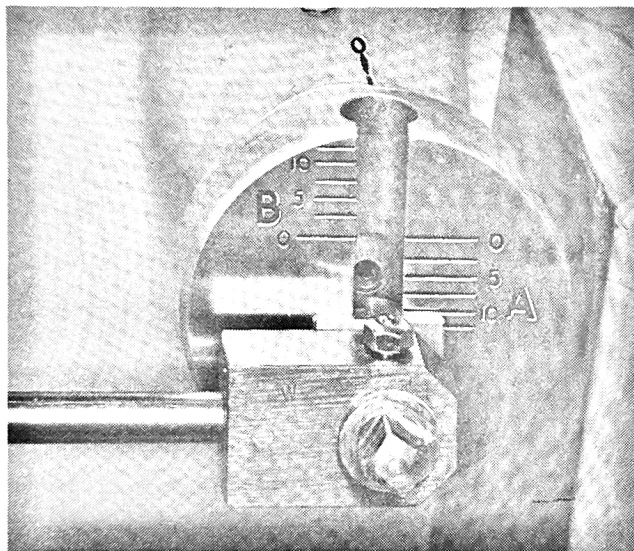


Fig. 3

The stroke should only be altered when the two marks on the feed plate and the bearing housing are in line, indicating that the slot in the crank gear is vertical as above. This setting can be obtained by fitting the operating handle to the squared end of the main shaft, through the hole in the guard and operating the machine with this handle. The stroke position of the ram can be altered by unlocking the $\frac{7}{16}$ " self locking nut on the top of the ram, the ram being then moved by hand and locked in the required position.

The meshing of the drive pinion with the crank gear can be adjusted when necessary, by means of the gear shaft eccentric.

After setting stroke and ram position and selecting correct speed for stroke set, always operate the machine by hand to check ram movement. **DO NOT RUN THE MACHINE UNDER POWER UNTIL THIS CHECK HAS BEEN MADE, AND THE HANDLE REMOVED FROM THE MAIN SHAFT.**

In general the faster speeds are provided for shorter strokes and the slower speeds for longer strokes.

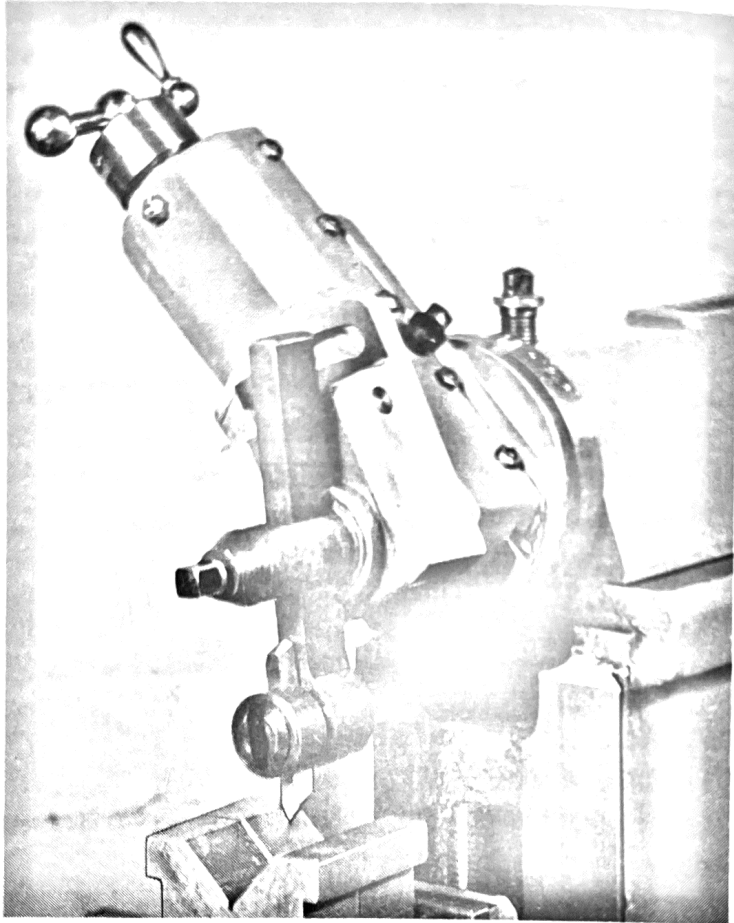


Fig. 4

A tool slide is fitted to the front end of the ram which can be swivelled to any position once the locking screw, on top of the ram adjacent to the tool slide, has been slacked with the special box key.

An engraved scale is marked on the ram face showing degrees plus and minus 45° from the normal vertical position, and allows accurate setting of the tool slide.

The tool slide has an operating handle and a micrometer dial engraved in $.001''$ and can be fed into or away from the workpiece by hand. The tool slide works on dovetail ways and is fitted with adjustable gib. A locking screw is provided. At the front of the tool slide is mounted the clapper and clapper box which can be

swivelled and locked independently of the tool slide using the box key. The cutting tool is set in the toolpost and clamped to the clapper, which holds the tool firm during the cutting stroke and hinges away from the workpiece during the return stroke to prevent damage to the cutting tool edge. When the tool slide is swivelled always operate the machine by hand to ensure that the tool slide does not strike the main body of the machine, before switching on power.

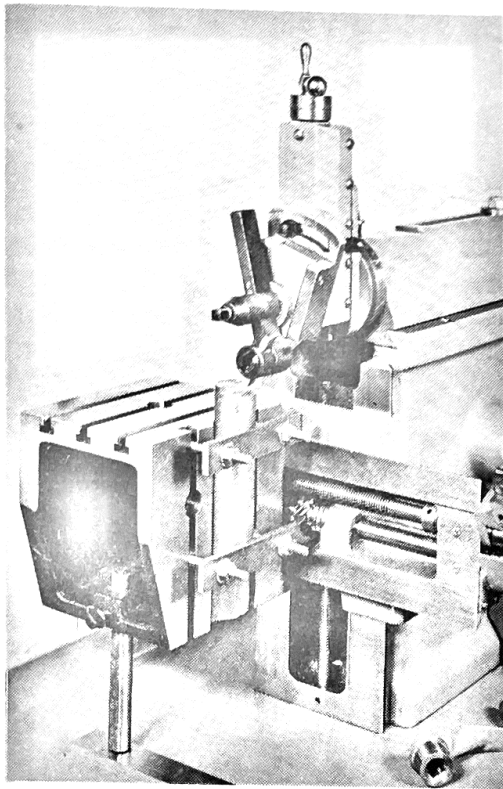


Fig. 5

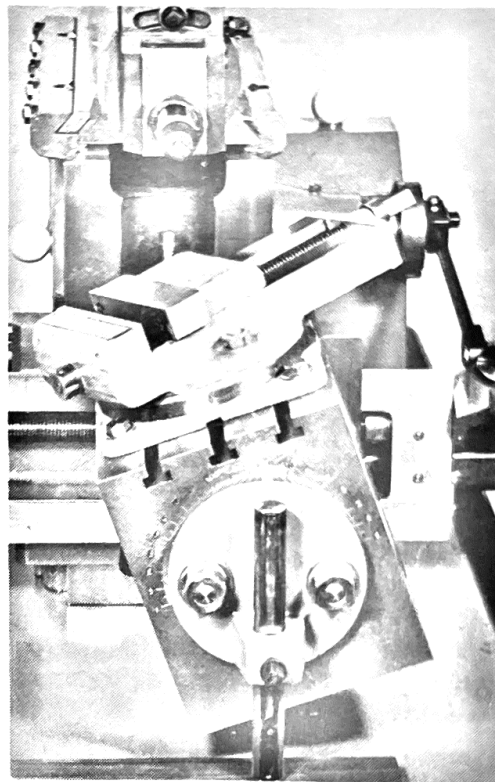


Fig. 6

The standard machine is fitted with a fixed table, fig. 5, the top face having three tee slots and a locating hole for a vice spigot, the vice being additional equipment. The vertical face of the table facing the operating position has two tee slots, a vertical vee slot and hole for vice. This vertical vee slot being used to hold vertical, round shafts or similar work pieces. The slots will take a standard $\frac{5}{16}$ " Whitworth bolt.

If required, a swivel table, fig. 6, can be fitted instead of the standard fixed table, at an extra charge and this must be specified when ordering the machine, as it cannot be fitted as additional equipment once the machine has been supplied. The swivel table can be used in conjunction with a special vice for machining workpieces where difficult compound angles are required and makes the machine more universal in its use, although the swivel table limits the extent of the horizontal table travel when swivelled towards the operator.

The table can be traversed horizontally towards or away from the operator by hand, with the operating handle fitted to the upper feed shaft of the carriage, and its position regulated by means of the micrometer dial engraved in .001" (see fig. 5). The table moves on the carriage on dovetail ways and has an adjustable gib. The table can be raised or lowered by hand, with the operating handle fitted to the lower feed shaft of the carriage. Before lowering the table, the table support at the front lower end of the table should be unlocked.

Power feed is provided for the horizontal traverse of the table and is controlled by the knob at the top of the feed housing.

If required, power feed can be fitted for the vertical movement of the carriage as an extra, which should be specified when the machine is ordered.

The carriage carrying the table and providing the vertical movement is fitted with dovetail ways and adjustable gib, and can be locked in any position with the box key. The front table support can also be locked and provides an additional support for the table when horizontal movement only is required.

The cross feed nut runs off the leadscrew thread before the limit of horizontal movement of the standard table is reached to prevent damage if the machine is left running with a power feed engaged. This safety feature cannot be included when the swivel table is fitted, nor does it apply to the vertical power feed. It is suggested these features should only be fitted when skilled personnel will use the machine.

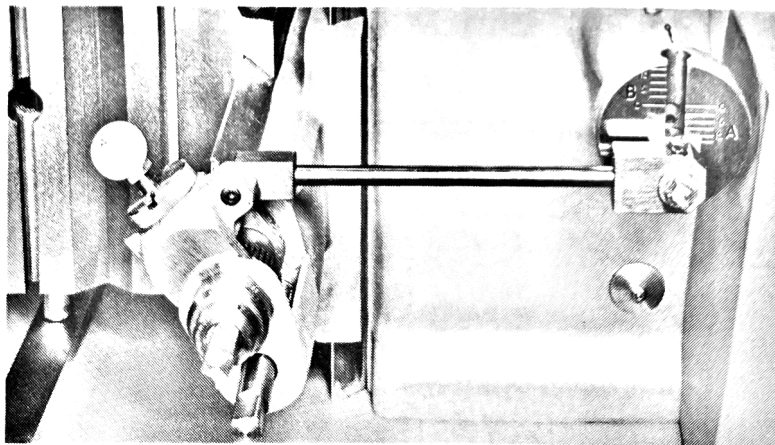


Fig. 7

Power feed for the table is obtained by using the knob on top of the feed housing. This has four positions, two feed and two neutral or no feed positions. The usual practice is to feed the table during the return or non cutting stroke of the ram. To feed the table towards the operating position of the machine, the feed indicator plate should be set with the box key to the A or lower

scale on the feed plate and the feed knob set with the letter A facing the operating position of the machine, as in fig. 7.

To feed the table away from the operating position of the machine, the feed indicator plate should be set to the B or upper scale and the feed knob set with the letter B facing the operating position.

With machines fitted for power vertical feed this is obtained by unscrewing the knurled locking screw on the feed housing and rotating the assembly 180° when the vertical feed will be engaged. It is not possible to engage the vertical and horizontal feeds at one and the same time.

Five feeds can be selected from the feed plate in increments of $.0025''$ per division, adjustment being made by slackening the feed adjusting screw with the box key and moving the feed arm over the scale on the bush, see fig. 7.

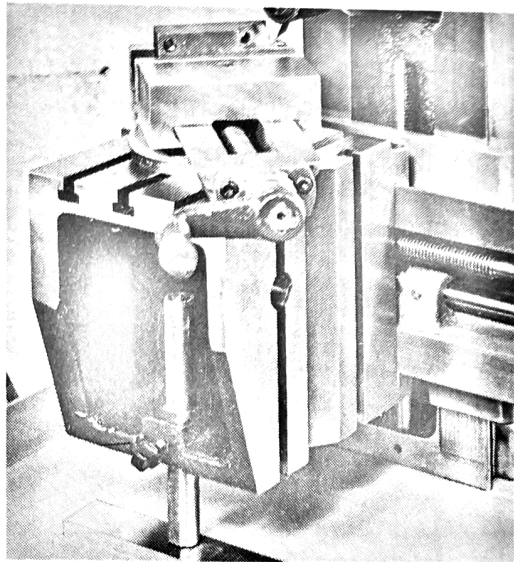


Fig. 8

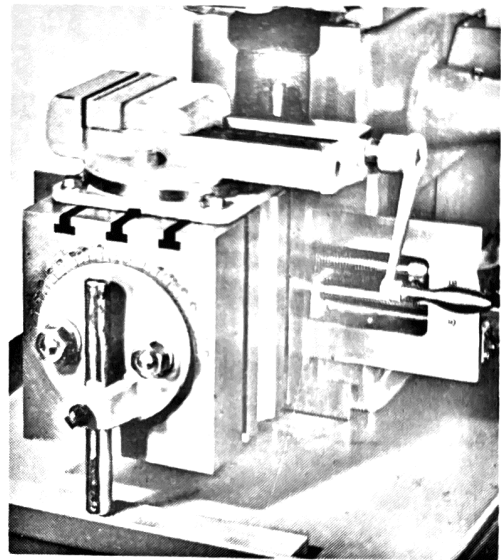


Fig. 9

Two vices are available as extras for use with the machine.

A cast iron swivel base vice located on a spigot and locked to the table either on the horizontal or vertical face is available. The base of the vice is engraved with a scale of $90^\circ-0-90^\circ$ and zero lines engraved on the table faces to facilitate setting the vice at any desired angle. The vice provides a ready means of holding all types of work and is really an essential piece of equipment if full use is to be made of the machine.

For the swivel table, a cast iron vice with a separate swivel base mounting is available, the mounting being fastened to the table by means of screws. This simplifies the fitting of the vice to the swivel table, the vice being similar in operation to that fitted to the standard table.

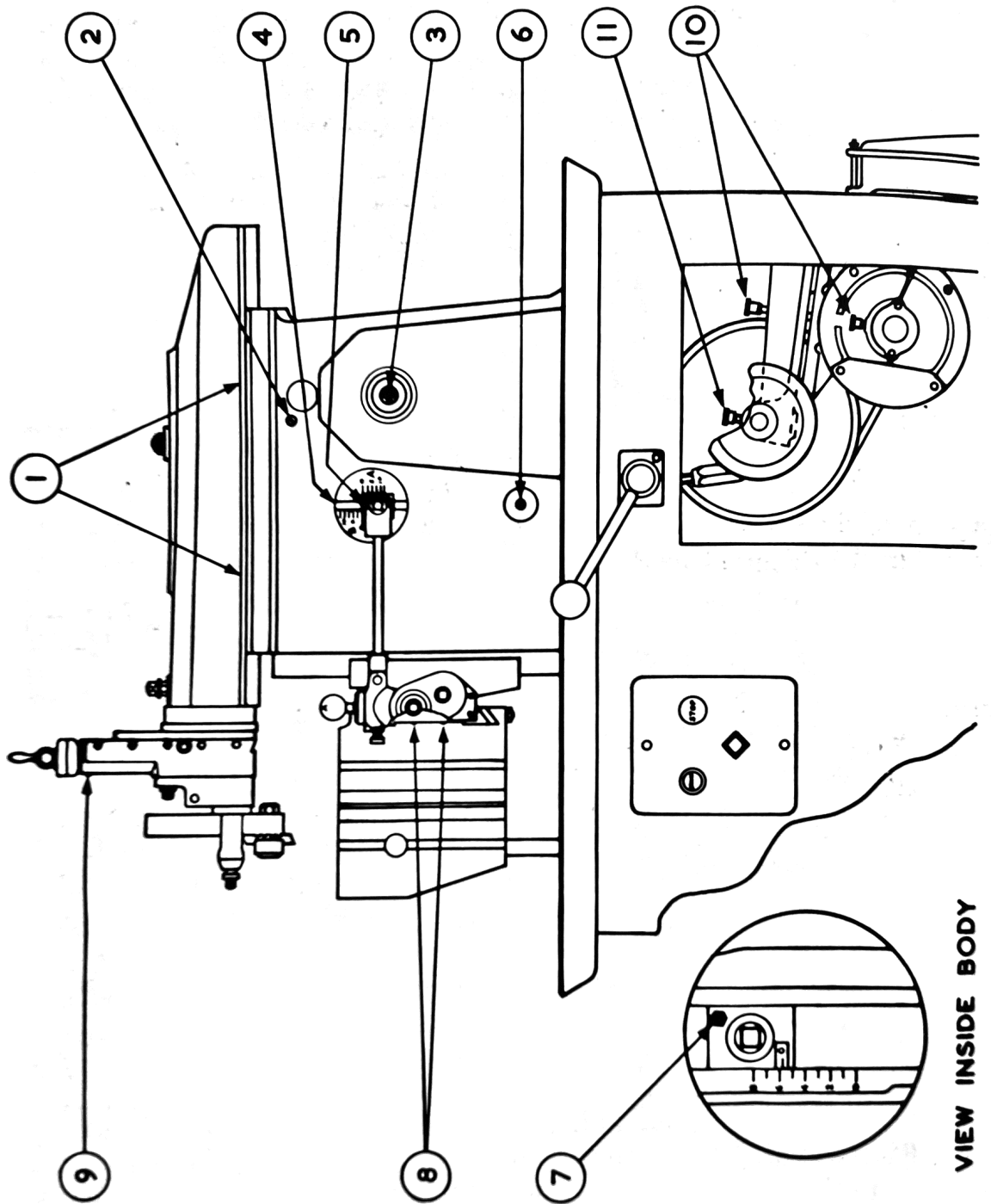


Fig. 10

LUBRICATION

Before the machine is operated it must be lubricated correctly with a light machine oil (S.A.E. 20 grade or similar) with the oil can provided and a light film of clean oil spread evenly over all sliding surfaces.

Lubrication points are located as follows:

1. Ram Slides. 4 oilers on top of machine body.
2. Crank gear and pinion. 1 oiler at top of body on operating side of machine.
3. Pinion bearings. 1 oiler in centre of shaft on operating side of machine, in hole in countershaft guard.
4. Crank gear bearings. 1 oiler in main bearing boss on operating side of machine.
5. Feed arm, big end. 1 oiler in bearing adjacent to feed indicator plate.
6. Rocker arm bearings. 1 oiler in shaft end below feed indicator plate.
7. Crank gear sliding block. 1 oiler in sliding block inside body of machine.
8. Horizontal feed shaft. 1 oiler on front face of carriage (top).
Vertical feed shaft. 2 oilers, 1 on front face of carriage (bottom) and 1 in centre of carriage, only visible when table is traversed away from operating position.
9. Tool slide-leadscrew. 1 oiler on front face of tool slide.
10. Motor. 2 greasers. A small charge of grease only required at the most once every 3 months, when greasers are fitted. Some motors require no attention.
11. Countershaft bearings. 2 greasers. A small charge of grease every 3 months. New models are fitted with self lubricated ball bearings, requiring no attention.

All the above points should be lubricated regularly when the machine is in use.

It is good practice to give a small charge of oil during each hour the machine is being used. Cleaning off all cuttings from machined surfaces with a brush and applying a light coat of fresh oil to all machined ways and leadscrews.

Occasional oiling once a week is recommended for all hinges, plungers, clapper box swivel and ram linkage, the latter being visible through the slot in the top of the ram, the countershaft linkage and swivel.

OPERATION

Mounting the workpiece

Flat work can conveniently be held by $\frac{5}{16}$ " bolts and clamps on to either the horizontal or vertical faces of the table. Irregular shapes may require packing before clamping and round shafts held in vee blocks or in the vertical V-slot.

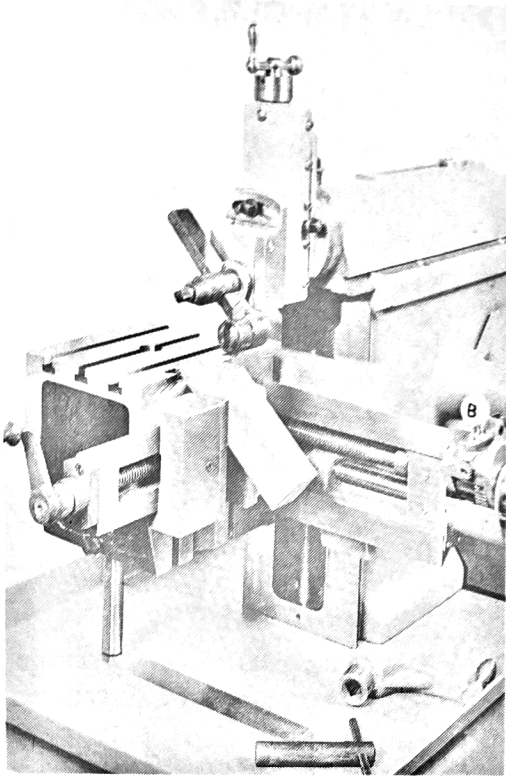


Fig. 11

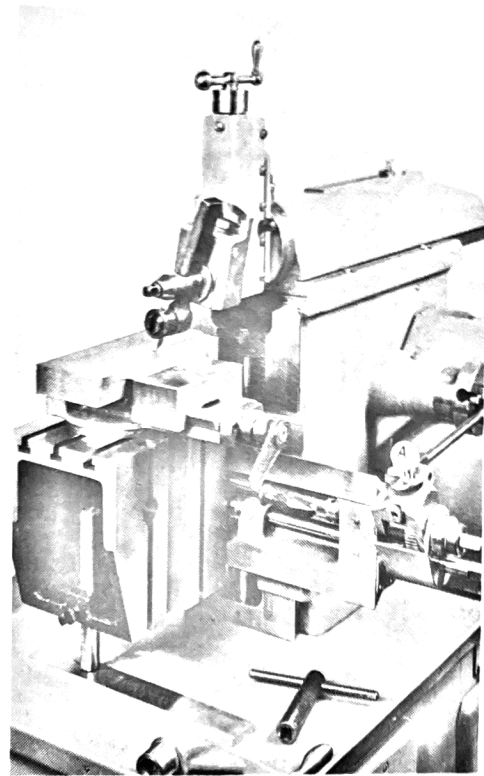


Fig. 12

A vice fitted to the table provides a simpler method of holding workpieces of any shape, the general principle being that for machining faces up to 4 inches long (the capacity of the vice), the jaws should be set at right angles to the stroke of the machine so that all thrust from the cutting tool is taken by their full face.

For any oblique cuts the vice is set at the angle required, or if work up to 8 inches long is to be machined with any special form and can be held by the vice in its width, the vice may be swivelled so that the jaws are in line with the ram stroke providing light cuts only are taken and the work is held rigid.

It is good practice to use thin paper between the workpiece and the vice jaws so that any slackness can be felt after tightening the jaws.

The vice must be clamped securely to the table by means of the $\frac{7}{16}$ " B.S.F. bolt or in the case of the special vice used with the swivel table to its base by the two nuts on either side of the vice. Its position can be determined by setting the degree scale on the base of the vice to the zero marks either on the top or side face of the table.

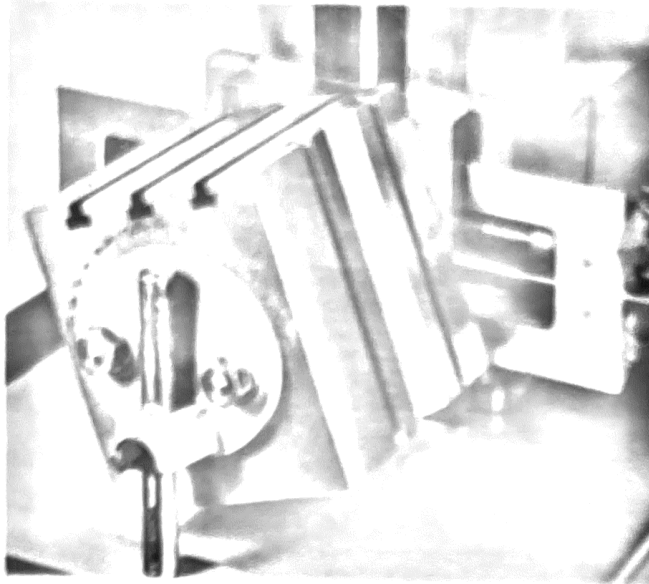


Fig. 13

The swivel table can be inclined to any position by slackening the two nuts on the front face and setting the degree scale on the front of the table to the zero on the plate.

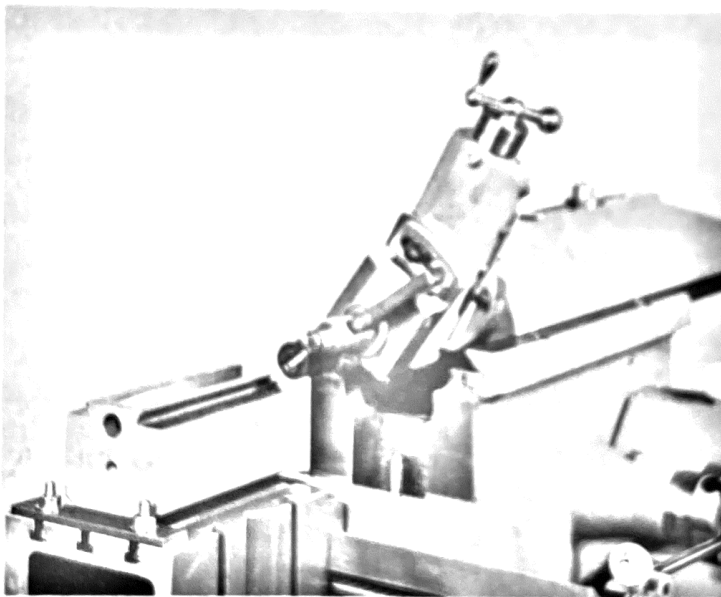


Fig. 14

The tool slide can be swivelled on the front face of the ram by unlocking the square headed bolt, it can then be set to any position by aligning the zero mark on the tool slide with the degree scale on the face of the ram.

The swivel slide is used for machining dovetails or angular planes, the tool slide being fed into or away from the work piece on its slides, see fig. 14.

Setting the tool

The clapper box can be swivelled and locked to the face of the tool slide in such a position that the tool on the return stroke will not catch the workpiece. This can be checked simply by lifting the clapper when the tool has been set. The tool should lift clear of the workpiece.

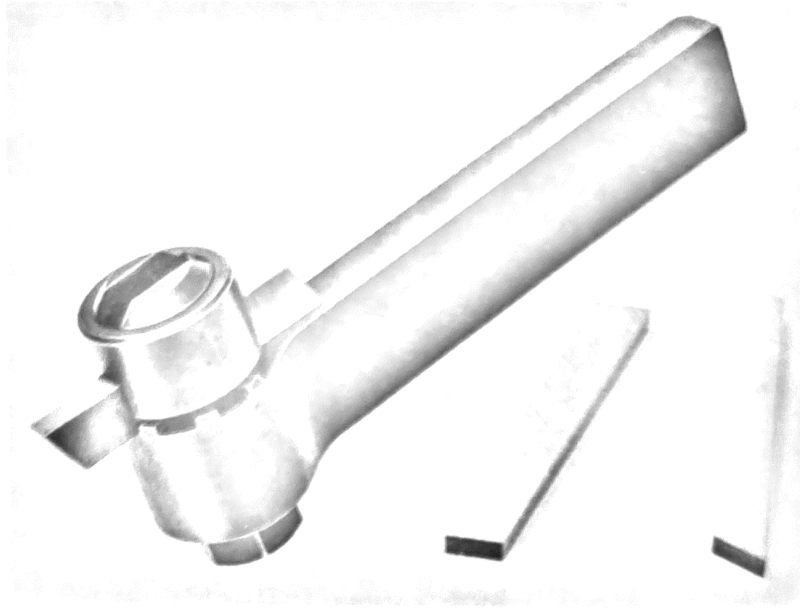


Fig. 15

A toolholder can be supplied for the machine which can be fitted with the required shape of H.S.S. toolbits for the work in hand.

The toolbit can be adjusted as well as the toolholder, simplifying the setting of the tool and making a large stock of tools unnecessary.

Typical tool bit shapes are as follows:

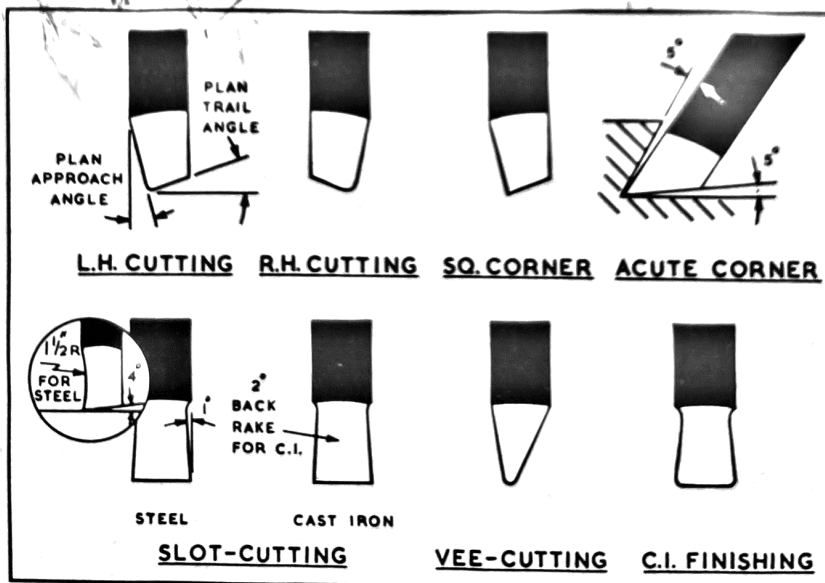


Fig. 16

Operating the machine

Check that the workpiece is securely clamped, either to the table or in the vice and that the vice, if used, is securely clamped to the table.

Adjust the height of the table and tool slide so that the tool clears the workpiece and that the tool slide can be moved either in or out. Lock the carriage clamp and set the table support at the foot of the table so that the table is well supported during the cutting stroke.

Check that the toolholder, tool bit, clapper box and tool slide swivels are all securely clamped and that the clapper when lifted forward provides clearance for the tool on the return stroke.

Fit the operating handle to the squared end of the main drive shaft — this will be visible through the hole in the guard — and operate the machine by hand through a full cycle to ensure tool clearance is provided. This can be done easily if the belt tension is first released by moving the belt tension lever backwards through 180° and the feed knob is set to either of the no feed positions, the letter A or B facing the front of the machine as in fig. 14, page 11.

Rotate the operating handle until the marks on the bearing housing and the feed plate coincide. See fig. 3, page 3.

Ascertain the maximum length of cut required from the workpiece and always allow $\frac{1}{4}$ " more than this for the machine stroke to allow for tool clearance at the beginning and end of the cutting stroke.

Open the door in the body of the machine and with the box key slacken the stroke adjusting screw and set the mark on the sliding block to the required stroke position engraved on the scale and lock tightly the stroke adjusting screw. See fig. 2, page 3.

Set the feed required on the feed plate to the A scale if the feed is required towards the operator, or to the B scale, away from the operator and lock in position. As a general guide the coarser feeds are used when roughing and the finer feeds when finishing, similarly, smaller feeds should be used with longer strokes and the larger feeds with the shorter strokes.

With the operating handle move the ram to its full forward position. Slacken the ram position nut on top of the ram and position the ram so that the cutting tool is approximately $\frac{1}{4}$ "

beyond the workpiece to be machined and lock the ram position nut with the spanner.

Check that when the ram is now moved to the full rear position with the operating handle that the tool is approximately $\frac{1}{2}$ " behind the workpiece and that the tool slide and tool do not strike the main body of the machine.

Open the guard and drive cabinet door on the operating side of the machine and select the speed required by moving the vee belt to the step required.

As a general guide the slower speeds are for the longer strokes, the faster speeds for shorter strokes.

Large step on machine drive pulley for strokes 6" to 8"

3rd step on machine drive pulley for strokes 4" to 6"

2nd step on machine drive pulley for strokes 2" to 4"

Small step on machine drive pulley for strokes 0" to 2"

Move the belt tension lever to the forward position and check that the drive belts are reasonably tight. Adjust with the adjusting nut if necessary.

Close the guard and cabinet door.

Check that correct lubrication has been carried out.

Remove the operating handle from the main drive shaft.

The machine is now ready for operation under power but it is always good practice to first check that all adjusting and locking screws are tight and that when the machine is put through a full cycle with the operating handle there is clearance for the tool and the ram. If belt tension is first released by moving belt tension lever backwards through 180° this will be done more easily.

The table can be hand fed either horizontally or vertically by placing the operating handle on either the top shaft at the operating end of the carriage for horizontal movement or to the bottom shaft for vertical movement. When operating the feed by hand the feed knob should be set in the no feed position with either the letter A or B towards the front of the machine.

To feed the table horizontally by power, the feed knob should be rotated until the letter A or B, depending upon which scale has been used on the feed plate, is facing the operating position.

General

The depth of cut that can be taken with the machine depends very largely upon the strength of the material being worked upon and the finish required. Up to $.125''$ depth of cut can quite easily be taken but for fine surface finish this should be reduced to $.005''$ or $.002''$.

When shaping cast iron it is often found that the end of the material tends to break away at the end of a cut and this can be avoided if this edge, before commencing to machine it, is chamfered off with a file.

Vertical cuts can be made either by raising the table or by lowering the tool slide. For greater stability it is usual to set the tool slide near its uppermost position and raise the table to obtain the correct cutting position. When the table support is then adjusted the tool slide is fed downwards into the work, this will ensure maximum stability of both the table and the tool.

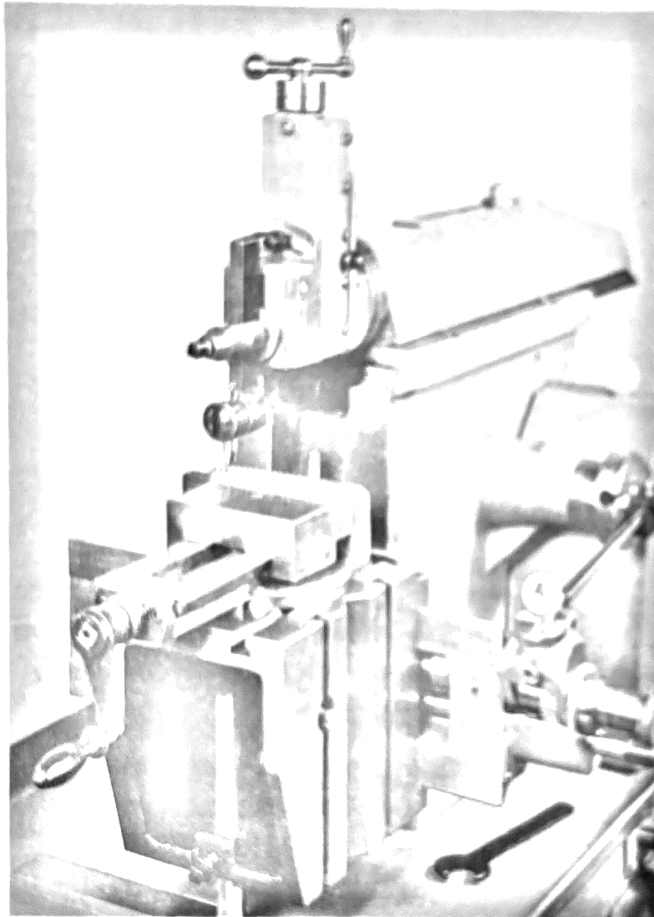


Fig. 17

When cutting racks or keyways it is essential that the cutting tool is ground correctly to the form and shape required.

Indexing for the pitch of the teeth is carried out using the horizontal cross feed dial and the tool fed into the material to the correct depth using the tool slide dial.

Dovetails can be accurately machined by setting the tool slide to the angle required and feeding into the work with the tool slide and a similar procedure adopted for machining bevels.

Internal keyways may be cut on the machine using a special bar and cutter in a special toolholder, which can be supplied as extra equipment.

An indexing head and rotary table can also be supplied for use with the machine as extras, for machining accurately indexed flats on shafts or similar components.

Low voltage lighting can be fitted to the machine if required as extra equipment.

SPECIFICATION

Length of ram stroke	0" to 8"
Strokes per minute	Approx. 35, 60, 100, 160
Maximum cutting speed	Approx. 107 ft. per min.
Tool slide vertical travel	3½"
Tool slide swivel	360 degrees
Tool post for shank size	⅞" x ⅞"
Table length	7"
Table width. Standard pattern	5¾"
Table width. Swivel pattern	6"
Table height	7"
Table—Horizontal travel	9"
Table—Vertical travel	6"
Table—Distance from ram	½" to 6½"
Power feed	·0025", ·005", ·0075", ·010", ·0125"
Table tee slots	To suit standard ⅝" bolt
Vice—Width of jaws	4"
Vice—Maximum jaw opening	4"
Vice—Overall height Std. pattern	2¾"
Electric drive motor	½ h.p. 1,425 r.p.m.

SECONDARY

DRIVE BELT FITTED A 40 SHOULD BE
LONGER A 60

PRIMARY DRIVE BELT A 31" FITTED
A 32" PREFERRED

SPECIFICATION - METRIC

0 to 200mm.

35, 60, 100, 160

33 metres per minute.

90mm.

360 degrees

11mm x 22mm.

175mm.

145mm.

150mm.

175mm.

225mm.

150mm.

13 to 165mm.

0.06, 0.13, 0.19

0.25, 0.3mm.

8mm. bolt

100mm.

100mm.

61mm.

Electric drive motor, English and Metric. All models now $\frac{3}{4}$ h.p., 1,425r.p.m.

