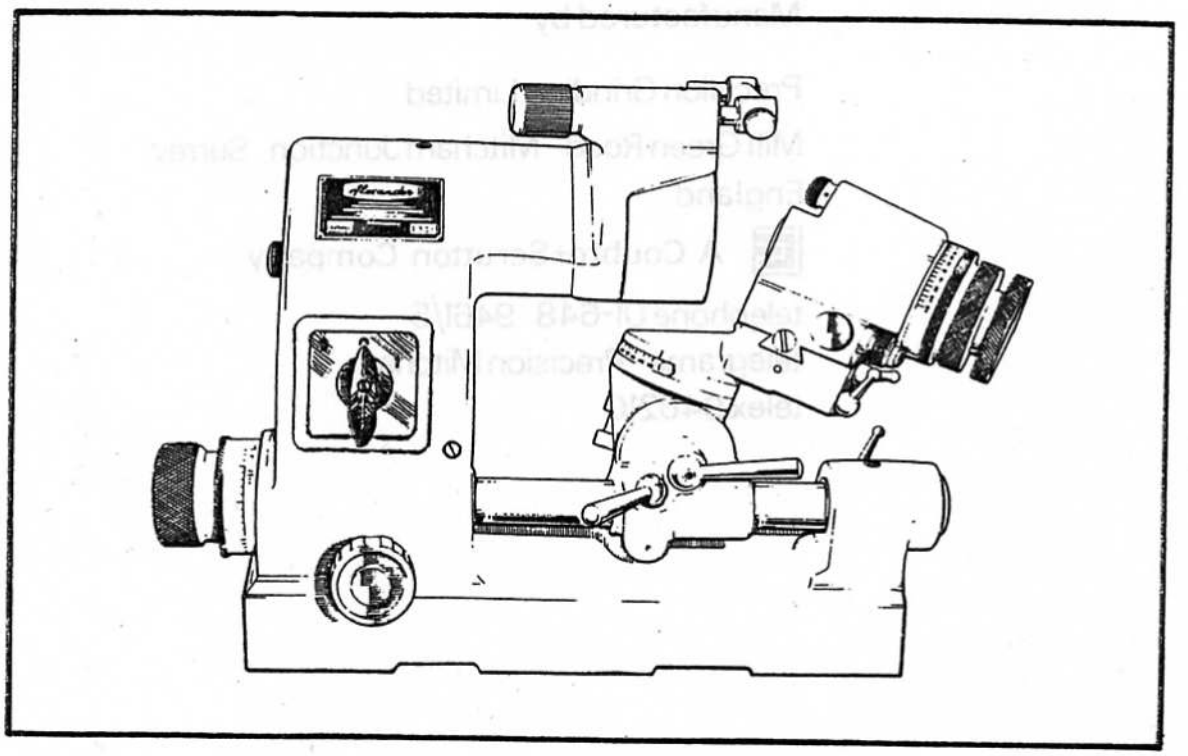
ALEXANDER CUTTER GRINDER INSTRUCTION MANUAL



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INTRODUCTION

This manual is a guide to your Cutter Grinder. With diagrams and description it shows how to grind most types of single point cutters. Details of general maintenance are also given so that by correct maintenance you can ensure maximum service from the equipment.

The 2 CG will take cutters up to 11/16 inch (17.5 mm) diameter and cutters can be ground accurately and quickly to the best clearance and cutting angles for the material being machined. Dividing scales marked in degrees allow the work head to be rotated horizontally and vertically to give universal movement to the slide. A third cross slide fitted with a vernier scale graduated in 0.001 inch or 0.01 mm divisions will off-set the cutter for grinding off centre radii.

Read the instructions in this manual carefully, they will help to ensure that your Cutter Grinder is used correctly and gives good service in shaping and sharpening cutters.

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PREPARING THE MACHINE FOR GRINDING CUTTERS

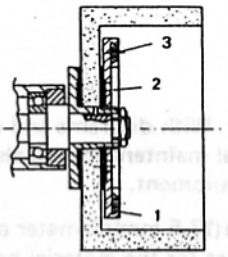
1. Ensure that the motor is correctly connected so that the wheel rotates in an anti-clockwise direction when looking at the front edge of the grinding wheel.

2. Ensure that vibration is reduced to a minimum.

WHEEL BALANCING

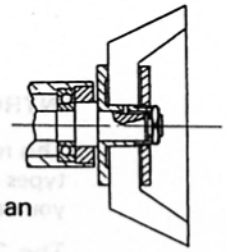
Alexander cutter grinders are fitted with flanges incorporating adjustable weights to facilitate wheel balancing

With the grinding wheel secured to the spindle and the weights 1 on the flange plate 2 diametrically opposite each other, run the grinder and check for vibration on the collet housing. If excessive vibration is found, unclamp the screw 3 and adjust the weights until minimum vibration is obtained.



CUP WHEELS

Diamond faced cup wheels cannot be secured with the balancing flange. A simple securing flange is available as an extra for this purpose.



DRESSING THE GRINDING WHEEL (Figs. 1 and 2)

The wheel should be dressed regularly and particularly when the wheel has become loaded or the corner has worn off. Failure to redress the wheel will result in overheating of the cutting tool and a poor surface finish. The diamond tool for dressing the wheel is held in a swinging arm and locked in position by a thumb screw. A feed screw is used to advance the diamond to the wheel. The wheel dresser is housed in the wheel guard (Fig. 1) so that the grinding wheel can be dressed without disturbing the cutter in the collet. The wheel is dressed by passing the swinging arm across the face of the wheel taking small dressing cuts. Take small cuts when refacing the wheel to ensure greater diamond life. While the cutter is being ground the diamond is swung clear.

When halving cutters, relieve the face of the wheel (Fig. 2). This will help stop the tool from overheating and make it easier to produce a parallel flat on the cutter.

GRINDING INSTRUCTIONS FOR HALVING CUTTERS (Fig. 3)

Measure the diameter of the cutter with a micrometer to determine the amount to be removed. The cutter should be ground to within +0.0004" – 0.000" (+0.01 – 0 mm) of the centre line. Ensure that all readings on the scales S, M and O are set to zero. Place the cutter to be halved in the collet and lock the collar (G) to close the collet, with the index pin D in the centre hole to stop the cutter rotating. Unlock the clamp C1 and slide the complete cutter unit along the bar until the face of the cutter is just clear of the wheel, tighten the clamp C1. Unlock the handle C and adjust the stop Q to determine the length of flat on the cutter. Then adjust the micrometer drum N so that the cutter just touches the side of the wheel. Set the adjustable micrometer drum scale P to zero and, using micrometer drum N, feed the cutter into the wheel. At the same time swing it across the face of the wheel until the cutter is halved. Check with a micrometer to ensure that the correct amount of metal has been removed.

SETTING THE MACHINE AND CUTTER FOR GRINDING (Fig. 3)

a. Position the collet housing at right angles to grinding wheel axis by zeroing the support arm R and the vertical swivel S.

b. Place the pin of the snap lock D in the right hand hole and rotate the collar T until the red dot appears in the window F. Drop the index pin of the snap lock D into the centre hole.

c. Insert the collet and cutter. Set the flat face of the cutter against the finger E and then lock the cutter using the collar G. Pull out the snap lock D and place the index pin in the right hand hole.

NOTE: Standard Tunbo cutters that are supplied already halved are ground to +0.008" (0.2 mm) on centre.

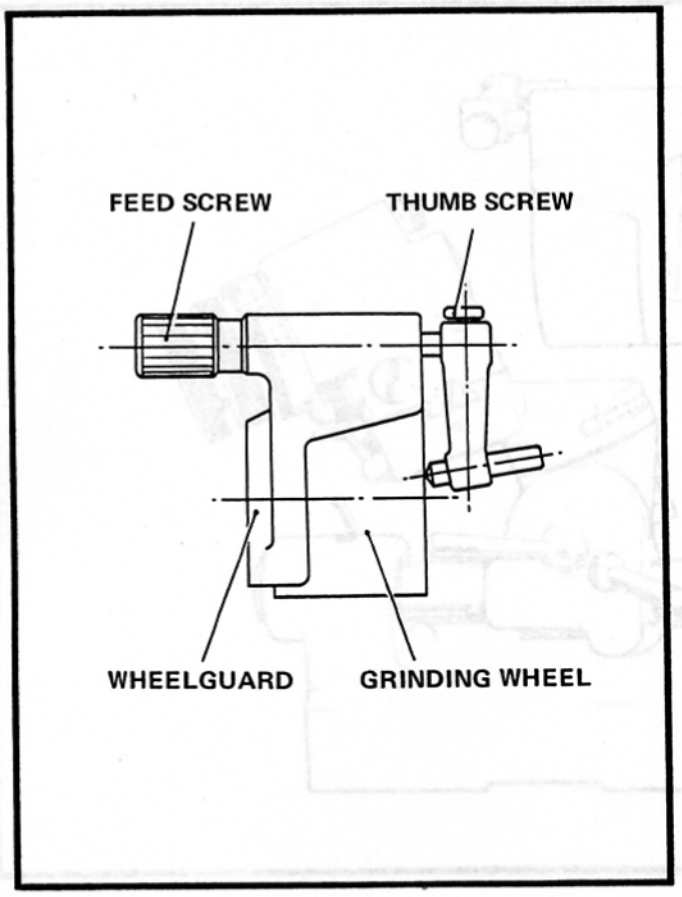


FIG. 1

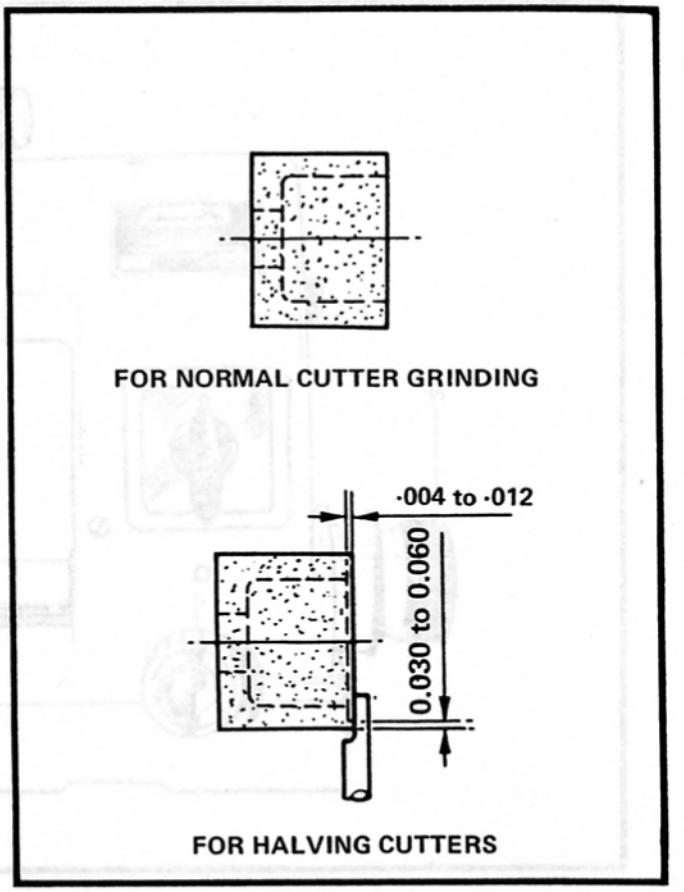


FIG. 2

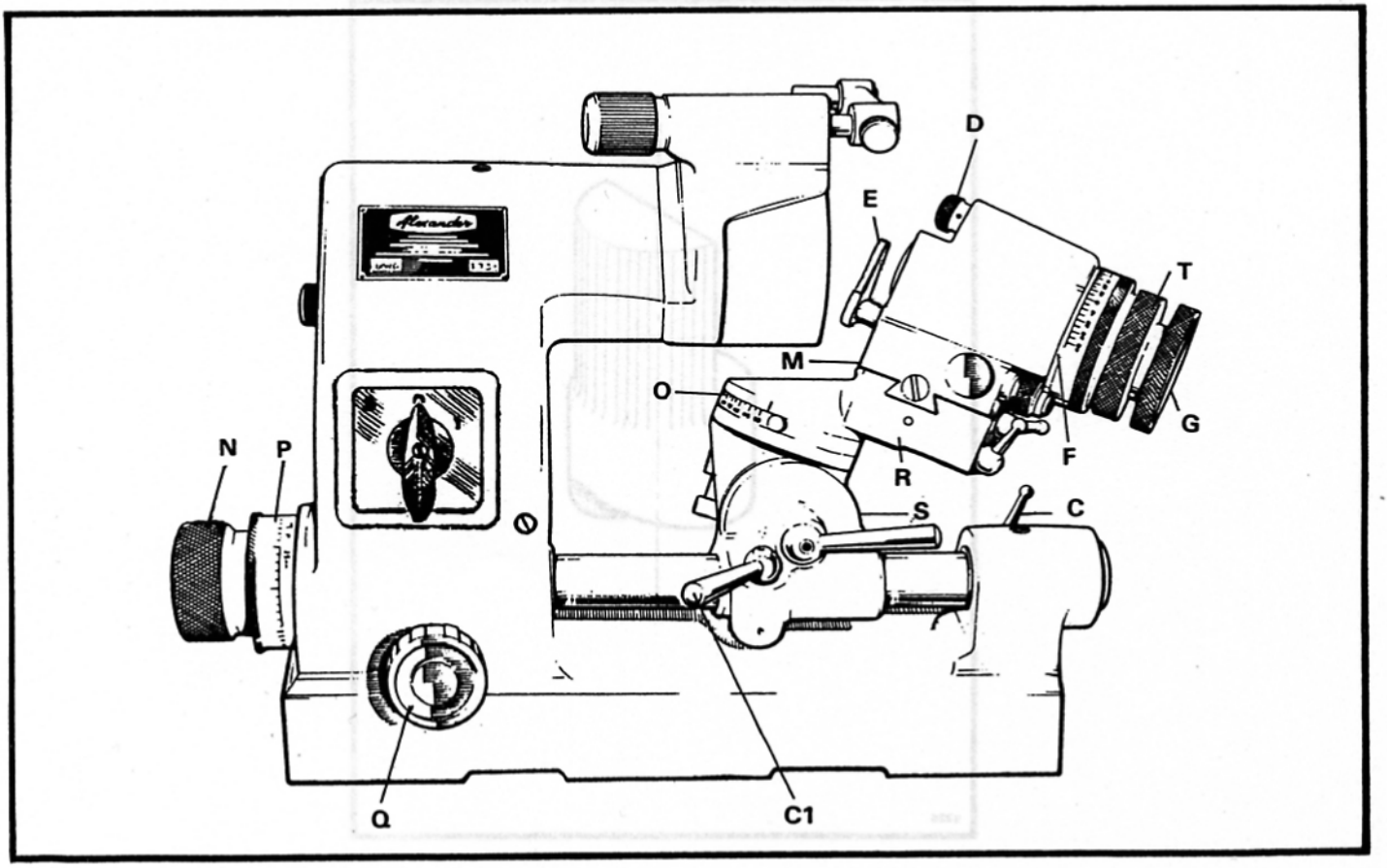


FIG. 3

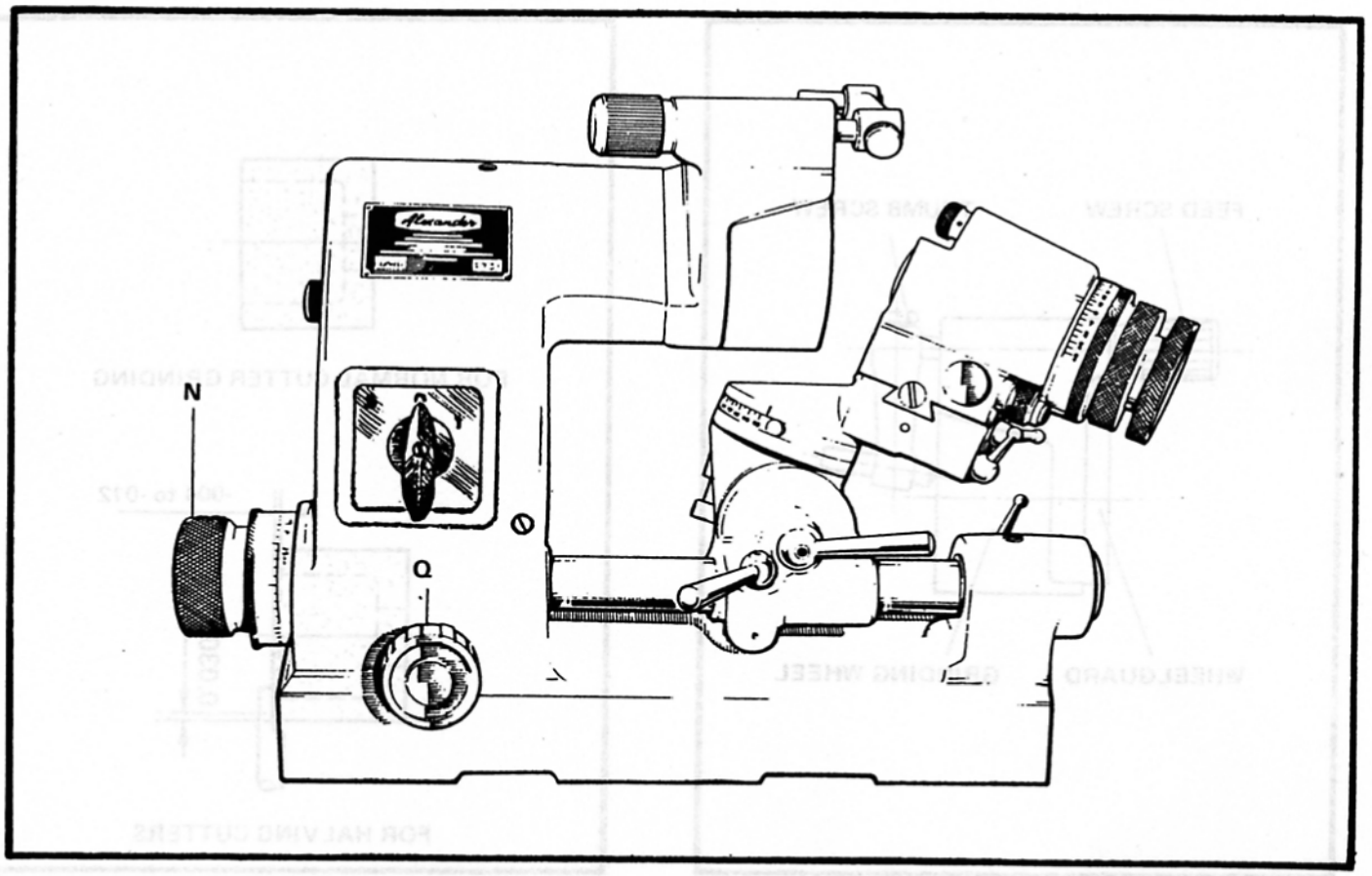


FIG. 4

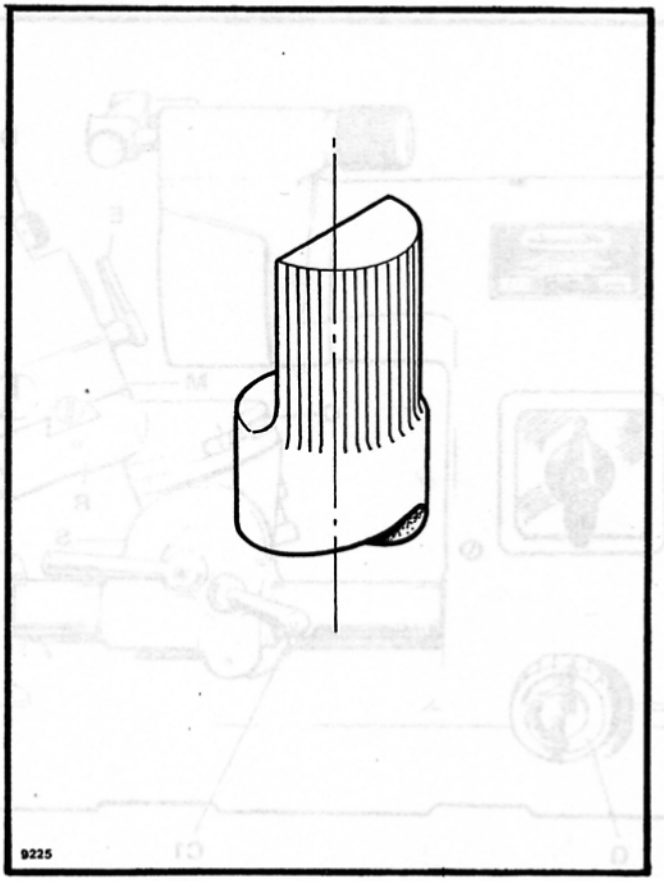


FIG. 5

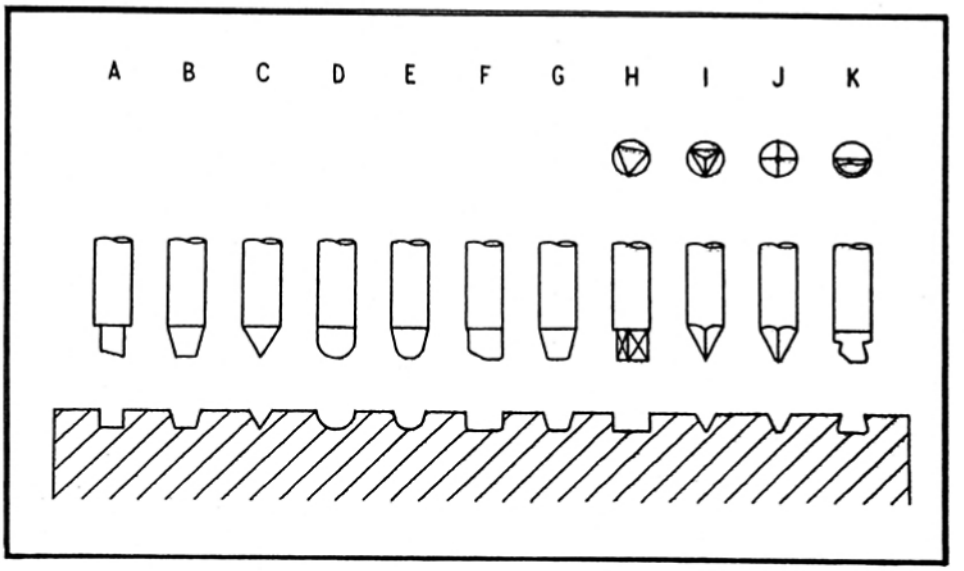


FIG. 6

ROUGHING OUT CUTTERS (Fig. 4 and 5)

To ensure longer wheel life and to stop cutters overheating when roughing out, use the following method:—

Set the stop Q to determine the length of the cut. Use the micrometer N to advance the cutter to the wheel and to set the depth of cut. Swing the cutter across the face of the wheel and back, then rotate the cutter by approximately 10^{o} to 20^{o} and take another cut. This will produce a series of small flats around the cutter (Fig. 5). These flats can then be removed by rotating the cutter and advancing it slowly across the face of the wheel. When the cutter is within +0.006" (0.15 mm) of the finished size dress the wheel and then finish grind the diameter to +0.002" (0.05 mm) by rotating the cutter slowly across the wheel.

HINTS ON THE GRINDING AND USE OF CUTTERS.

There are 11 basic types of single point cutters and these are described below.

CUTTER TYPES & PROFILES (Fig. 6)

CUTTER A Flat Bottom Parallel Sides
Used for Mould Work & Parallel Side Relief Engraving.

CUTTER B Flat Bottom Tapered Sides
Used for Mould Work & Taper Side Relief Engraving.

CUTTER C Pointed Type (Engraving Cutters)
Used for Sunk Engraving.

CUTTER D Round Nose Parallel Sides
Used for Moulds & Three Dimensional Work.

CUTTER E Round Nose Tapered Sides
Used for Mould & Three Dimensional Work.

CUTTER F Off-Set Radius
Used for Mould Work & Small Radii in Deep Cavities.

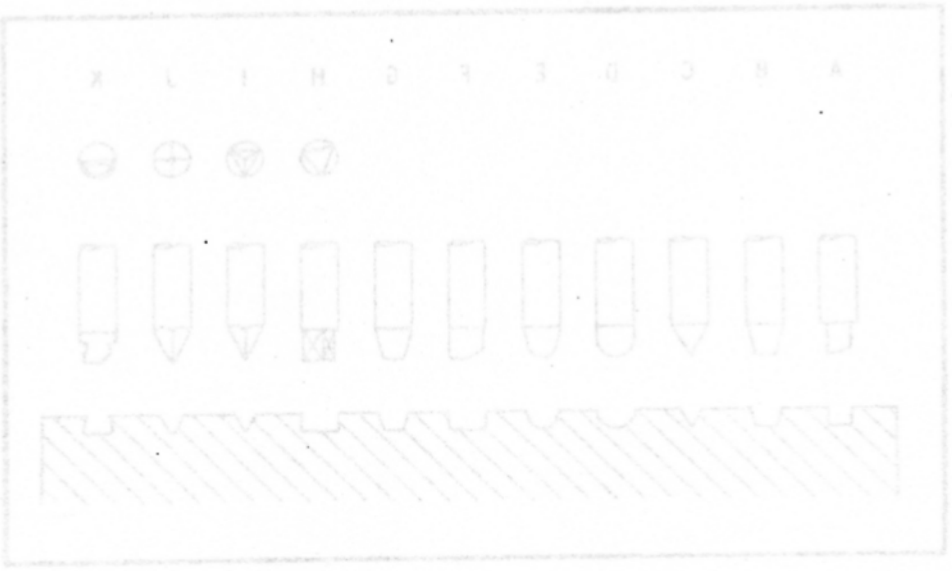
CUTTER G Tapered Off-Set Radius Profile Cutter

CUTTER H Triangular Parallel Sides
For super finishing after roughing with D bit type cutters. Strength and rigidity make it ideal for narrow deep slots. When cutting wood or similar materials the slow cutting action of this cutter powders the material removed; thus preventing the cutter becoming choked.

CUTTER I Pointed Triangular Tapered Sides
Engraving Cutter for Producing a very fine line.

CUTTER J Tapered Four Sided
Used for fine detail work i.e. Medallions.

CUTTER K Dovetail or Back Relieved
For dovetail grooves or under-cutting single point turning tools.



Clearance Angles Fig. 7

For any cutter to machine effectively it must have one or more clearance angles. The angles usually required for single point cutters are illustrated in(Fig. 7)and are referred to in the individual grinding instructions. Because of the variation in materials supposedly of the same specification and also the wide range of materials on which these types of cutters can be used,it is impossible to lay down a hard and fast rule regarding clearance angles.

As a general guide however, the best results are obtained if the clearance angles are made as large as possible when cutting hard materials.

If an initial clearance angle of 20^{o} is ground on the cutter and it cuts well, then this is the correct angle for this application. If the cutter cuts slowly but the cutting edge lasts a long period, then the clearance angle should be increased. If the cutter cuts rapidly but the cutting edge becomes blunt quickly, the clearance angle should be reduced.

Because it is a quick operation to regrind a cutter it is more economical to sacrifice part of the life of the cutting edge and increase the machining rate. To obtain the best results and finish, lightly stone the flat face of the cutter. The cutting edge can also be stoned, but this must be done very carefully. When using a high speed on hard materials, the cutting edge may be lightly removed by stoning. For tough materials, it is sometimes advisable to leave a 0.003" (0.075 mm) land rather than grinding to a knife edge, this will increase the life of the cutter. When using pointed engraving cutters it is an advantage to remove the point by stoning (see Fig. 15).

Secondary Clearance Angles

Secondary clearance can be ground on cutters by hand, this secondary clearance angle gives a fly-cutter action. The secondary clearance can also be produced on the machine by grinding the normal clearance, and then adjusting the tilting support 'U' (Fig. 8) to a greater angle. The secondary clearance angle is then ground in the same way as the normal angle.

To grind the clearance angle of cutting edge ('a' Fig. 7) use the procedure described on page (9).

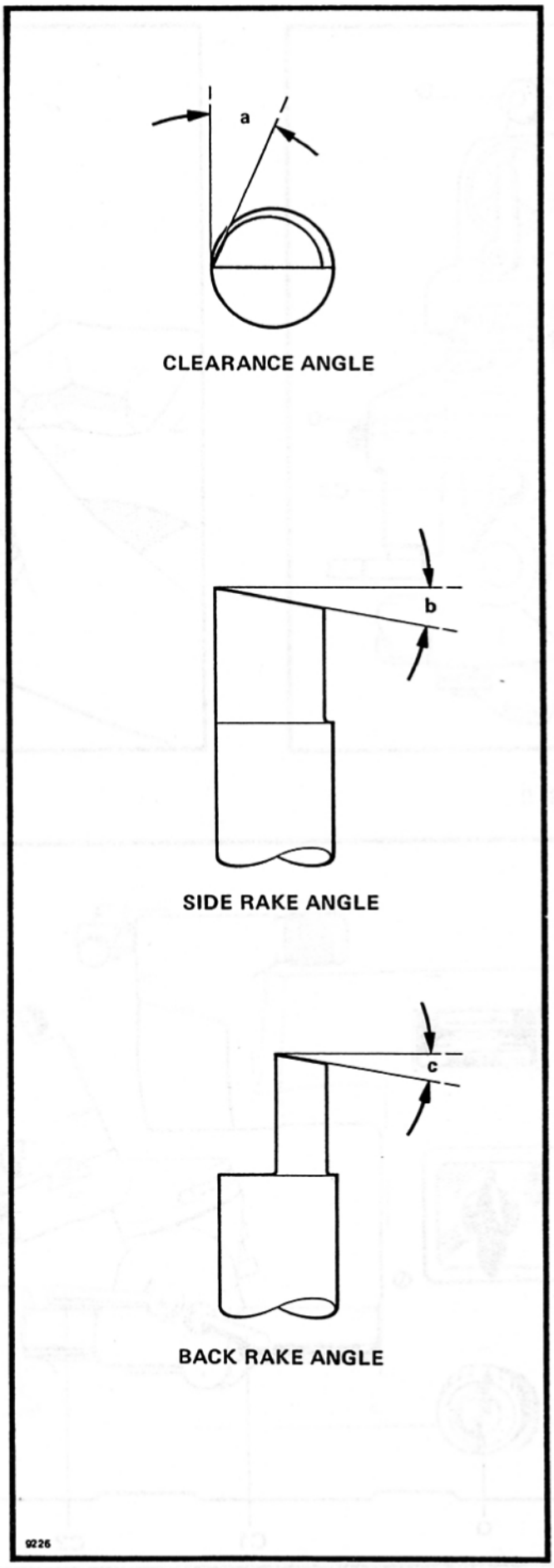


FIG. 7

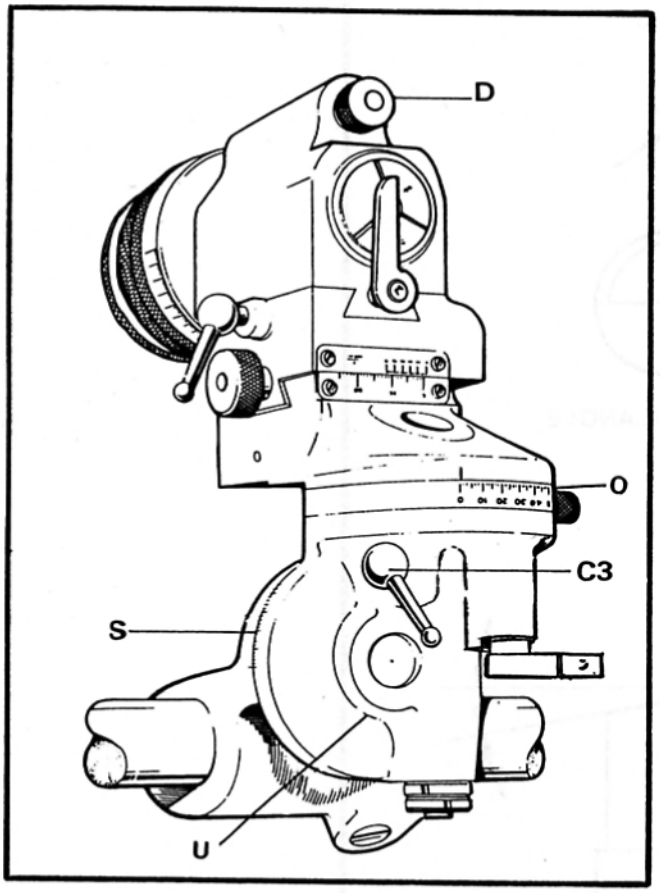


FIG. 8

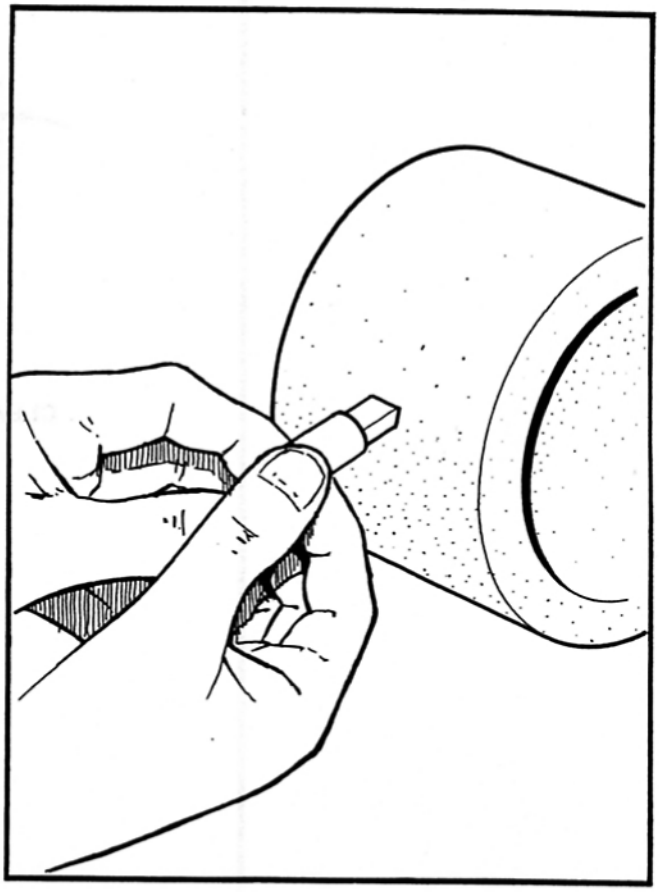


FIG. 9

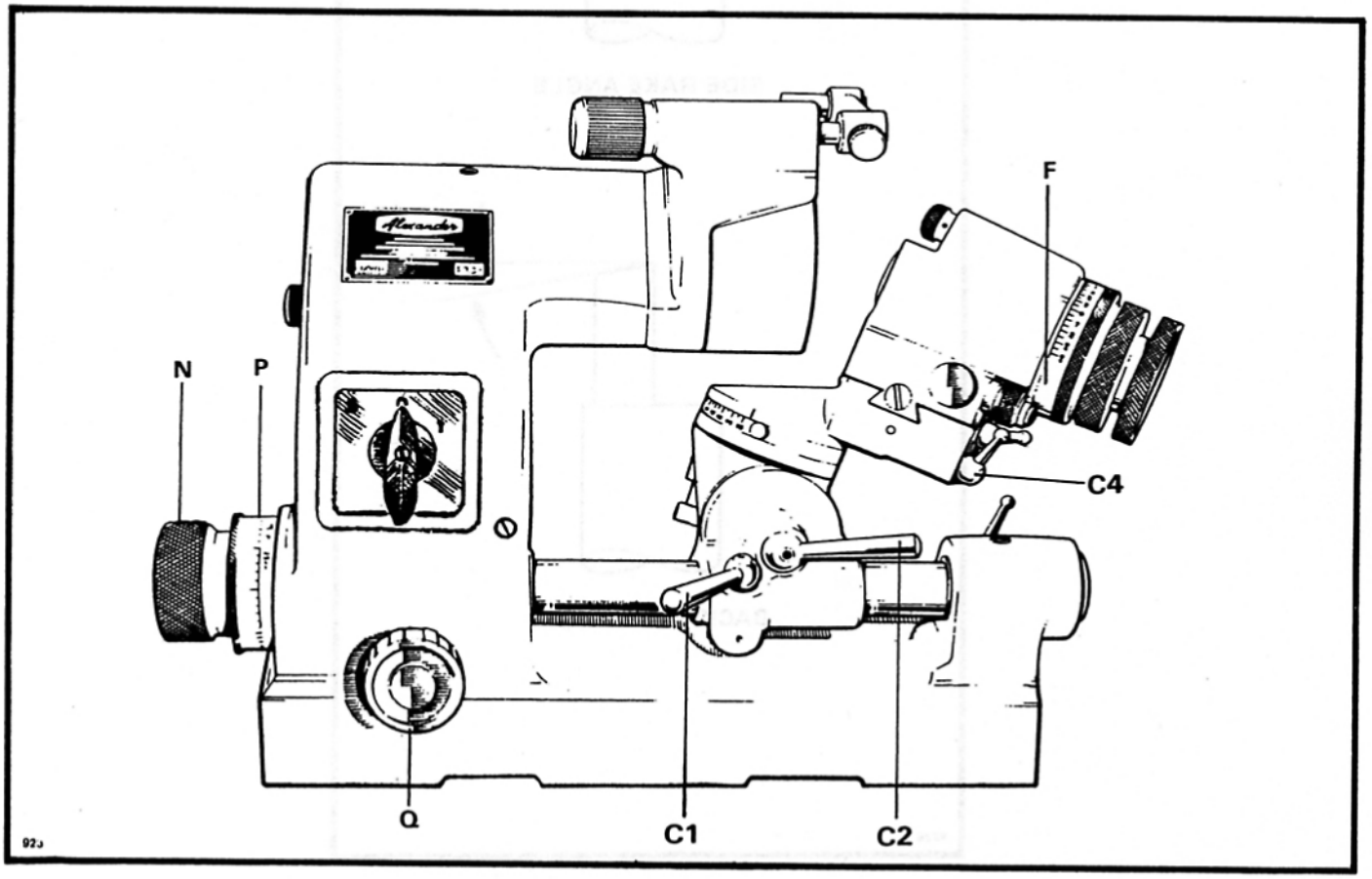


FIG. 10

GRINDING PARTICULAR TYPES OF CUTTERS

A. Flat Bottom Parallel Sides (Figs. 7, 8, 9 and 10).

After halving the cutter it is necessary to grind the clearance angles to form a cutting edge. The clearance angles should be selected to suit the material that the tool is cutting.

To grind the clearance angle of cutting edge ('a' Fig. 7) use the following procedure.

Set the cutter (as described on page 2) and make sure that all readings are set to zero and the handles locked. Unclamp the lever C2 (Fig. 10) and, using the angular scales, set the swivel arm U (Fig. 8) to the required clearance angle ('a' Fig. 7). Release the clamp C1 (Fig. 10) and slide the complete cutter unit along the guide bar until the face of cutter is just clear of the wheel, and reclamp C1 (Fig. 10). Adjust the stop Q (Fig. 10) to determine the length of cutting edge required. Then using the micrometer drum N (Fig. 10) bring the side of the cutter to just touch the wheel, set the micrometer drum P (Fig. 10) to zero. Engage the index pin on the snap lock D (Fig. 8) in the right hand hole and grind the cutter to the required diameter +0.002" (0.05 mm).

Return the red dot to the window F (Fig. 10) and engage the index pin on the snap lock D (Fig. 8) into the left hand hole. This allows the collet bearing to rotate through 180°.

Grind the clearance by feeding in with the micrometer N (Fig. 10) until a small land can be seen at the cutting edge. Advance by 0.001" (0.025 mm) increments until the land is almost gone. Then move by 0.0005" (0.01 mm) increments until the land disappears and a sharp edge is obtained. Advance another 0.0005" (0.01 mm) to take a finishing cut on the form.

Rake Angles (b and c Fig. 7) for the parallel cutter

Bring the red dot back into window F (Fig. 10) and engage the index pin in the centre hole.

Release the lever C2 (Fig. 10) and, using the scale S (Fig. 8), set the swivel arm to the side rake angle (b Fig. 7) required and tighten clamping lever C2 (Fig. 10). Release levers C3 (Fig. 8) and C4 (Fig. 10) and hold index drum O (Fig. 7) clockwise against stop and set at 90°-"c"to give the required back rake angle (c Fig. 7). Reclamp the levers C3 (Fig. 8) and C4 (Fig. 10). Bring the cutter close to the wheel by unclamping C1 (Fig. 10) and sliding the complete cutter unit along the guide bar and reclamp C1 (Fig. 10). Grind the side and back rakes (b and c) to required depth using the micrometer drum N (Fig. 10).

It is also possible to produce the back rake angle required by holding the cutter and grinding it on the circumference of the grinding wheel (Fig. 9).

B. Flat Bottom Tapered Sides (Figs. 11, 12, 13)

Formula X = R–Y

After halving and setting the cutter (as described on page 2) check that all the readings are set to zero. Loosen the locking handle C5 (Fig. 13) and, using the knurled off-set adjustment screw J (Fig. 11), move the slide to the right by 'Y' (Fig. 12) dimension measured on the vernier M (Fig. 11).

Bring the diameter of the cutter into light contact with the face of the wheel then set the adjustable micrometer drum P (Fig. 13) to zero. Move the cutter unit and bar slide to the left by amount X (Fig. 12) using the micrometer drum N (Fig. 13). Reset the micrometer drum scale P (Fig. 13) to zero.

Example: D = 0.250", Y = 0.075"
Dim. X = R–Y = 0.125" – 0.075" = 0.050"
or
D = 6 mm, Y = 2 mm
Dim. X = R–Y = 3–2 = 1 mm

Swing the support arm R (Fig. 11) through 90°. Roughly position the collet housing B (Fig. 13) by unlocking the screw H (Fig. 13) and handle C6 (Fig. 11), and move the collet housing forward until the cutter is just clear of the wheel. Tighten the clamping screw H (Fig. 13). Using the adjusting screw I (Fig. 13) bring the nose of the cutter into contact with the face of the wheel and clean the face of the cutter to establish a datum point, then lock the handle C6 (Fig. 11). Return the support arm R (Fig. 11) to its original zero position. Set the angle of taper required by unlocking the handle C3 (Fig. 11) and C4 (Fig. 13). Push the graduated collar O (Fig. 11) in a clockwise direction to the stop and swing the support arm R (Fig. 11) to half the angle of taper ($^{e}/_{2}$ Fig. 12). Lock in this position by locking the handle C4 (Fig. 13). Feed the micrometer drum N (Fig. 13) back until the cutter is clear of the wheel and set the stop Q (Fig. 13) to give an adequate amount of movement of the cutter past the wheel. Grind the form of the cutter by swinging the arm R (Fig. 11) between the stops and rotating the collar T (Fig. 13) through 360° until +0.001" (0.025 mm) on the zero reading is obtained on the micrometer drum N (Fig. 13). Return the red dot to the window F (Fig. 13) and engage the index pin of the snap lock in the left hand hole. Unclamp the lock C2 (Fig. 13) and set the angular scale S (Fig. 11) on the swivel arm to the clearance angle (a Fig. 12) required and lock C2 (Fig. 13).
Take a light cut along the tapered face of the cutter to produce a land. It is possible that at this angle the land will not be parallel so that a further adjustment of the swinging support arm R (Fig. 11) is necessary. An example of this is given in Figure 19. Grind the clearance by feeding in with the micrometer N (Fig. 13) until a small land appears at the cutting edge. Advance by 0.001" (0.025 mm) until the land is almost gone, then move the cutter by 0.0005" (0.01 mm) increments until the land disappears and a sharp edge is obtained. Advance another 0.0005" (0.01 mm) and take a finishing cut on the form. For the secondary clearance angle see the note on page 6. The secondary nose clearance for this type of cutter is most easily done by hand.

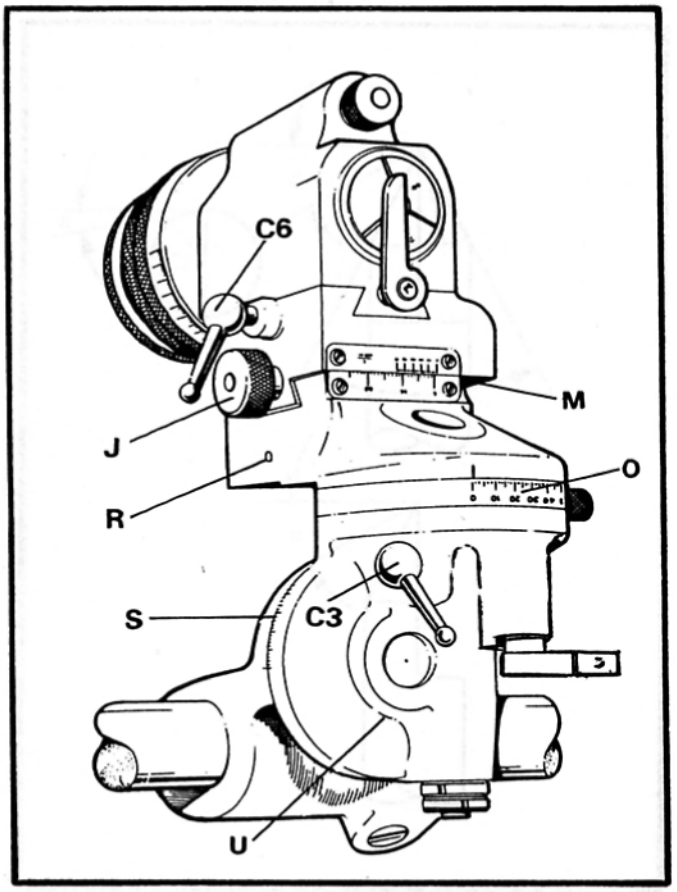


FIG. 11

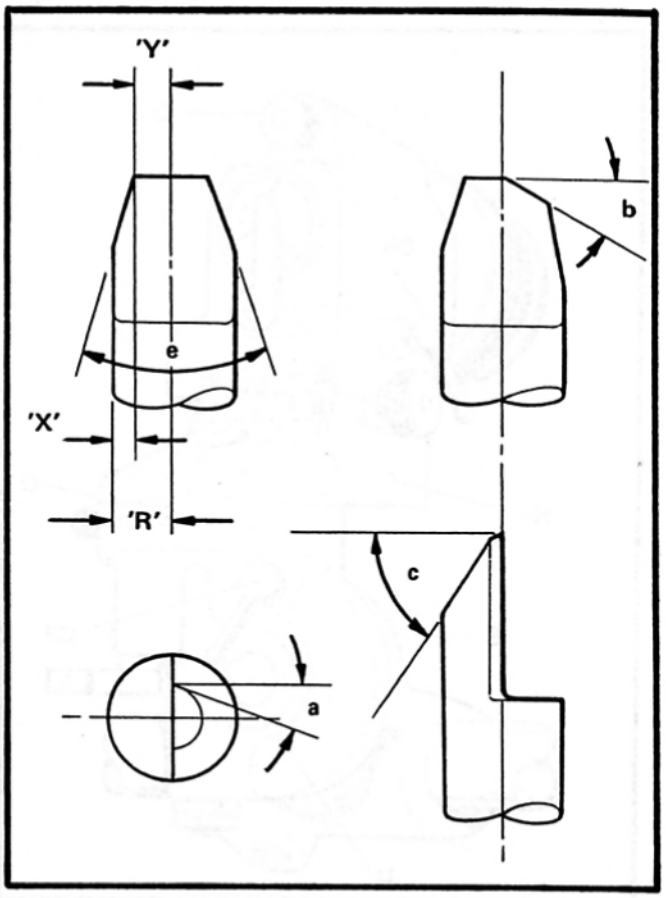


FIG. 12

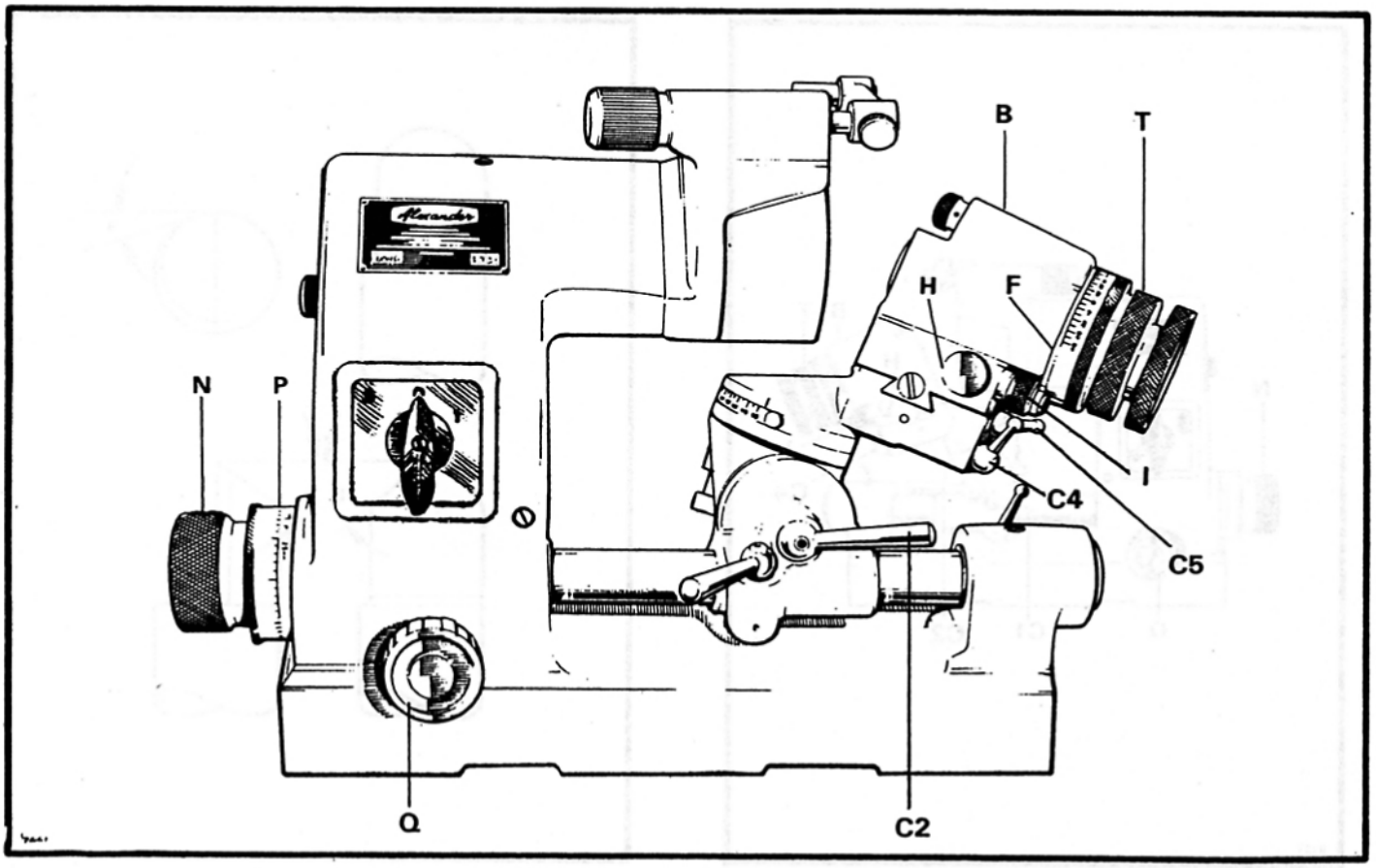


FIG. 13

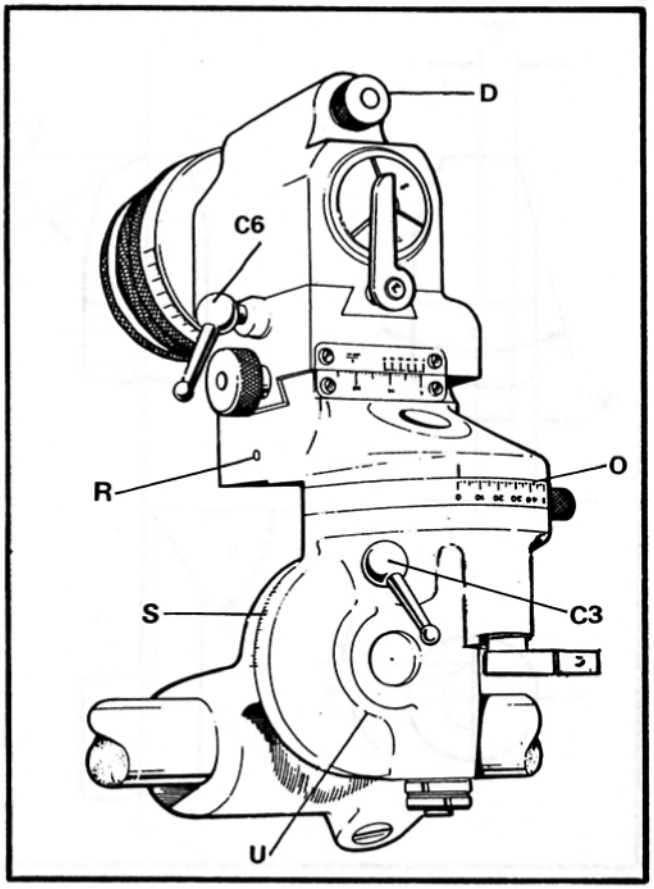


FIG. 14

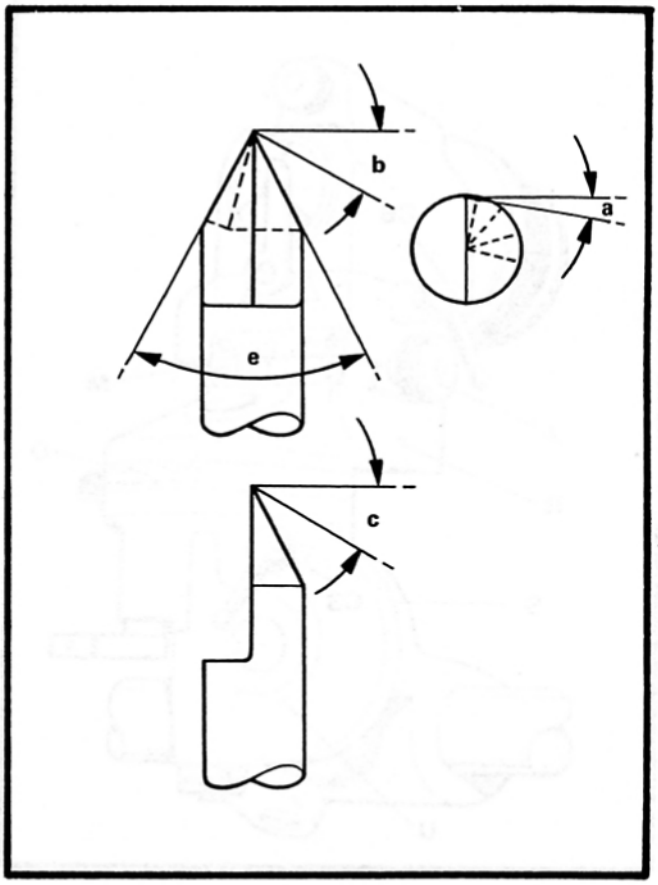


FIG. 15

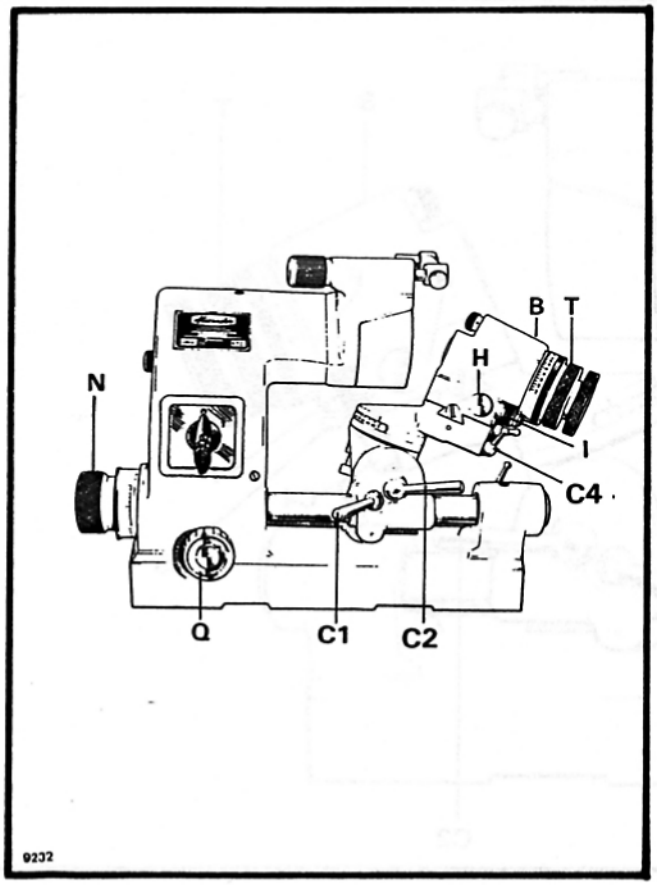


FIG. 16

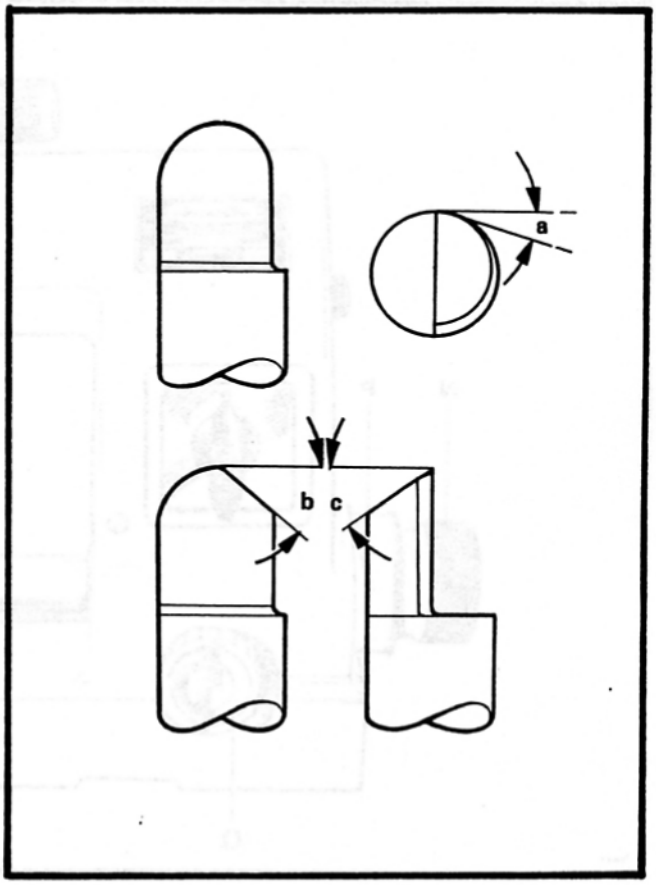


FIG. 17

C. Engraving Cutter (Figs. 14, 15, 16)

When grinding pointed engraving cutters, the included cutter angle and the clearance angle are produced in one operation.

After halving and setting the cutter (as described on page 2) check that all the readings are set to zero and the handles locked. Engage the index pin of the snap lock D (Fig. 14) into the left hand hole to enable the collet to be rotated through 180°.

Release the clamping levers C3 (Fig. 14) and C4 (Fig. 16). Hold the index drum O (Fig. 14) clockwise against stop and set the swivel arm against the scale O (Fig. 14) to one half of the included angle required. Re-lock C3 (Fig. 14) and C4 (Fig. 16).

Release the clamping lever C2 (Fig. 16) and using the angular scale S (Fig. 14) set the swivel arm to the clearance angle ('a' Fig. 15) required and reclamp the lever C2 (Fig. 16). Release the clamp C1 (Fig. 16) and slide the complete cutter unit along the guide bar until the cutter is just clear of the face of the wheel and reclamp C1 (Fig. 16). Set stop Q (Fig. 16) to give adequate cross movement. Then using the micrometer drum N (Fig. 16) feed the cutter into the grinding wheel. Grind the cutter by passing it backwards and forwards across the wheel and at the same time rotating it through 180°. Grind the cutter to a point. Secondary clearance angles formed by stoning are shown more clearly in Figure 15. The flat on the top of the cutter will give an offset cutting edge. For fine engraving cuts not exceeding 0.0004" (0.01 mm) the shape of the cutter should not be changed.

D. Straight Sided Round Nose Cutter (Figs. 14, 16 and 17)

Halve and set the cutter (as described on page 2) and make sure that all readings are set at zero. Swing the tilting support arm U (Fig. 14) to set the clearance angle (a) (Fig. 17) required, on the angular scale S (Fig. 14). Position the index pin of the snap lock D (Fig. 14) in the right hand hole and by unclamping the lock C1 (Fig. 16) slide the cutter unit along the guide bar until the cutter just clears the face of the grinding wheel. Adjust the handwheel Q (Fig. 16) for the length of the cutting edge required and grind the outside diameter of the cutter to +0.005" (0.12 mm) of the size required.

NOTE: After this operation is completed the micrometer drum N (Fig. 16) must not be moved until after the nose radius has been ground.

Loosen the locking handle C3 (Fig. 14) and swing the support arm R (Fig. 14) through 90°, roughly position the collet housing B (Fig. 16), by unlocking the clamping screw H (Fig. 16) and the handle C6 (Fig. 14) and moving the nose of the cutter forward until it is just clear of the grinding wheel face. Tighten the clamping screw H (Fig. 16). Advance the nose of the cutter to the face of the wheel using the knurled adjusting screw I (Fig. 16) and grind to clean up the end of the cutter to establish a datum. Lock the handle C6 (Fig. 14). Rough out the spherical nose by rotating the collar T (Fig. 16) through 360° and at the same time swinging the support arm R (Fig. 14) through 90°. Return the support arm R (Fig. 14) to the zero position so that the cutting edge is parallel to the wheel, do not tighten the locking handle C3 (Fig. 14). Finish grind the outside diameter of the cutter to +0.002" (0.05 mm) by advancing the cutter towards the wheel using the micrometer drum N (Fig. 16), at the same time swinging the support arm R (Fig. 14) through 90° and rotating the collar T (Fig. 16).

To grind the clearance angle (a) (Fig. 17) return the red dot to the window F and engage the index pin of the snap lock D (Fig. 14) in the left hand hole and grind the clearance by feeding the cutter to the wheel using the micrometer drum N (Fig. 16) and swinging the support arm R (Fig. 14) through 90°. At the same time rotate the cutter through 180° until a small land is formed on the cutter. Then advance the micrometer drum N (Fig. 16) by 0.0005" (0.01 mm) increments until the land just disappears and a sharp edge is obtained. Advance another 0.0005" (0.01 mm) to take a finishing cut.

NOTE: If the flat of the cutter is above centre line the cutter must not be rotated through more than 90° when the cutter is parallel to axis of the wheel. Otherwise a second, negative, clearance angle will be formed on the other edge. When the cutter is moved away from the parallel position the cutter may be rotated through 180°.

E. Taper Sided Round Nose Cutter (Figs. 18, 19, 20 and 21)

Formula X = R - r (Fig. 20)
Radius r = Radius Required
X = Distance moved by micrometer drum N (Fig. 18)

After halving and setting the cutter (as described on page 2) check that all readings are set to zero. Unclamp the lock C1 (Fig. 18) and slide the cutter unit along the guide bar until the cutter almost touches the wheel then reclamp C1 (Fig. 18). Set the stop Q (Fig. 18) to give adequate movement of the cutter across the face of the wheel. Then with the micrometer drum N (Fig. 18) move the cutter to touch on the side of the wheel and set the adjustable micrometer drum scale P (Fig. 18) to zero. Move the cutter to the left by the amount X (Fig. 20) using the micrometer drum N (Fig. 18) and reset the micrometer drum scale P (Fig. 18) to zero. Unclamp the lock C3 (Fig. 21) and swing the support arm R (Fig. 21) through 90°, roughly position the collet housing B (Fig. 18) by unclamping screw H (Fig. 18) and handle C6 (Fig. 21) so that the cutter is just clear of the wheel face. Tighten the clamping screw H (Fig. 18). Advance the nose of the cutter using the knurled adjusting screw I (Fig. 18) until it touches the face of the wheel, lock the handle C6 (Fig. 21). Return the support R (Fig. 21) to the original zero position and set the taper angle required by unlocking the handle C3 (Fig. 21) and pushing the graduated collar O (Fig. 18) in a clockwise direction against its stop, and then swing the support arm R (Fig. 21) anti-clockwise to set half the angle of taper (e) (Fig. 20) and lock in this position by locking the handle C4 (Fig. 18). Reset the stop (Q) (Fig. 18) to give adequate movement of the cutter across the face of the wheel.

Feed the micrometer drum N (Fig. 18) back until the cutter is clear of the wheel. Place the index pin of the snap lock D (Fig. 21) in right hand hole and advance the cutter using the micrometer drum N(Fig. 18) and rough out the form to +0.002" (0.05 mm) of diameter by rotating the collar T (Fig. 18) through 360° and swinging the support arm R (Fig. 21) to the limit of both stops.

Clearance Angle (a) (Fig. 20)

Unclamp the lock C2 (Fig. 18) and with the angular scale S (Fig. 21) set the swivel arm to the clearance angle (a)(Fig. 20) required and lock C2 (Fig. 18). Return the red dot to the window F (Fig. 18) and engage the index pin of the snap lock D (Fig. 21) into the left hand hole to enable the collet bearing to be rotated through 180° between stops. Take a light cut along the tapered face of cutter to produce a parallel land. It is possible that at this angle the land is not parallel so that a further adjustment of the swinging support arm R (Fig. 21) is necessary (see Fig. 19). Grind the clearance angle by feeding in with micrometer drum N (Fig. 18) until a small land is left at the cutting edge. Advance by 0.001" (0.025 mm) increments until the small land is almost gone. Then move by 0.0005" (0.01 mm) increments until a sharp edge is obtained. Advance another 0.0005" (0.01 mm) and take a finishing cut on the form. For secondary clearance angles see note on page 6.

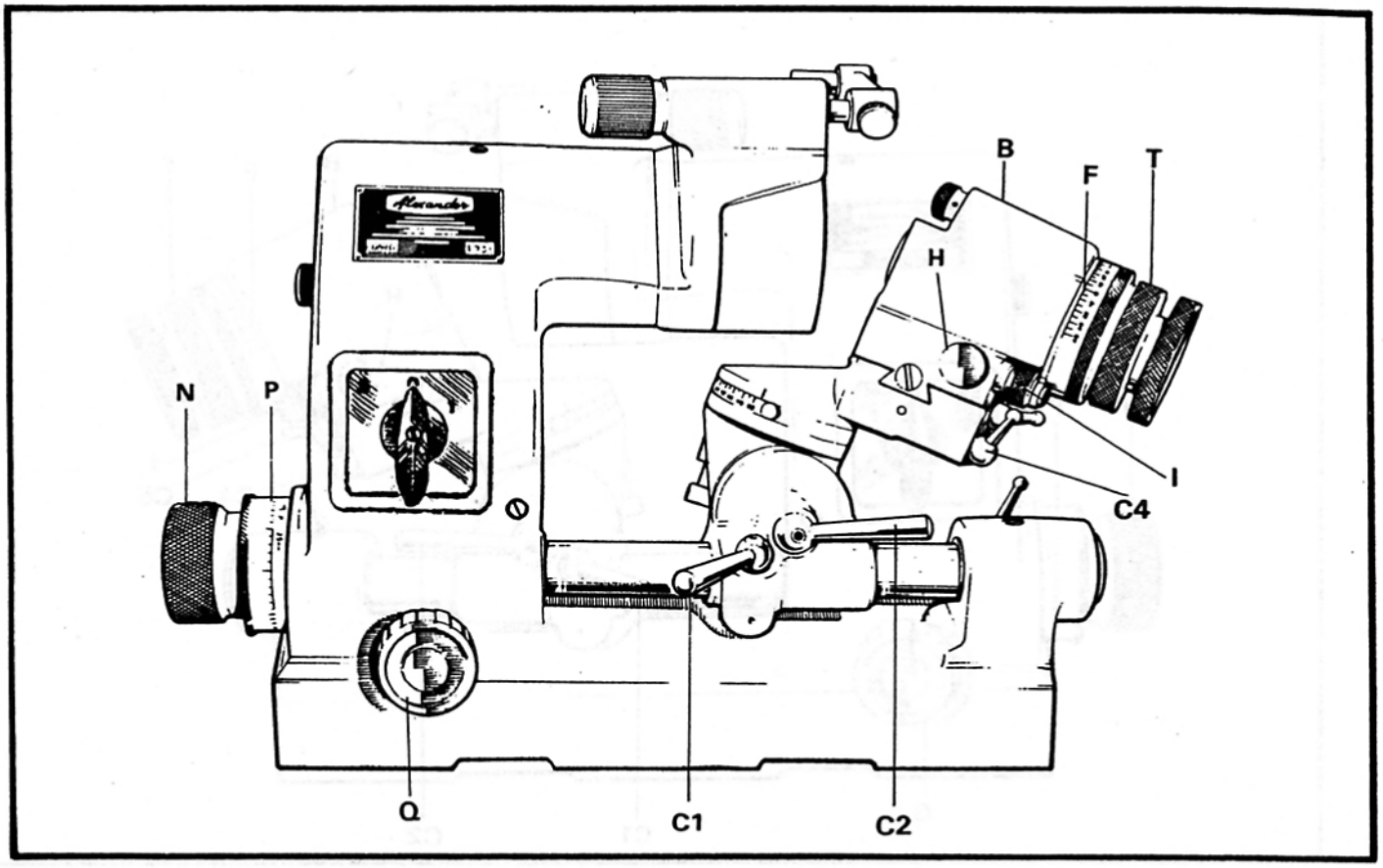


FIG. 18

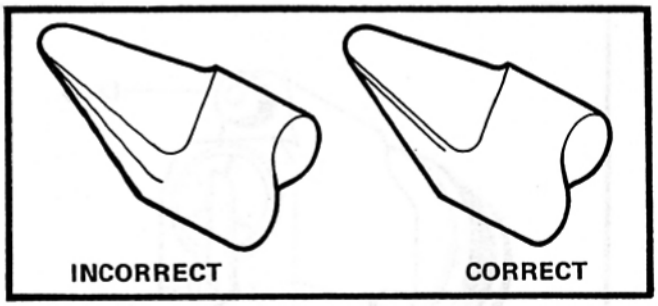


FIG. 19

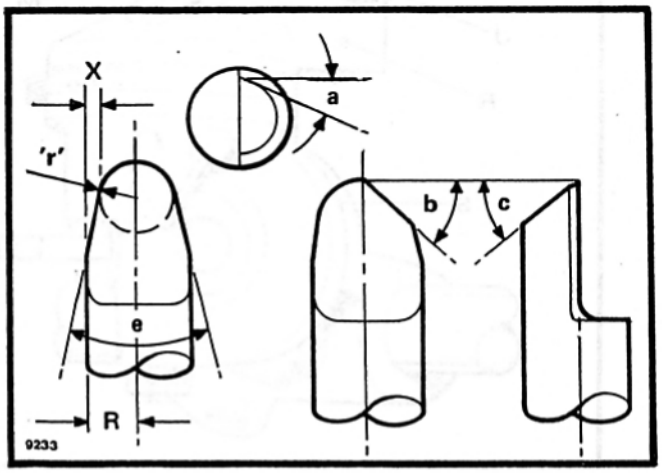


FIG. 20

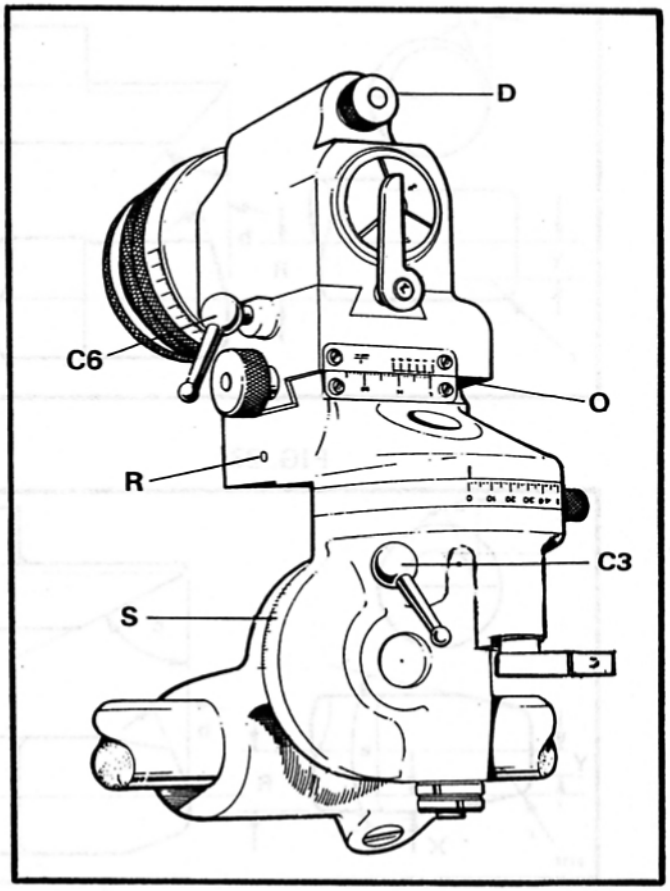


FIG. 21

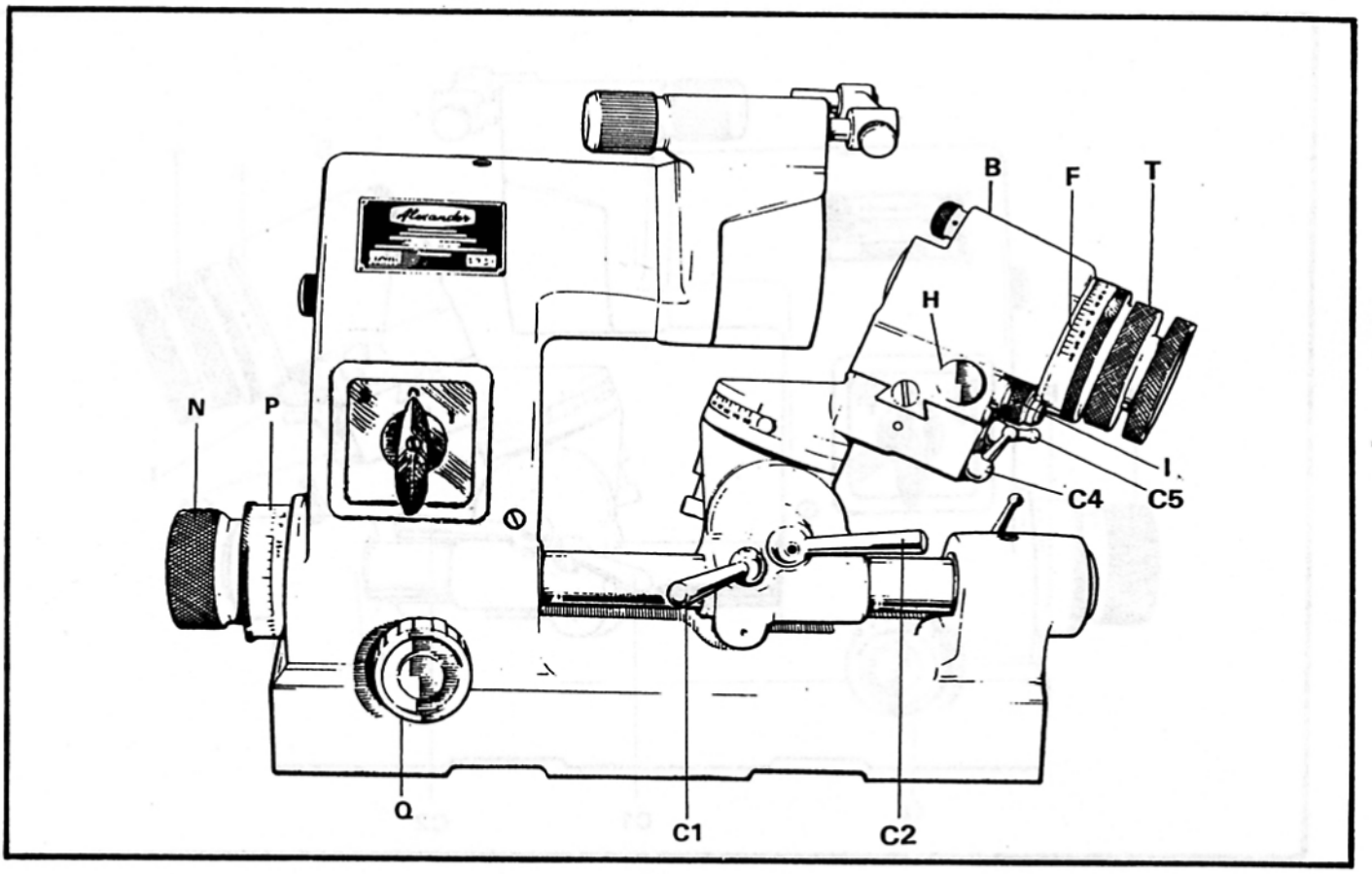


FIG. 22

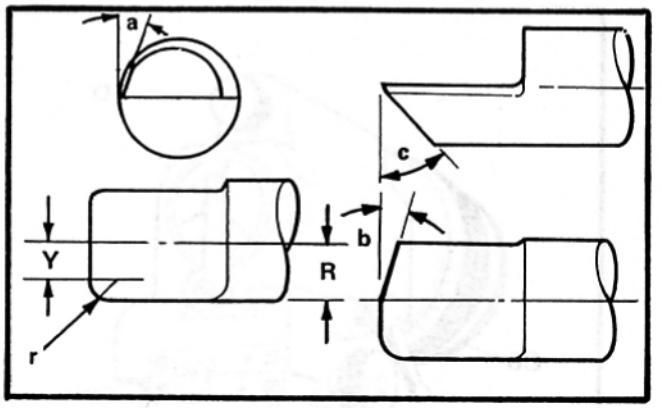


FIG. 23

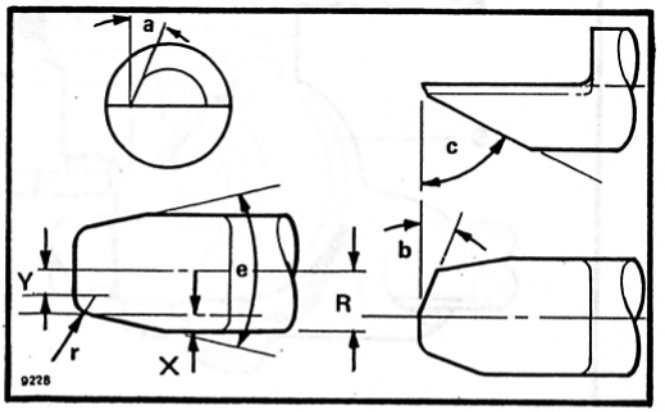


FIG. 24

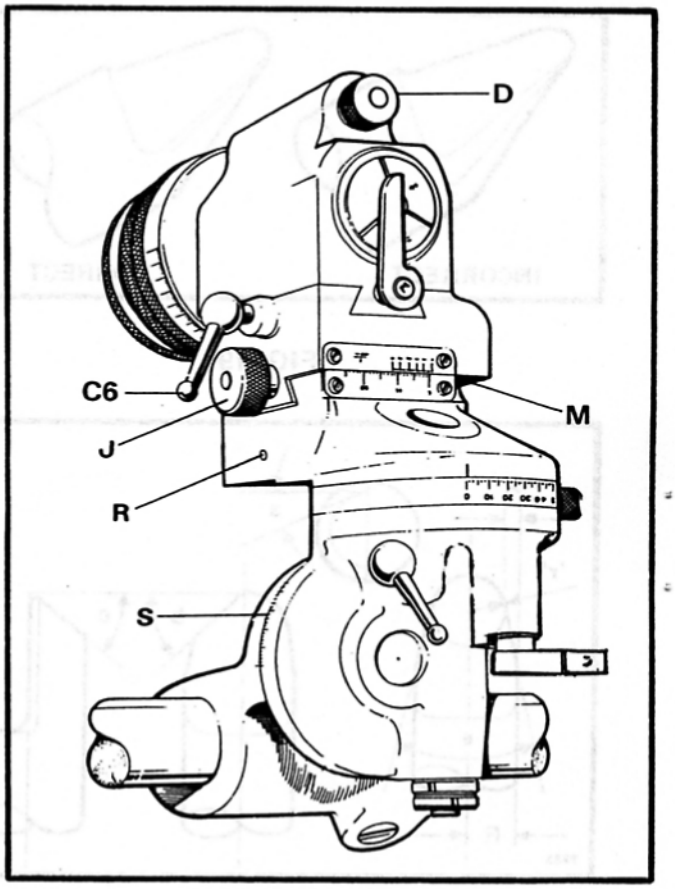


FIG. 25

F. Off-Set Radius Cutter (Figs. 22, 23, 25)

Formula Y = R - r

After halving and setting the cutter (as described on page 2) check that all readings are set to zero. Loosen the locking handle C5 (Fig. 22) and with the knurled ring J (Fig. 25) move the slide to the right to set the distance Y (Fig. 23) on the vernier. Place the index pin of the snap lock D (Fig. 25) in the right hand hole and grind the outside diameter to the size +0.005" (0.1 mm). Swing the support arm R (Fig. 25) through 90°, roughly position the collet housing B (Fig. 22) by unlocking the screw H (Fig. 22) and the handle C6 (Fig. 25) until its tip is just clear of the wheel face. Tighten the clamping screw H (Fig. 22). Move the nose of the cutter in to touch the face of the wheel to establish a datum using the adjusting screw I (Fig. 22), then lock the handle C6 (Fig. 25). Set the stop Q (Fig. 22) to give sufficient movement of the cutter across the face of the wheel. Rough out the form by swinging the support arm R (Fig. 25) through 90° and rotating the collar T (Fig. 22) through 360° until within +0.002" (0.05 mm) on diameter. Return the red dot to the window F (Fig. 22) and engage the index pin of the snap lock D (Fig. 25) in the left hand hole. Unclamp the lock C2 (Fig. 22) and using the angular scale S (Fig. 25) set the swivel arm to the clearance angle (a) (Fig. 23) required and lock C2 (Fig. 22). Reset the stop Q and grind the clearance angle by feeding in the micrometer drum N (Fig. 22) until a small land can be seen at the cutting edge. Advance by 0.001" (0.02 mm) increments until the land almost disappears. Then move by 0.0005" (0.01 mm) increments until a sharp edge is obtained. Advance another 0.0005" (0.01 mm) and take a finishing cut off the form. For secondary clearance angles see the note on page 6 and Fig. 23.

G. Tapered Off-Set Radius Cutter (Figs. 22, 24, 25)

Formula Dim. X = R - (r + Y)

After halving and setting the cutter (as described on page 2) check that all the angular readings are set to zero. Loosen the locking handle C5 (Fig. 22) and with the knurled ring J (Fig. 25) move the slide to the right by Y (Fig. 24) dimension seen on the vernier M (Fig. 25). Unclamp C1 (Fig. 22) and slide the cutter unit along the guide bar until the cutter almost touches the wheel and then reclamp C1 (Fig. 22). Set the stop Q (Fig.22) to give adequate movement of the cutter across the face of the wheel. Using the micrometer drum N (Fig. 22) bring the cutter into light contact with the wheel and set the adjustable micrometer drum P (Fig. 22) to zero. Adjust the cutter unit and bar slide to the left by the amount X (Fig. 24) using the micrometer drum N (Fig. 22), and reset the dial P (Fig. 22) to zero.

Example: R = 0.125", r = 0.050" and Y = 0.030"
Dim. X = R - (r + Y)
= 0.125" - (0.050" + 0.030")
= 0.045"

or

R = 3 mm, r = 1 mm, Y = 1 mm
Dim. X = 3 - (1 + 1)
= 1 mm

Swing the support arm R (Fig. 25) through 90°, roughly position the collet housing B (Fig. 22) by unlocking the screw H (Fig. 22) and handle C6 (Fig. 25) so that the nose of the cutter is just clear of the wheel. Tighten the clamping screw H (Fig. 22). Bring the nose of the cutter up to touch the face of the wheel using the adjusting screw I (Fig. 22) to establish a datum and lock handle C6 (Fig. 25). Return the support arm R (Fig. 25) to its original zero position, and set to half the angle of taper (e) (Fig. 24) by unlocking the handle C3 (Fig. 22) and pushing the graduated collar O (Fig. 22) in a clockwise direction against its stop and then swinging the support arm R (Fig. 25) to half the angle of taper and lock in this position with the handle C4 (Fig. 22). Feed the micrometer drum N (Fig. 22) back until the cutter is clear of the wheel. Re-set the stop Q (Fig. 22) to allow adequate movement of the cutter across the face of the wheel. Engage the index pin of the snap lock D (Fig. 25) in the right hand hole and grind the form of the cutter by swinging the support arm R (Fig. 25) between stops and rotating the collar T (Fig. 22) through 360° to within + 0.002" (0.05 mm) of the diameter. Unclamp the lock C2 (Fig. 22) and, with the angular scale S (Fig. 25), set the swivel arm to the clearance angle (a) (Fig. 24) required and reclamp C2 (Fig. 22). Return the red dot to the window F and engage the index pin of the snap lock in the left hand hole. Take a light cut along the tapered face of the cutte produce a land. It is possible that at this angle the land is not parallel so that a further adjustment of the swing support arm R (Fig. 25) is necessary. Figure 19 shows a similar example. Grind the clearance angle by feeding with the micrometer N (Fig. 22) until a small land is left at the cutting edge. Advance by 0.001" (0.025 mm) increments until the land has almost disappeared. Then move the cutter by 0.0005" (0.01 mm) increments un sharp edge is obtained. Advance another 0.0005" (0.01 mm) and take a finishing cut on the form. For second clearance angles see the note on page 6.

H. Triangular Parallel Sides (Figs. 26, 27, 28 and 29)

Place the index pin of the snap lock D (Fig. 26) in the centre hole. Check that all readings are set to zero. Unclamp the locking handle C1 (Fig. 26) and slide the cutter unit along the guide bar until the cutter almost touches the grinding wheel, then reclamp C1 (Fig. 26). Using the handwheel Q (Fig. 26) set the length of the cutting edge required. Advance the cutter by using the micrometer drum N (Fig. 26) to touch the side of the grinding wheel and grind a small flat along the length of the cutter.

Index the collar T (Fig. 26) through 120°, by pulling out the snap lock D and allowing it to snap back into Four slots in turn in the Index Plate. The fourth slot is 120° to the first.

Example: The index plate has twelve slots. Therefore one slot will turn the cutter housing through $\frac{360^{o}}{12} = 30^{o}$

Four slots will turn the cutter housing through $30^{o} \times 4 = 120^{o}$.

After rotating the collet housing through 120° grind a second small flat, repeat this operation to grind the third flat and then continue the grinding operations until the cutter is roughed out.

NOTE: The dimension of the finished cutter from base to apex is 3/4 of the cutter diameter.

Example: If the diameter of the cutter is 0.100" (4 mm), the distance from the base to apex is 0.075" (3 mm).

Finish grind the cutter to the required size. This leaves the cutter with three cutting edges. If only one cutting edge is required use the micrometer drum to feed one face of the cutter 0.0005" (0.01 mm) in to the wheel so that 2 cutting edges are reduced. Back off the bottom of the cutter away from the cutting edge to give the angle (b) (Fig. 27).

NOTE: If three cutting faces are required, back off to any one cutting edge (see Fig. 27).

A relieved grinding wheel will cut down overheating and make it easier to produce parallel flats on the cutter.

I. Pointed Tapered Three Sided Cutter

Insert the cutter in the collet and make sure all the readings are set to zero. Unclamp the lock C3 (Fig. 26) and swing the support arm R (Fig. 26) to half the required angle of the cutter and reclamp. Place the index pin of snap lock D (Fig. 26) in the right hand hole and grind the outside diameter of the cutter to size. Rotate the collar T (Fig. 26) until any slot in index plate is vertical and drop the snap lock D (Fig. 26) into the centre hole and commence grinding small flat along the length of the cutter. It will be seen that the land D (Fig. 26) is not parallel to the tapered diameter of cutter. Reduce the angle of the support arm R (Fig. 26) and regrind the flat until a parallel land is obtained. Grind the flats to a knife edge following the same procedure as that used for the triangular parallel sided cutter.

J. Tapered Four Sided Cutter

This cutter is produced in a way similar to the above cutter, but the index collar T (Fig. 26) is only swung through 90° instead of 120°. The cutting point can be formed in two ways:

1. Lightly stone across the two edges to form a small chisel point (Fig. 28).
2. Stone a small radius on two edges (see Fig. 29).

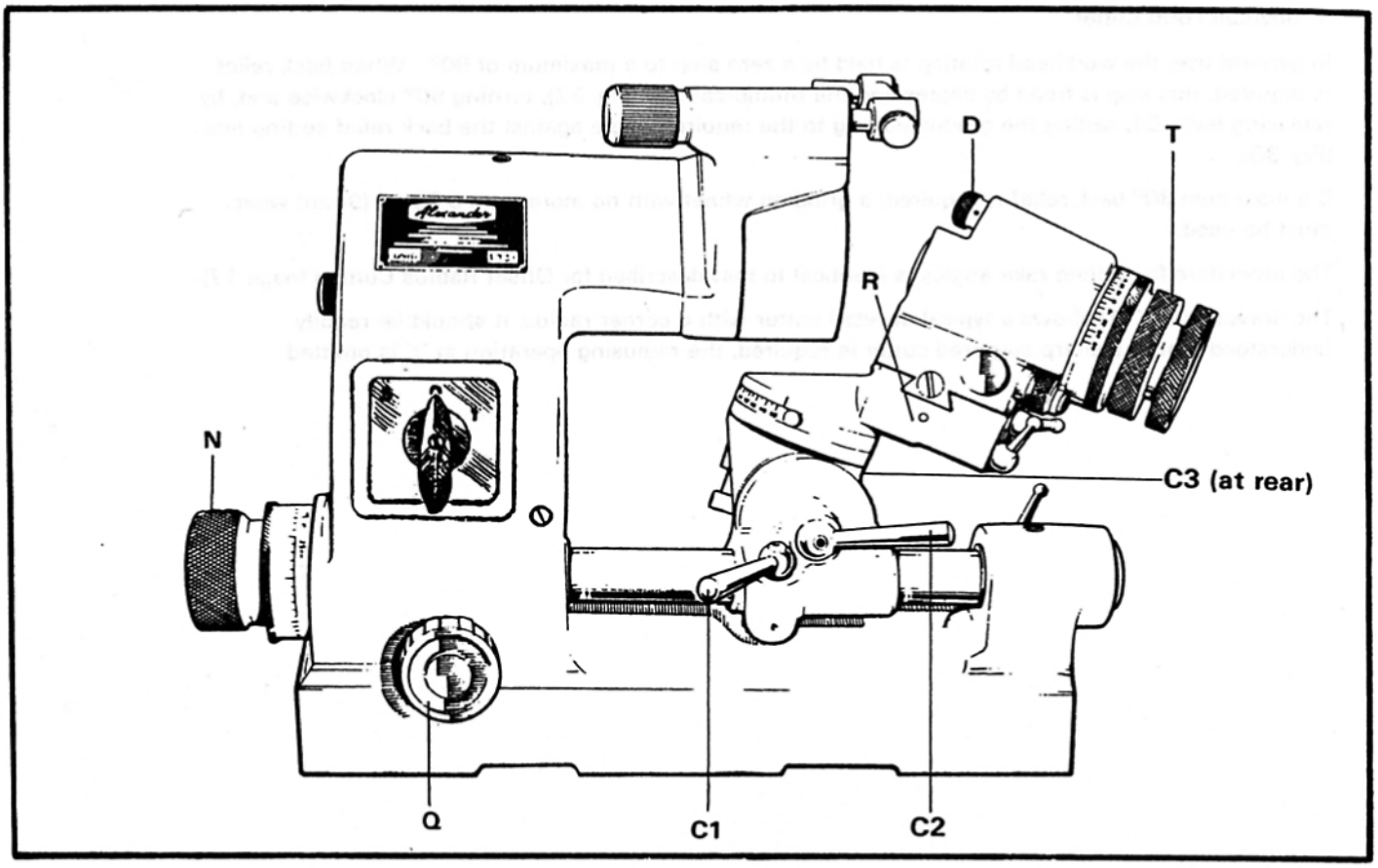


FIG. 26

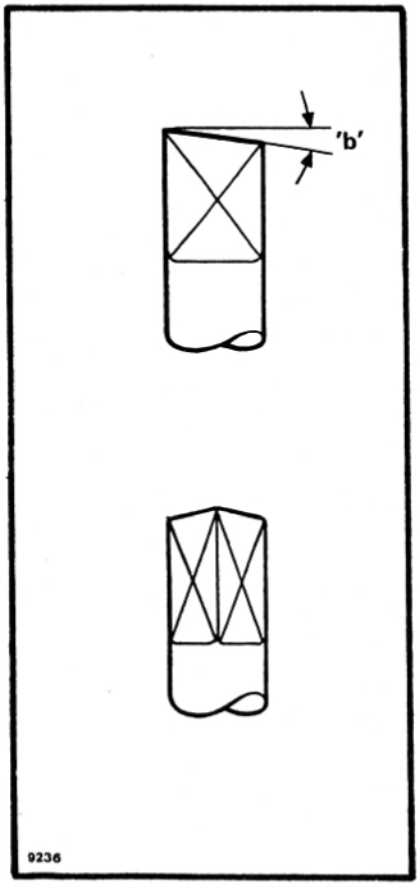


FIG. 27

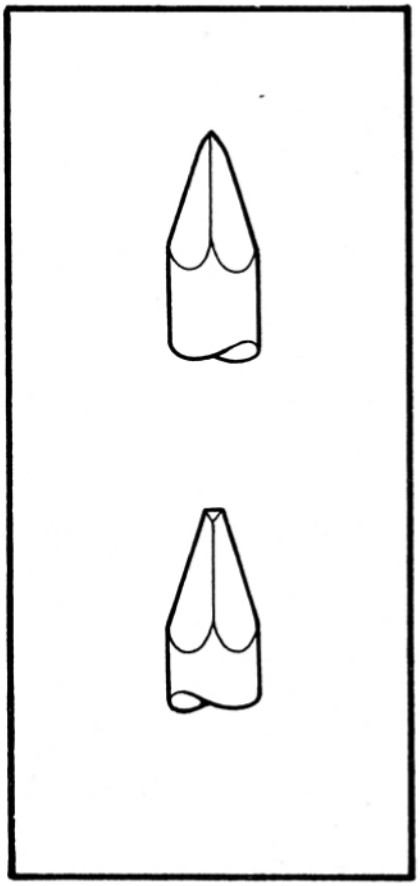


FIG. 28

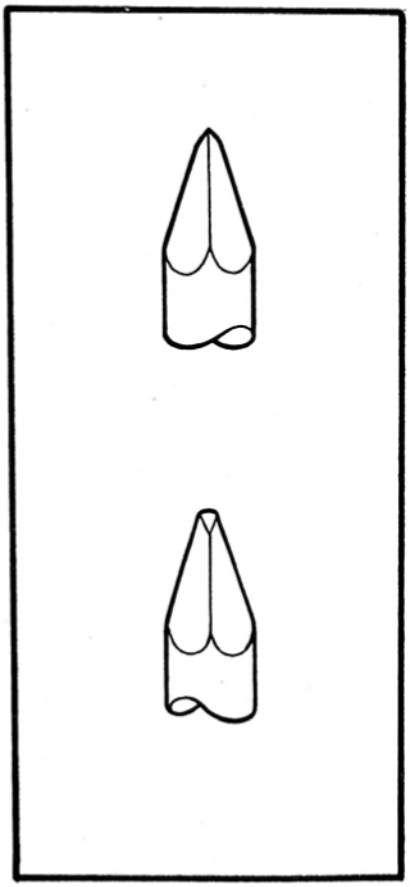


FIG. 29

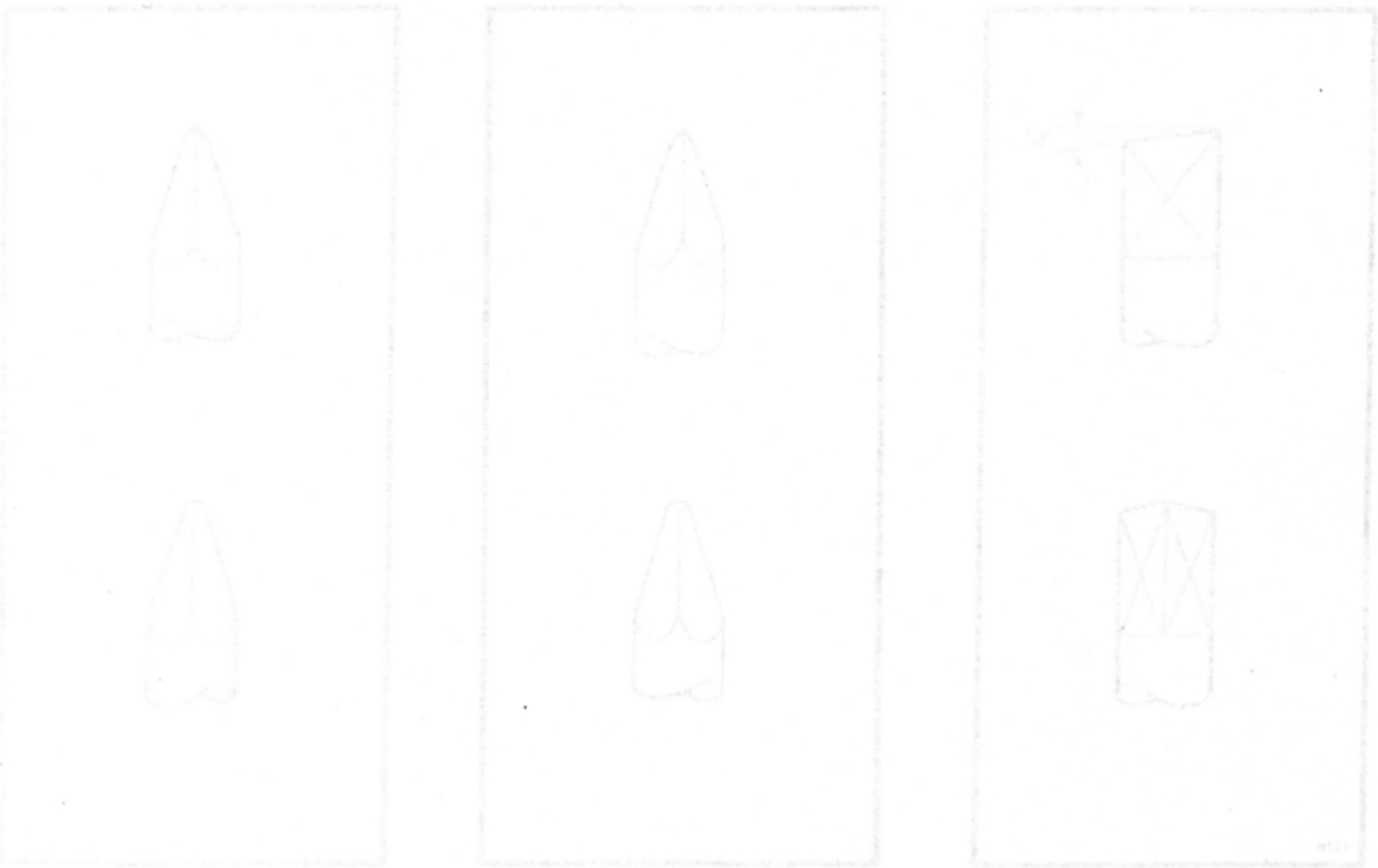
K. Dovetail Form Cutter

In general use, the workhead rotation is held by a zero stop to a maximum of 90° . When back relief is required, this stop is freed by depressing the thumb-catch Z (Fig. 32), turning 90° clockwise and, by releasing lever C4, setting the graduated ring to the required angle against the back relief setting line (Fig. 30).

If a maximum 30° back relief is required, a grinding wheel with no more than 0.35 in. (9mm) wear must be used.

The procedure for setting rake angles is identical to that described for Offset Radius Cutters (page 17).

The drawing (Fig. 31) shows a typical dovetail cutter with a corner radius. It should be readily understood that, if a sharp cornered cutter is required, the radiusing operation at 'r' is omitted.



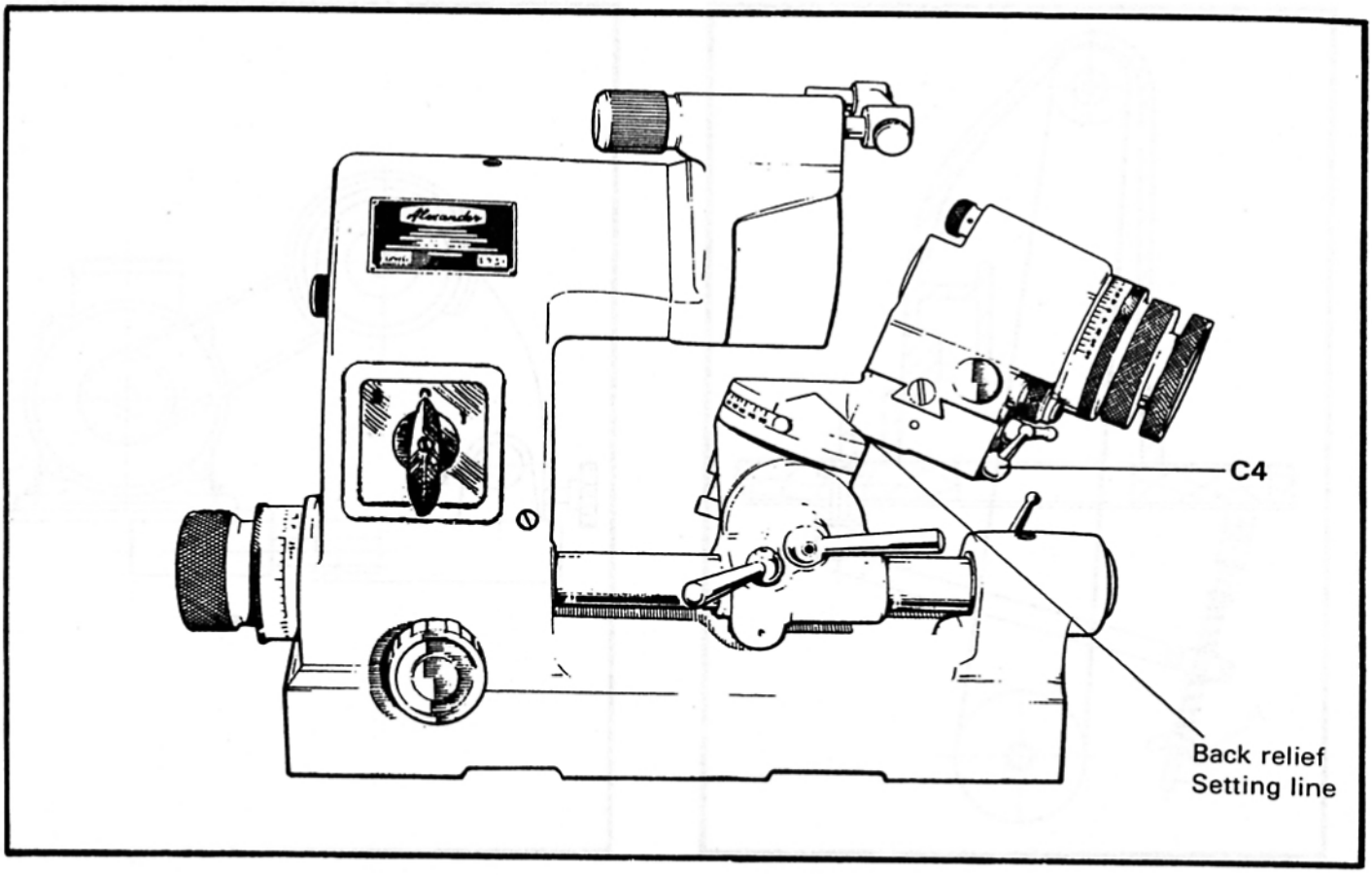


FIG. 30

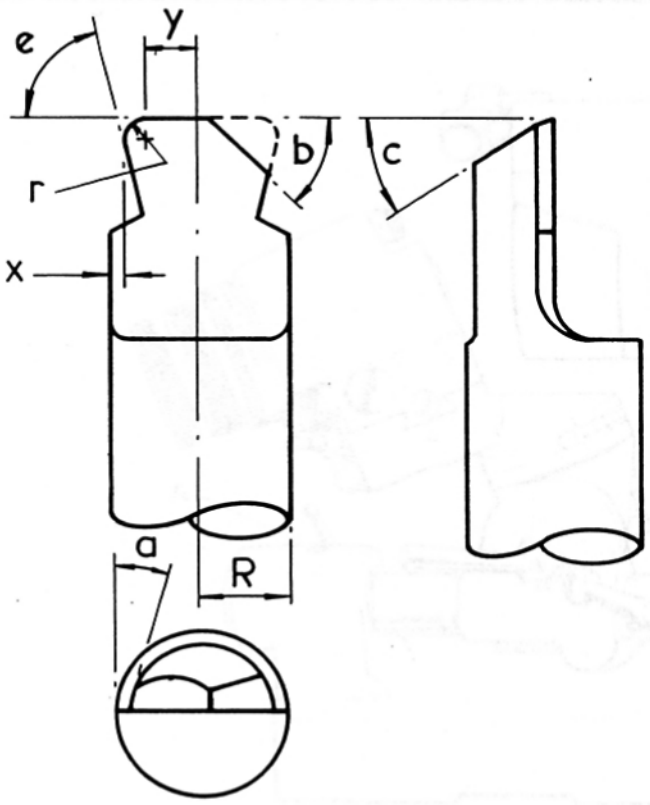


FIG. 31

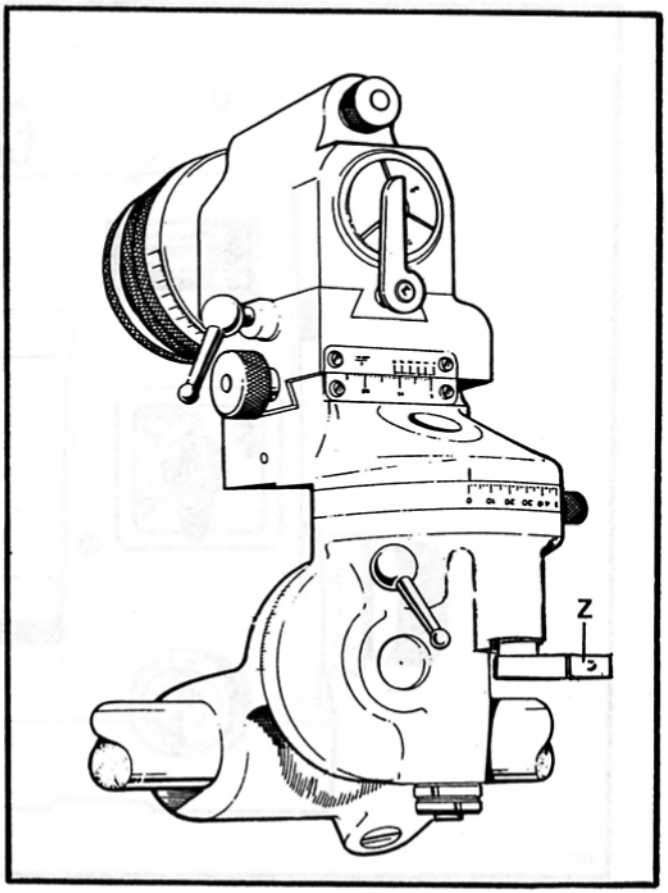


FIG. 32

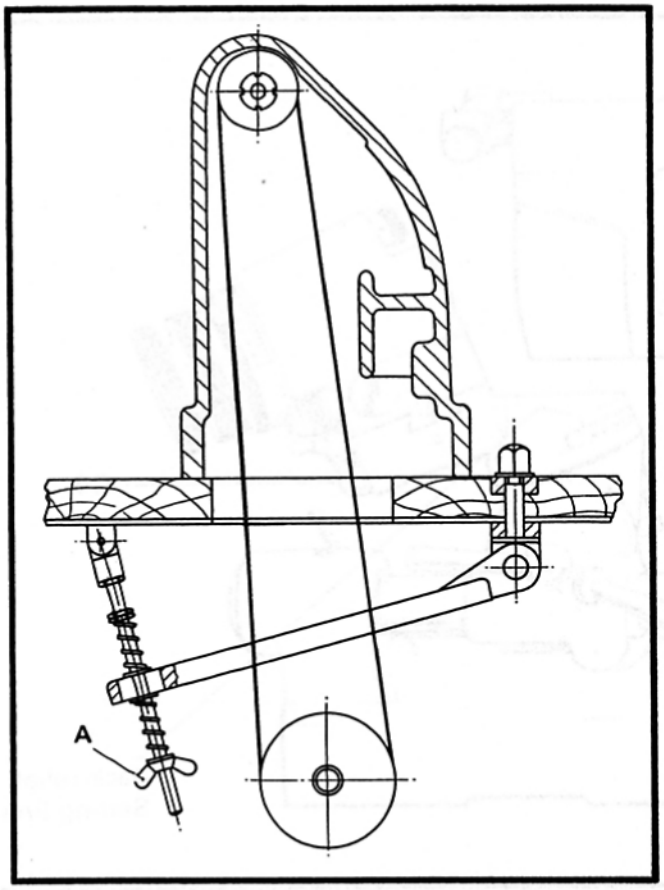


FIG. 33

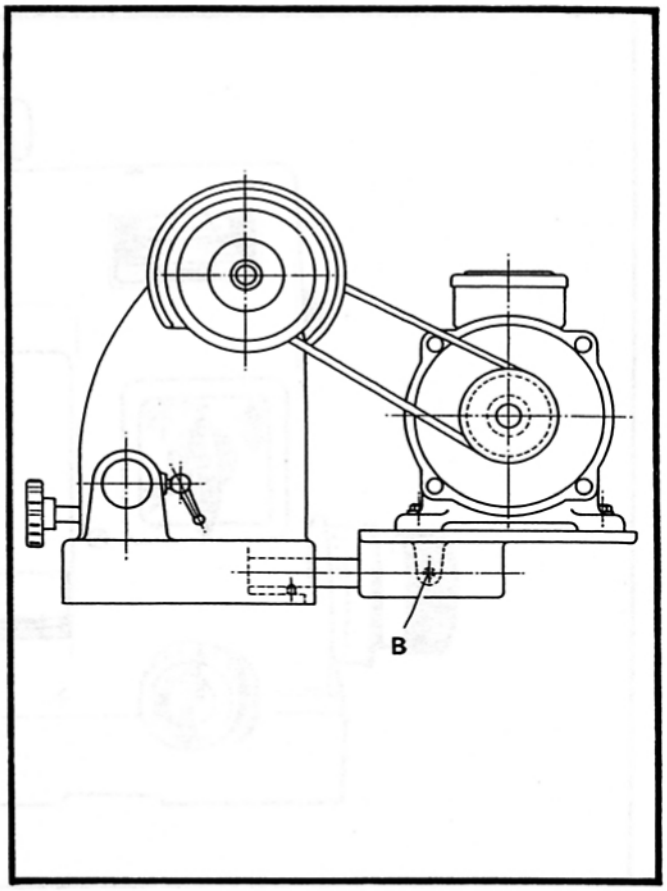


FIG. 34

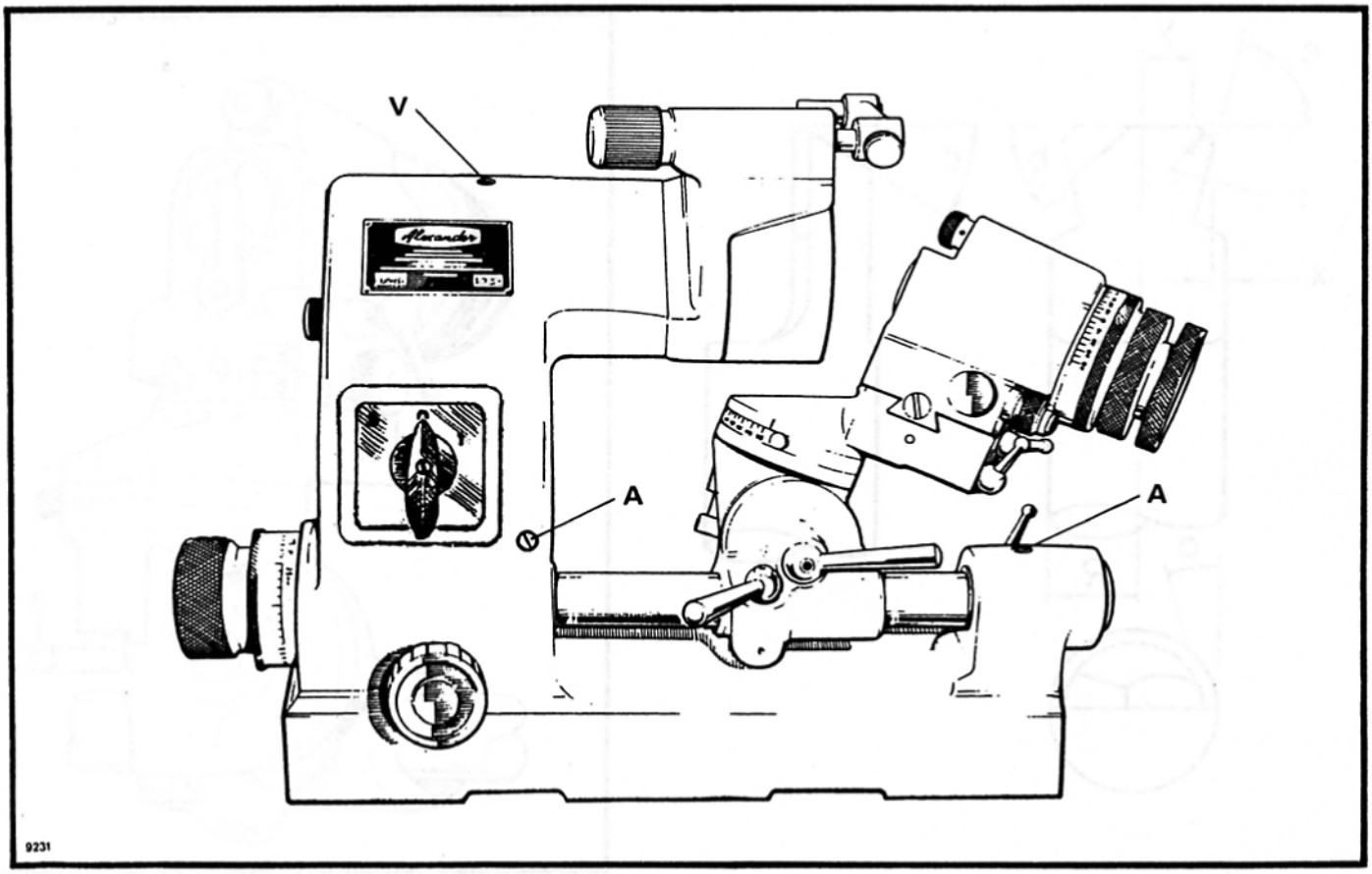


FIG. 35

CHANGING BELTS

Cabinet Type (Fig. 33) Flat Belt Drive

Pull out the cover plate at the left hand side of the main casting to gain access to the spindle pulley. Open the cabinet door and screw in the wing nut A (Fig. 33) until the belt is slack. Remove the belt and place a new belt over the spindle pulley. From inside the cabinet pull the belt through and place it on the motor pulley. Unscrew the wing nut A (Fig. 33) to tension the belt.

Bench type (Fig. 34)Round Belt Drive

Unclamp the screw B (Fig. 34) and move the motor platform towards the cutter grinder unit to slacken the belt. Unclamp the screw (V) (Fig. 35) in the top of the main casting and remove the spindle pulley and replace the spindle in its housing and lock in position. Place the belt over the motor pulley and tension the belt by moving the motor platform away from the cutter grinder. Reclamp the screw B (Fig. 34).

LUBRICATION (Fig. 35)

Point A Use good quality Spindle Oil (one shot every 3 months).

REMOVING AND FITTING THE GRINDING WHEEL (Figs. 36 and 37)

To remove a grinding wheel undo the hexagon nut G (Figs. 36 and 37) and remove the threaded flange plate D (Figs. 36 and 37) using the box spanner and pin spanners supplied with the grinder. If replacement wheels complete with flanges are available it is only necessary to undo the hexagonal nut G (Figs. 36 and 37). The wheel and flange can be removed together.

Bench Type (Fig. 36)

Place the wheel (A) (Fig. 36) complete with its cardboard washers onto the flange (B) (Fig. 36). Fit the tab washer (C) (Fig. 36) and secure the assembly with the threaded flange plate (D) (Fig. 36). Assemble the complete wheel and flange unit on the spindle (E) (Fig.36) and make sure that the locating pin (F) (Fig. 36) is properly seated in the machined slot in the spindle and that the pin (J) (Fig. 36) is seated in the pulley (H) (Fig. 36). Secure the complete unit to the spindle with hexagonal nut (G) (Fig. 36).

Cabinet Type (Fig. 37)

Place the wheel (A) (Fig. 37) complete with cardboard washers on the flange (B) (Fig. 37). Fit the tab washer (C) (Fig. 37) and secure the assembly with the threaded flange plate (D) (Fig. 37). Assemble the complete wheel and flange unit to the spindle (E) (Fig. 37) and make sure that the locating pin (F) (Fig. 37) is properly seated in the machined slot in the spindle (E) (Fig. 37). Secure with the hexagonal nut (G) (Fig. 37).

SERVICING THE INDEX HEAD BRACKET (Fig. 38)

After a considerable length of time it will be necessary to clean and lubricate the index head bracket. The following paragraphs tell how to dismantle the items that will need attention:

Collet Sleeve Bearing

In the following order remove the collet (A) (Fig. 38), collet nut (B) (Fig. 38), ring nut (C) (Fig.38), micrometer drum (D) (Fig. 38) and index ring (E) (Fig. 38). Remove the two lock nuts (F) (Fig. 38) and pull out the collet sleeve (G) (Fig. 38). Clean out the collet sleeve (G) (Fig. 38) and the collet housing (H) (Fig. 38) with paraffin. Re-pack the collet sleeve recess with grease and reassemble.

Slides

Release the clamping lever (J) (Fig. 38) and remove the screw (K) (Fig. 38). This will enable the collet housing (H) (Fig. 38) to be removed. Clean all the bearing surfaces, lightly oil and wipe. The cross-slide (L) (Fig. 38) cannot be removed, move it to its extreme position by releasing the clamping screw (M) (Fig. 38) and turning the screw (N) (Fig. 38). Clean all the bearing surfaces, lightly oil and wipe dry.

Swivel Arm

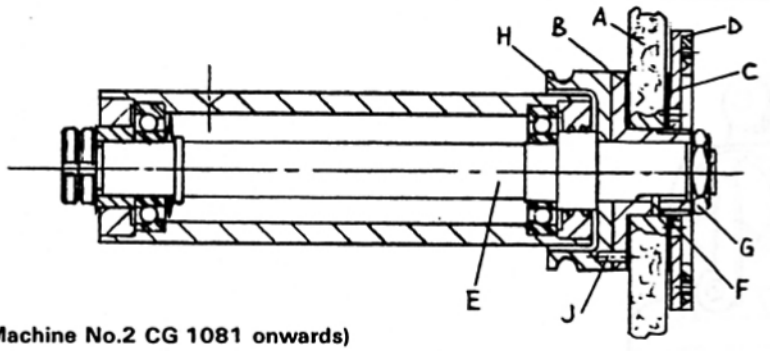
The swivel arm can be removed by unlocking the two nuts (O) (Fig. 38). Clean the bearing surfaces and lightly oil.

Adjusting the Clamping Mechanism of Index Drum (P) (Fig. 38)

If the clamping lever (Q) (Fig. 38) will not lock, the swivel arm index drum (P) (Fig. 38) and the screw (R) (Fig. 38) will have to be adjusted. Remove the swivel arm by unlocking the two nuts (O) (Fig. 38), then remove the screw (S) (Fig. 38), stop plate (T) (Fig. 38) and release the screw (U) (Fig. 38). Pull out the clamping lever (Q) (Fig. 38) and remove the index drum (P) (Fig. 38) to uncover the adjusting nut (V) (Fig. 38) and the screw (R) (Fig. 38). Remove these two details (V and R) (Fig. 38) and reduce the screw relative to the nut by rotating it through 180° .Use the reverse procedure for reassembly.

ADJUSTING THE STOP PINS FOR 90° SWIVEL

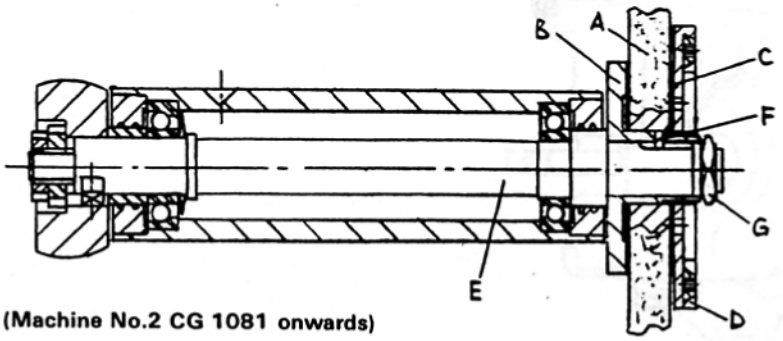
Because the stop plate (T) (Fig. 38) is frequently striking the stop pins (W) (Fig. 38) the swivel range may after some time exceed 90°. To correct this turn the eccentric stop pins (W) (Fig. 38). Adjust the cylindrical setting stop pin first and then the swivel motion stop pin.



D3000 Series (Machine No.2 CG 1081 onwards)

BENCH MODEL

FIG. 36



CTA 200 Series (Machine No.2 CG 1081 onwards)

CABINET MODEL

FIG. 37

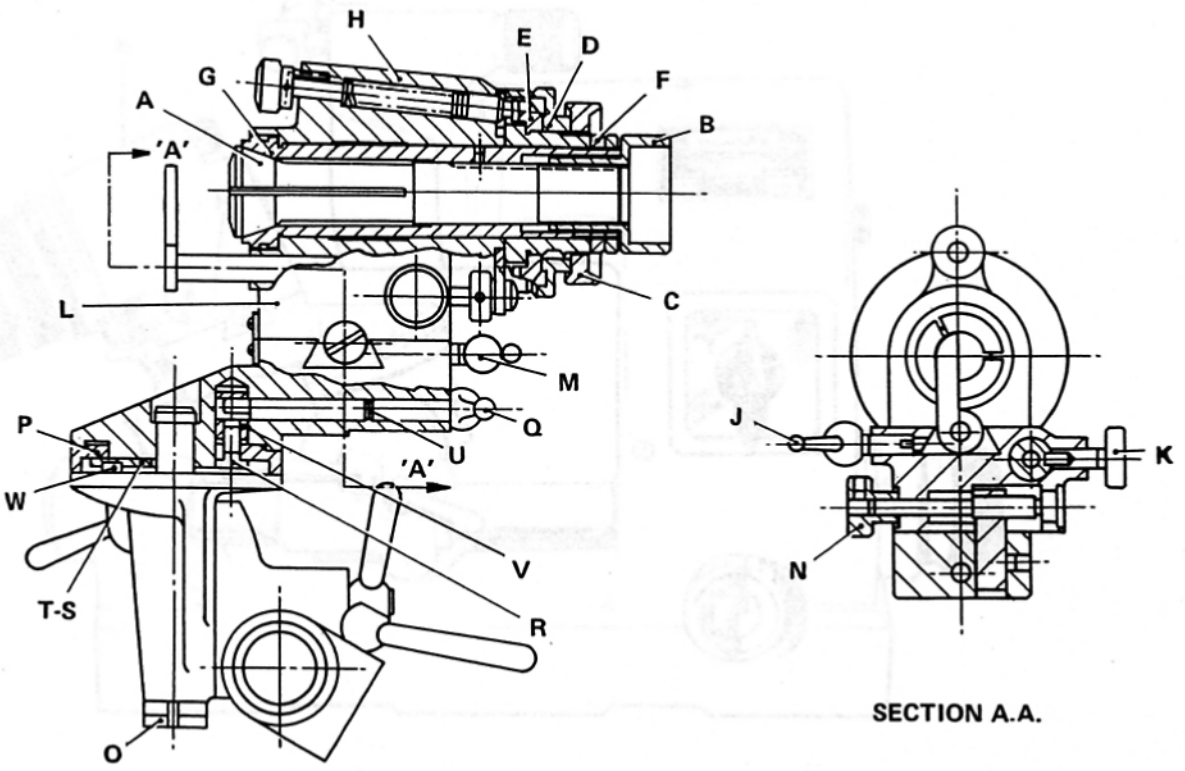


FIG. 38

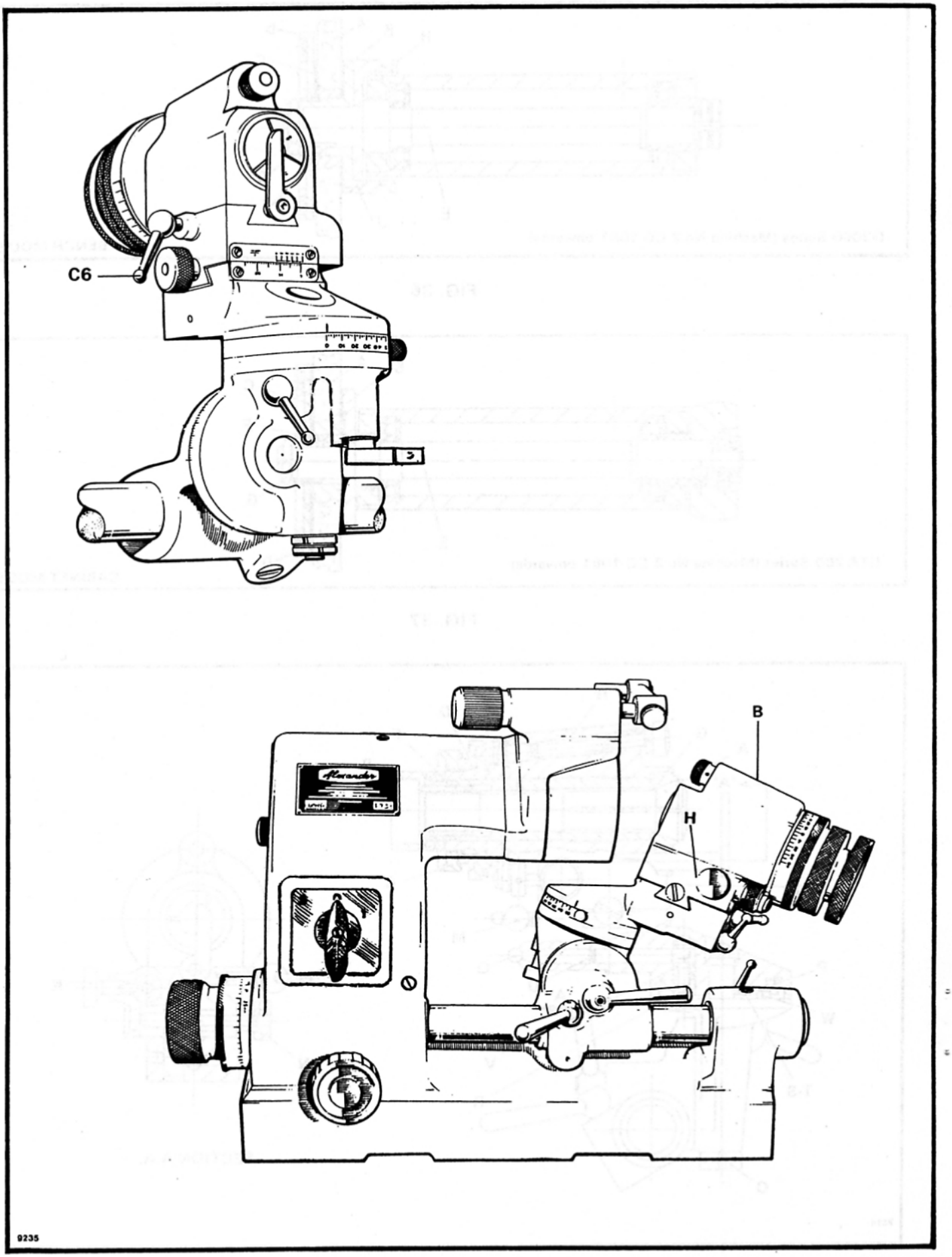


FIG. 39

HOUSING FOR CUTTER SPINDLE (Replaces Collet Housing B (Fig. 39).

This housing allows for single lip cutters to be reground while held in their engraving or diesinking spindles.

Unclamp the screw H (Fig. 39) and the handle C6 (Fig. 39), and pull the collet housing from its side. Insert the spindle housing into the slide. For grinding operations insert the spindle assembly containing the cutter into the locating fixture and clamp. The spindle is locked in the collet housing with a thumb screw.

Because the engraving and diesinking spindles are of different diameter several heads may be required. These would be matched to eliminate any inaccuracy when changing from one head to another.

CUTTER GRINDER SPECIFICATION			ENGLISH	METRIC
SPINDLE DRIVE	MOTOR CAPACITY		1/3 hp	0,25 kw
	SPINDLE SPEED		4500 rev/min	
WORK CAPACITY	MAX. COLLET CAPACITY		11/16 in	17.5 mm
	ADAPTOR SLEEVE TAPER		200/300 SERIES	
	MAX. RADIUS GROUND (WORN WHEEL PERMITS GREATER RADIUS)		11/16 in	17.5 mm
	COARSE ADJUSTMENT OF INDEX HEAD ALONG GUIDE BAR		4 in	100 mm
	MAX. MOVEMENT OF VERNIER SLIDE		0.4 in	10 mm
	MAX. LONGITUDINAL TRAVERSE OF CUTTER HOUSING		1.5 in	38 mm
	MAX. RELIEF ANGLE		40°	
	MAX. FINE ADJUSTMENT OF INDEX HEAD ALONG GUIDE BAR		0.6 in	15 mm
	NUMBER OF INDEX REGISTERS		12	
DIMENSIONS & WEIGHTS	BENCH TYPE	LENGTH X WIDTH X HEIGHT	20 x 21 x 11.1/2	508 x 533 x 292 mm
		NET WEIGHT WITH MOTOR	84 lb	38 kg
	CABINET TYPE	LENGTH X WIDTH X HEIGHT	19 x 17 x 46 in	483 x 432 x 1168 mm
		NET WEIGHT WITH MOTOR	140 lb	65 kg

CUTTER GRINDER MICROSCOPE (Figs. 40 and 41)

This is used for checking diesinking and engraving cutters and includes an eye-piece with a line and radius graticule (Fig. 41) for checking the forms. The tool locating slide is adjusted by micrometer so that radius off-set, angles and flats can be measured. The microscope can be used to hold and inspect the cutter while it is being stoned. When angles are being checked the graticule is rotated until it lines up with the angle of the cutter and then a reading is taken on the graduations round the eye piece mount.

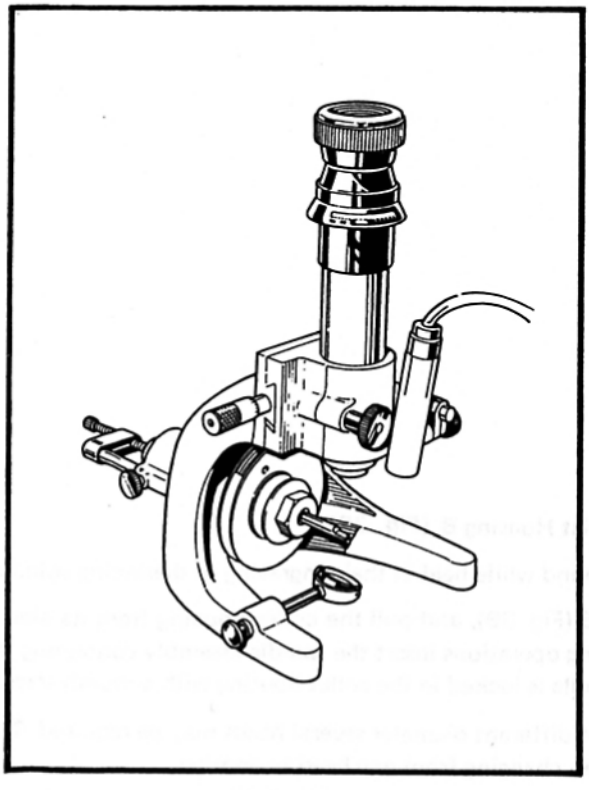


FIG. 40

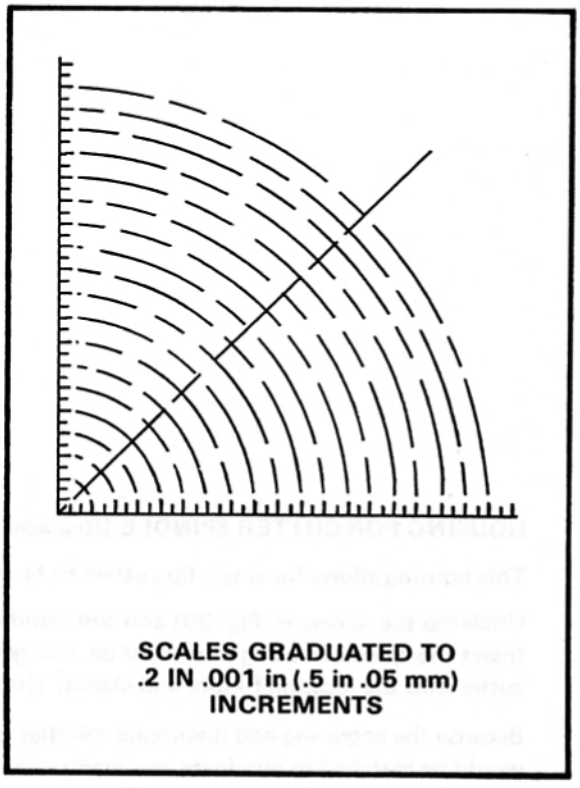


FIG. 41

Alexander

ALEXANDER
CUTTER GRINDERS

PARTS CATALOGUE

7808

Manufactured by:

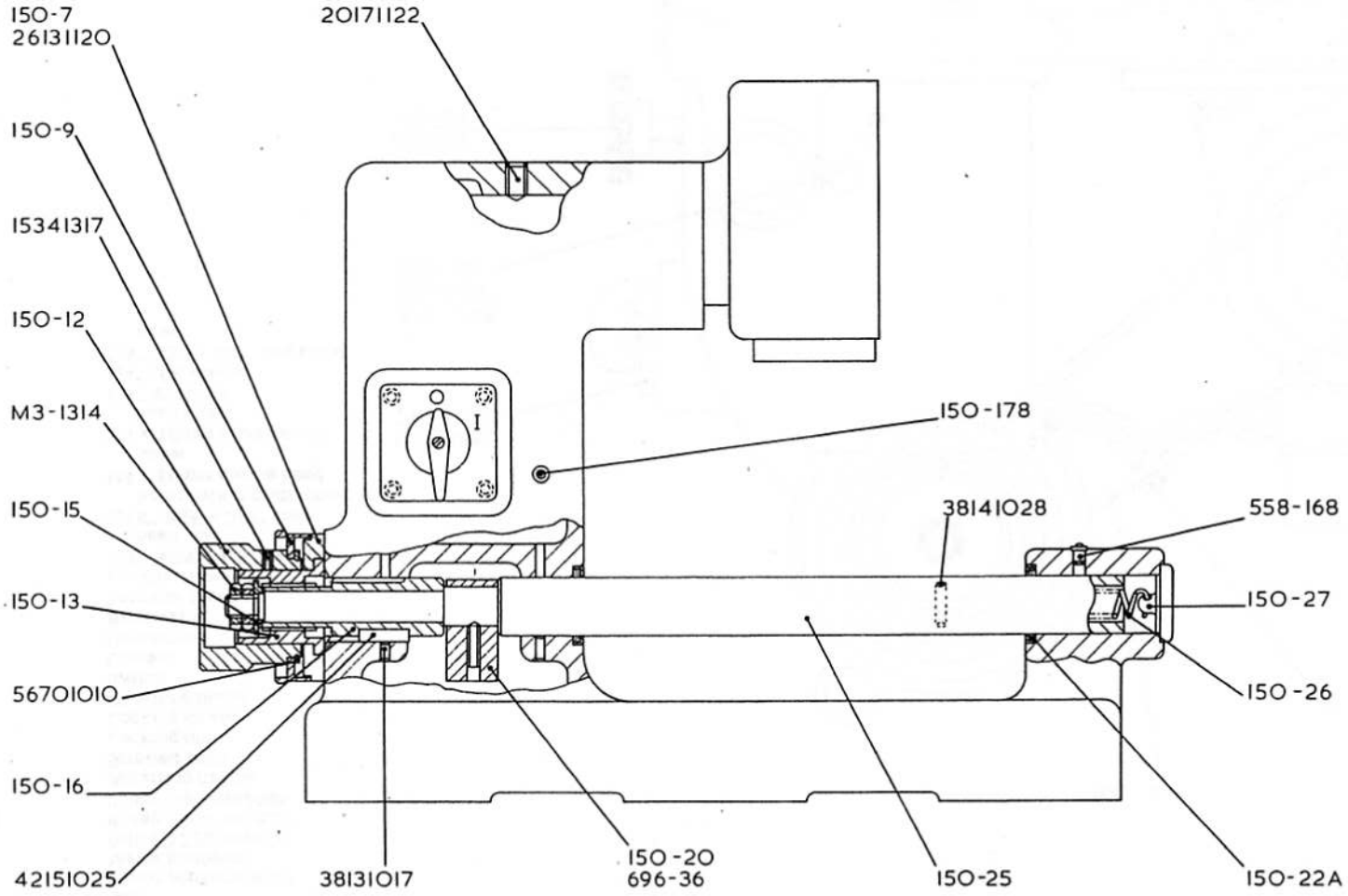
PRECISION GRINDING LIMITED
Mill Green Road, Mitcham Junction, Surrey CR4 4TX

Telephone: 01-648 9461
Telex: 946210
Telegrams: Precision Mitcham

A COUBRO + SCRUTTON COMPANY

Printed in England

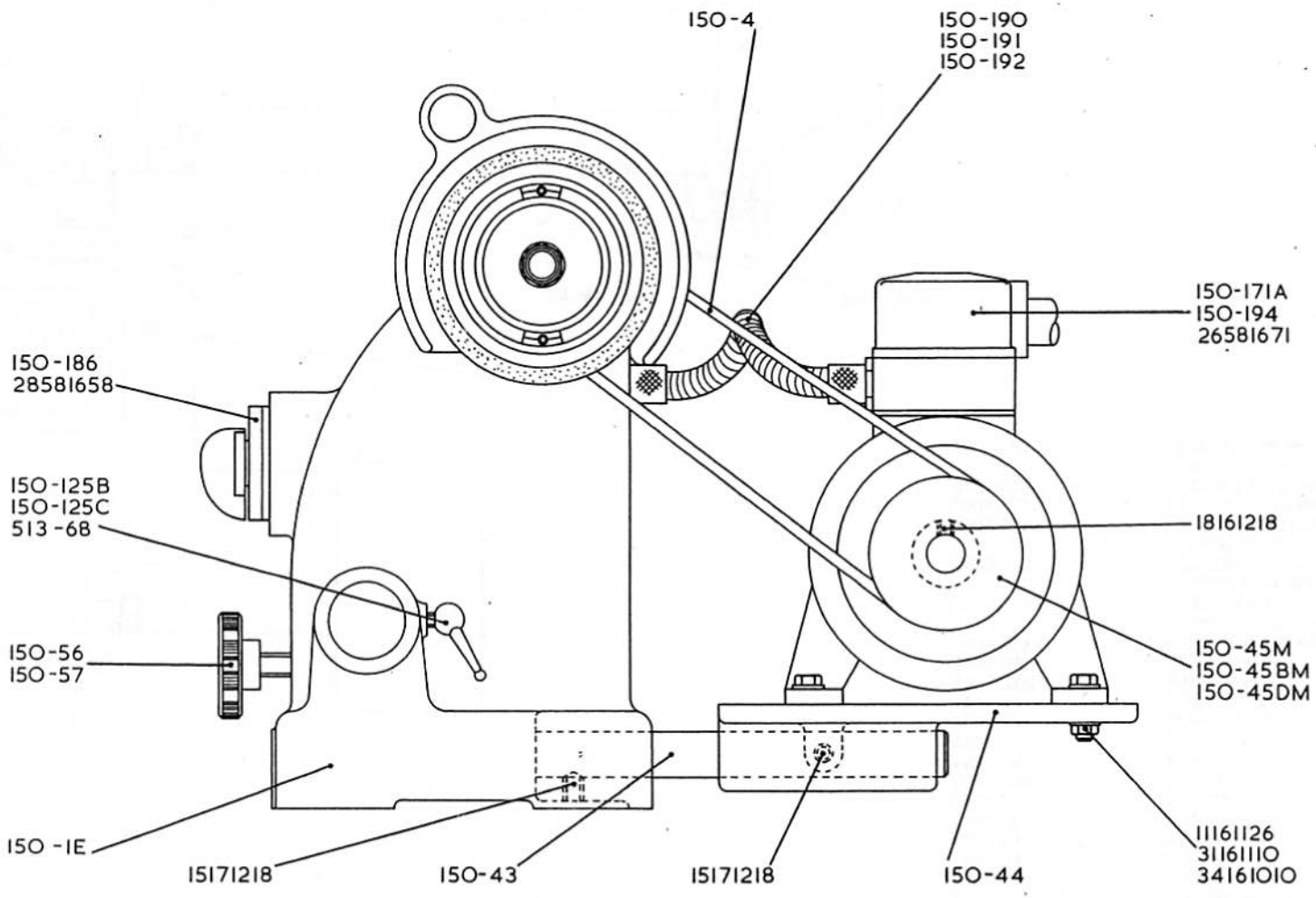
Base assembly (bench and cabinet type machines)



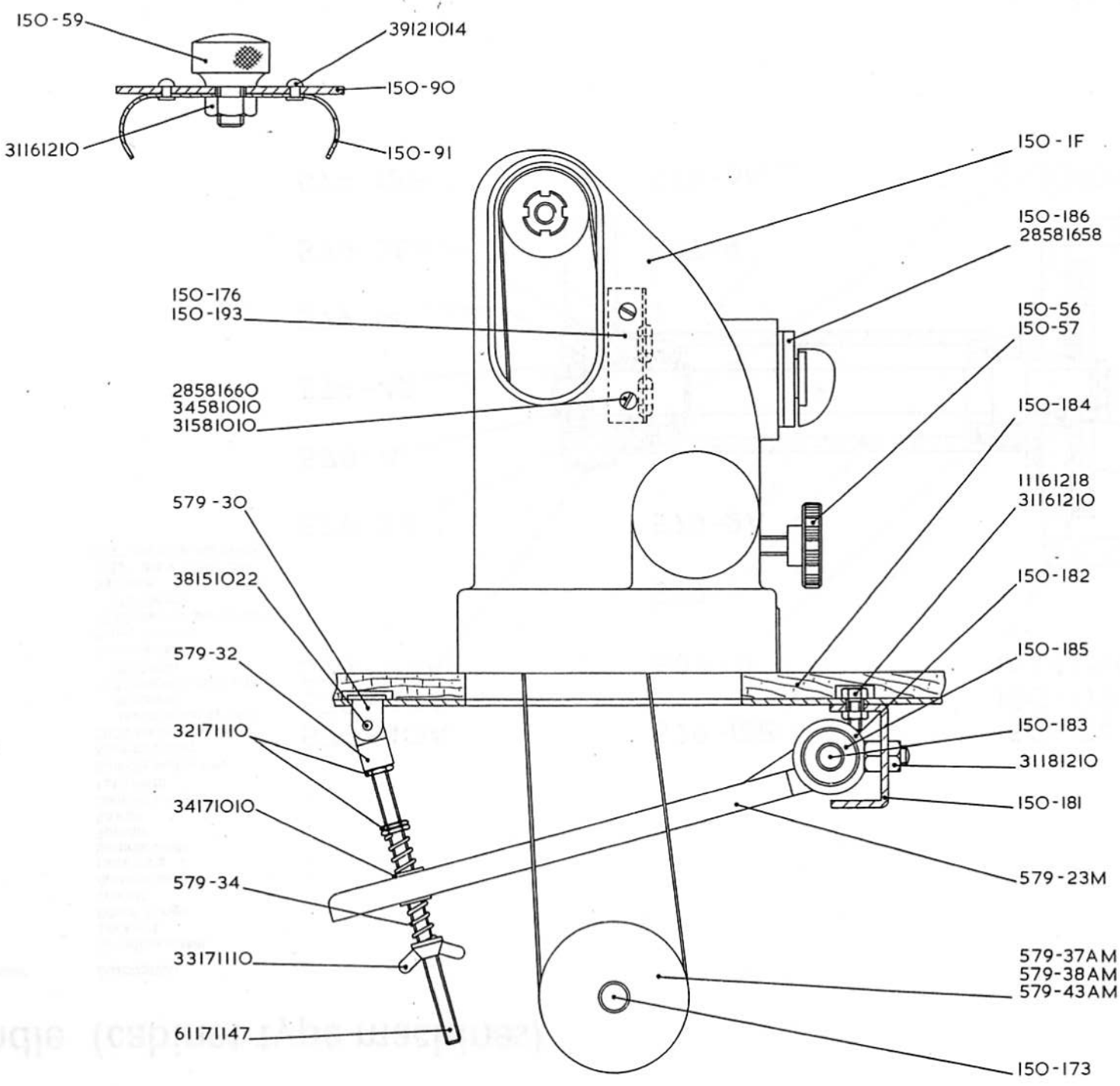
Detail number	*Description*
M3—1314	Locknut
150—7	Locating collar
150—9	Graduated ring
150—12	Adjusting ring
150—13	Adjusting nut
150—15	Washer
150—16	Adjusting sleeve
150—20	Stop lever
150—22A	Dust excluder
150—25	Shaft
150—26	Spring
150—27	Spring anchor
150—78	Oiler
558—168	Spring oiler
698—36	Lock screw
15341317	4BA x 5/16" cone point socket grub screw
20171122	5/16" BSW x 5/8" cone point slotted grub screw
26131120	1/8" BSW x 1/2" cheese head screw
38131017	1/8" dia. x 5/16" pin
38141028	5/32" dia. x 1" pin
42151025	3/16" x 13/16" round end key
56701010	1 5/8" dia. external circlip

Drive assembly (bench type machines)

Detail number	*Description*
150–1E	Main casting
150–4	Belt
150–43	Motor platform shaft
150–44	Motor platform
150–45BM	Pulley 1725 rev/min
150–45DM	Pulley 3500 rev/min
150–45M	Pulley 2800 rev/min
150–56	Adjusting handle
150–57	Screwed bush
150–125B	Locking pin
150–125C	Locking screw
150–171A	Mounting block
150–186	Switch
150–190	Conduit
150–191	Connector
150–192	Back nut
150–194	Terminal block
513–68	Locking handle
11161126	1/4" BSW x 7/8" hexagon head bolt
15171218	5/16" BSF x 3/8" cone point socket grub screw
26581671	M4 x 60mm cheese head screw
28581658	M4 x 10mm countersunk head screw
31161110	1/4" BSW nut
34161010	1/4" dia. washer
18161218	1/4" BSF x 3/8" dog point screw



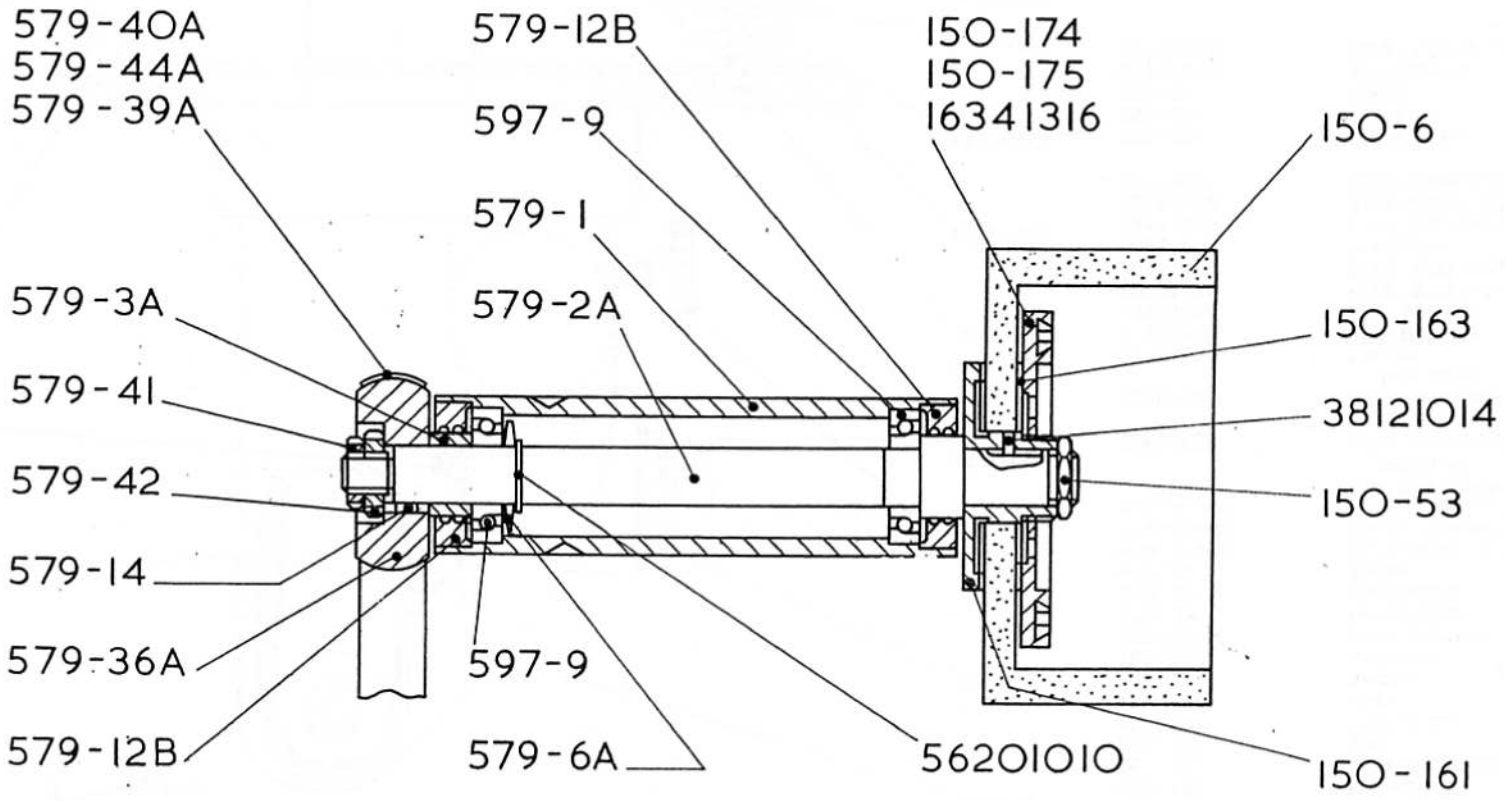
Drive assembly (cabinet type machines)



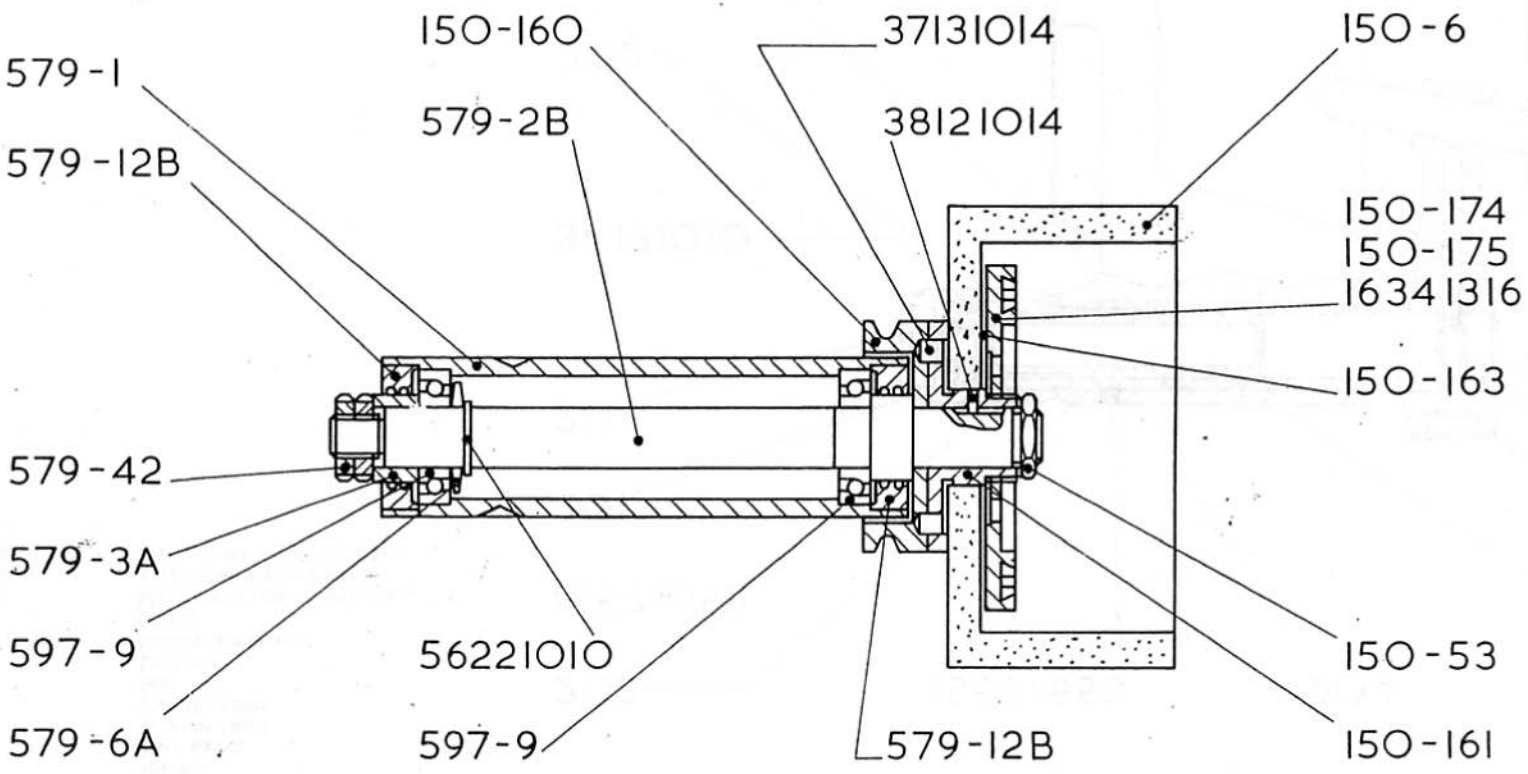
Detail number	*Description*
150–1F	Main casting
150–56	Adjusting handle
150–57	Screwed bush
150–173	Motor
150–176	Guard plate
150–181	Bar support
150–182	Bush mountings
150–183	Shaft
150–184	Cabinet top
150–185	Bush
150–186	Switch
150–193	Grommet
579–23M	Motor platform
579–30	Female spigot
579–32	Male spigot
579–34	Spring
579–37AM	Pulley 2800 rev/min
579–38AM	Pulley 1725 rev/min
579–43AM	Pulley 3450 rev/min
11161218	1/4" BSF x 3/8" hexagon head bolt
28581658	M4 x 10mm countersunk head screw
28581660	M4 x 16mm countersunk head screw
31581610	M4 nut
31161210	1/4" BSF nut
31181210	3/8" BSF nut
32171110	5/16" BSW locknut
33171110	5/16" BSW wing nut
34581010	M4 washer
34171010	5/16" dia. washer
38151022	3/16" x 5/8" pin
61171147	5/16" BSW studding
150–59	Clamp screw
150–90	Cover
150–91	Spring
31161210	1/4" BSF nut
39121014	3/32" x 3/16" rivet

Spindle (cabinet type machines)

Detail number	*Description*
150–6	Grinding wheel
150–53	Locknut
150–161	Wheel flange
150–163	Washer
150–174	Balance weight
150–175	Lock ring
579–1	Spindle body
579–2A	Spindle
579–3A	Spacer
579–6A	Belleville washer
579–12B	Labyrinth
579–14	Spindle pulley key
579–36A	Spindle pulley
579–39A	2800 rev/min or 3450 rev/min pulley belt (930mm)
579–40A	1725 rev/min pulley belt (990mm)
579–41	Pulley locknut
579–42	Pulley locknut
579–44A	1725 rev/min pulley belt (1070mm)
597–9	Ball race
38121014	3/32" dia x 3/16" pin
56201010	5/8" dia external circlip



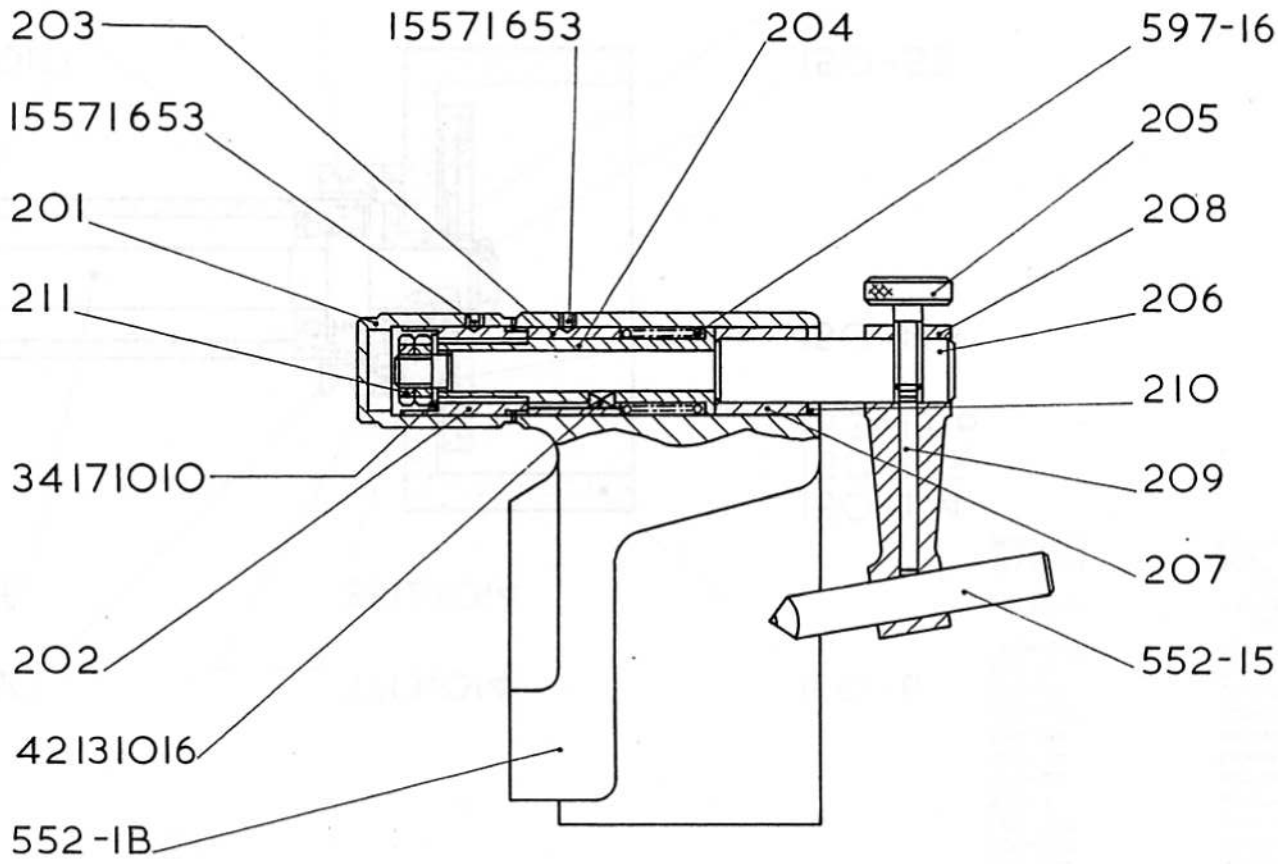
Spindle (bench type machines)



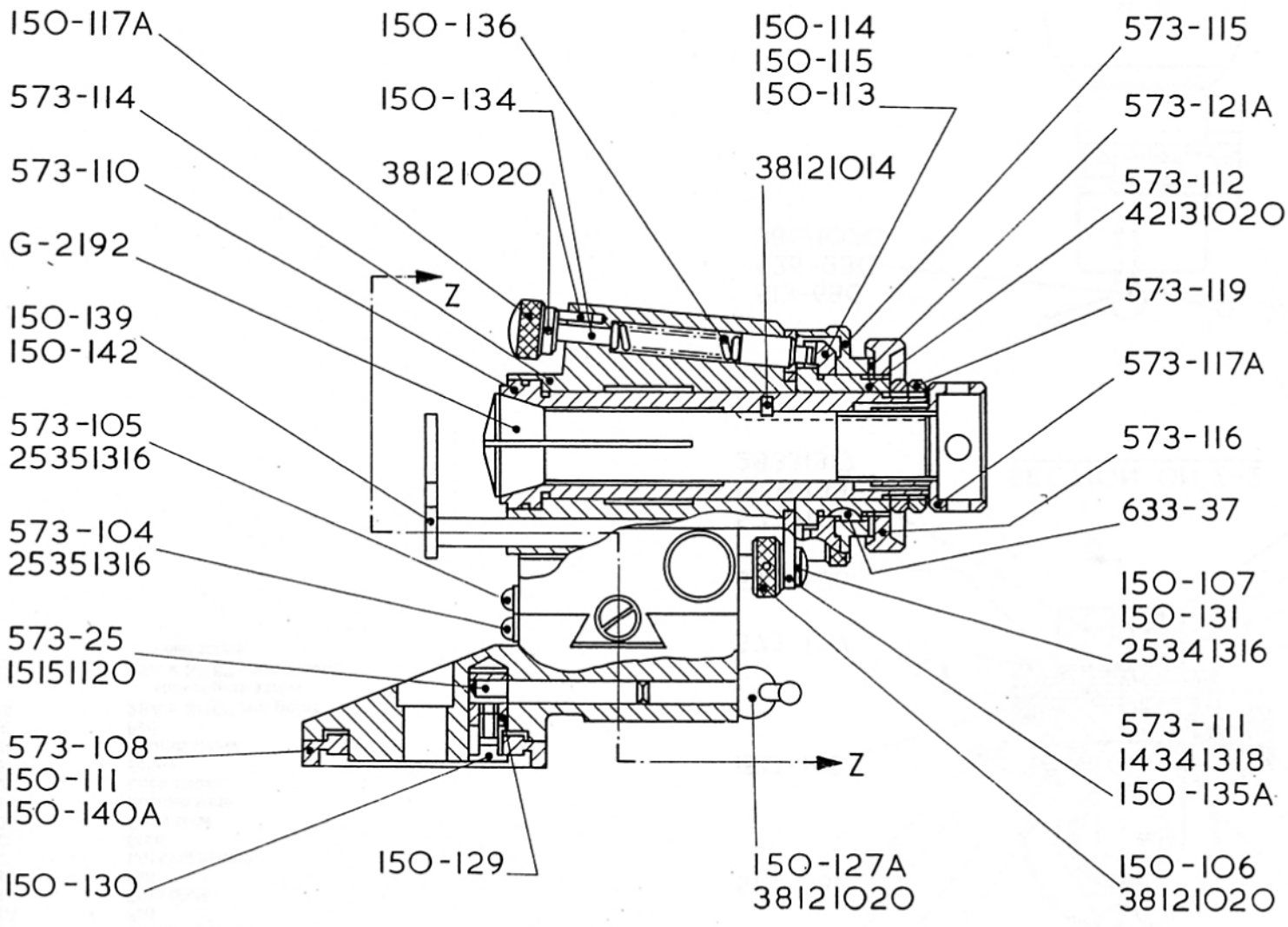
Detail number	*Description*
150–6	Grinding wheel
150–53	Locknut
150–160	Pulley
150–161	Wheel flange
150–163	Washer
150–174	Balance weight
150–175	Lock ring
579–1	Spindle body
579–2B	Spindle
579–3A	Spacer
579–6A	Belleville washer
579–12B	Labyrinth
579–42	Locknut
597–9	Ball race
16341312	4BA x 1/4" cup point socket grub screw
37131014	1/8" dia. x 3/16" dowel (hard)
38121014	3/32" dia. x 3/16" pin
56201010	5/8" external circlip

Wheel dresser unit, type 2 (bench and cabinet type machines)

Detail number	*Description*
552–1B	Wheel guard
150–201	Knob
150–202	Nut
150–203	Keyed sleeve
150–204	Threaded sleeve
150–205	Thumb screw
150–206	Spindle
150–207	Plain sleeve
150–208	Diamond arm
150–209	Clamping rod
150–210	Seal
150–211	Locknut
552–15	Mounted diamond
597–16	Spring
15571653	M3 x 4 cone point set screw
34171010	5/16" diameter washer
42131016	1/8" square x 1/4" long key



Cross slide assembly (bench and cabinet type machines)

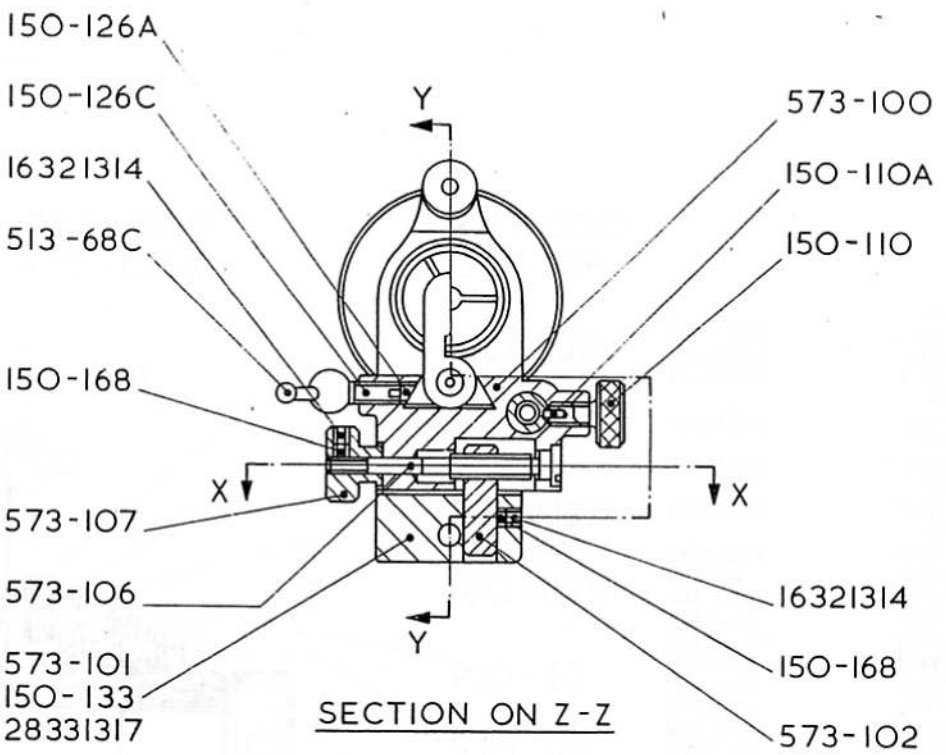


SECTION Y-Y

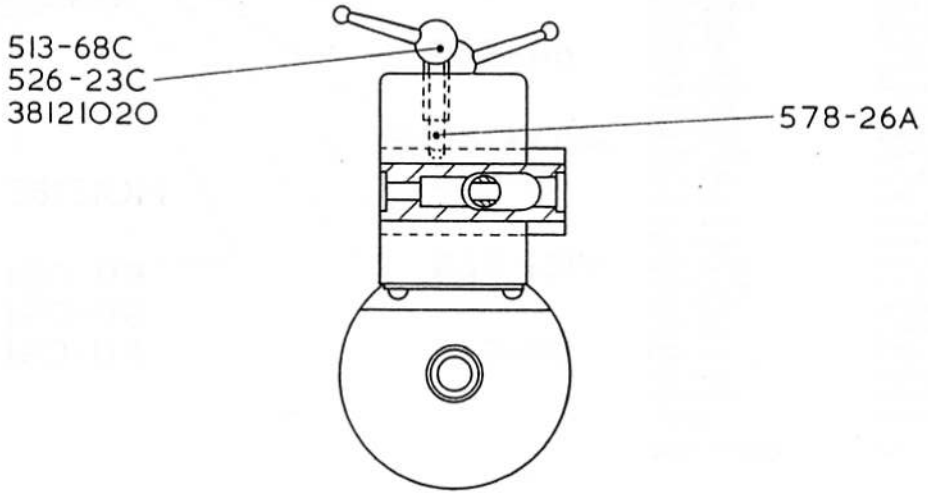
Detail number	*Description*
G2192	Collet
150–106	Adjusting ring
150–107	Adjustment spindle
150–111	Stop
150–114	Indicator stud (plain)
150–115	Indicator stud (dimpled)
150–117A	Plunger handle
150–127A	Handle
150–129	Locking piece
150–140	Clamping piece
150–131	Nut
150–134	Plunger
150–135A	Back plate window
150–136	Spring
150–139	Finger
150–140A	Knob for graduated disc
150–142	Finger shaft
573–25	Lock spindle
573–104	Rule (English)
573–104M	Rule (metric)
573–105	Rule (English)
573–105M	Rule (metric)
573–108	Graduated disc
573–110	Collet sleeve
573–111	Back plate
573–112	Sleeve
573–113	Dividing ring
573–114	Top slide
573–115	Graduated ring
573–116	Lock ring
573–117A	Draw sleeve
573–119	Lock nut
573–121A	Washer
663–37	Woodruff key
14341318	4BA x 3/8" socket countersunk screw
15151120	3/16" BSW x 1/2" cone point socket grub screw
25341316	4BA x 1/4" round head screw
25351316	6BA x 1/4" round head screw
38121014	3/32" dia x 3/16" pin
38121020	3/32" dia x 1/2" pin
42131020	1/8" x 1/2" round end key

Cross slide assembly (continued)

Detail number	*Description*
150–110	Locking screw
150–110A	Pad
150–126C	Clamping screw
150–126A	Pad
150–133	Stop plate
150–168	Pad
513–68C	Locking handle
526–23C	Stud
573–100	Cross slide
573–101	Bottom slide
573–102	Lock sleeve
573–106	Screw
573–107	Thumb screw
578–26A	Pad
16321314	2BA x 3/16" cup point socket grub screw
28331317	3BA x 5/16" countersunk head screw

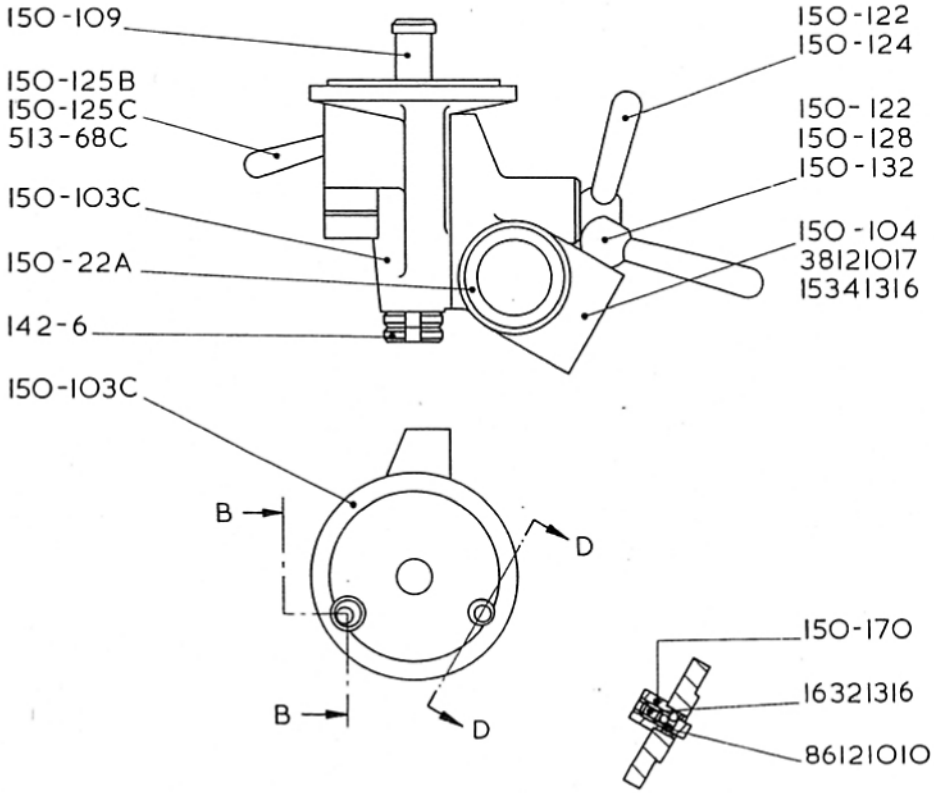


SECTION ON Z-Z



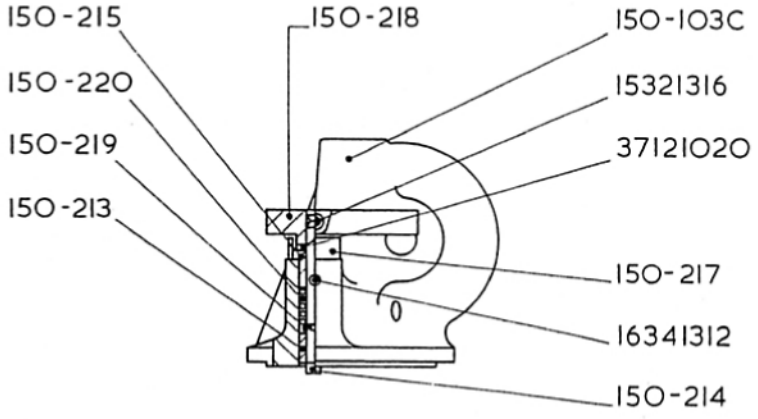
SECTION ON X-X

Cross slide swivel assembly (bench and cabinet type machines)



SECTION D-D
SHOWS CLAMPING OF
ANGULAR STOP

Detail number	*Description*
142–6	Locknut
150–22A	Seal
150–103C	Swivel casting
150–104	Slide
150–109	Spindle
150–122	Handle
150–124	Locking spindle
150–125B	Locking pin
150–123C	Locking screw
150–128	Locking screw
150–132	Spindle clamp
150–170	Stop
150–213	Bush
150–214	Shaft
150–215	Bush
150–217	Bush
150–218	Lever
150–219	"C" clip
150–220	Spring
513–68C	Locking handle
15341316	4BA x 1/4" cone point socket grub screw
16341312	4BA x 1/8" cup point socket grub screw
16321316	2BA x 1/4" cup point socket grub screw
37121020	3/32" dia. x 15/32" dowel (hard)
38121017	3/32" dia. x 5/16" pin
86131010	1/8" dia. steel ball



SECTION B-B
SHOWING RETRACTABLE ANGULAR STOP