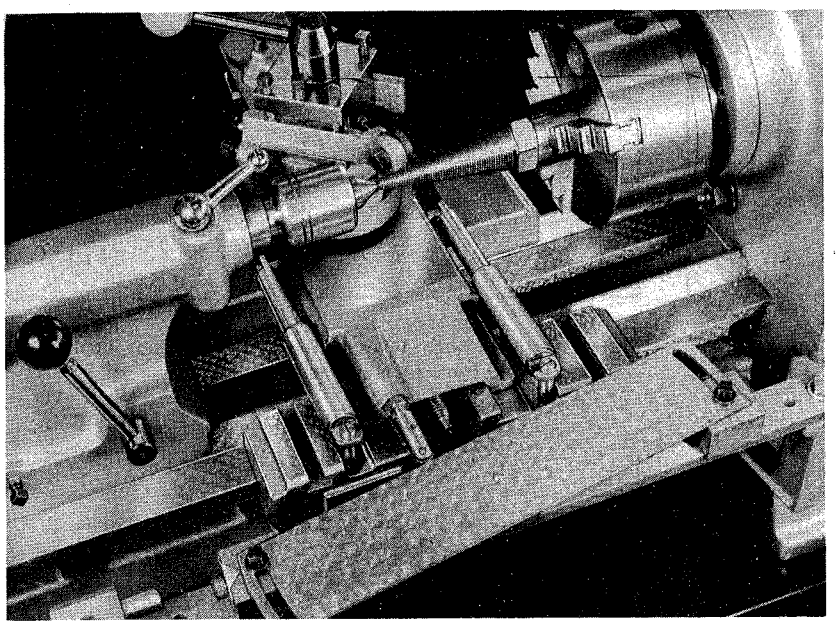
VICEROY

COPY AND TAPER TURNING ATTACHMENT

Operating and Setting Instructions



The "Viceroy" Copy and Taper Turning attachment has been designed as the result of requests from light industry and education authorities for a reasonable priced unit. It does not have the usual working parts found in conventional taper attachments and thus is easier to set and has less frictional losses.

SETTING FOR TAPER TURNING

Swivel the top slide until is is parallel with the cross slide and remove the cross slide nut to allow the slide to move freely when under spring tension thereby following the taper swivel plate. The top slide takes the place of the cross slide to control depth of cut.

Screw the ball race stylus into the tapped hole at the rear of the cross slide and lightly tighten the locknut to retain the ball race in a running position. The taper turning swivel plate is pivoted at its centre and the plate is engraved at one end only in degrees per foot.

A beam which supports the taper turning plate has holes at two inch intervals along its length to enable the taper turning plate and its supporting blocks to be retained in any desired position along the length of the bed. Place the two clamp support blocks on the beam with the block having the zero setting line at the tailstock end. The taper turning plate with its pivot block rests on the two clamp blocks and, at this stage, the square headed screws should be screwed finger tight into the clamp blocks through the radially elongated slots of the taper turning plate. Both plate and blocks are now virtually one unit and will slide along the beam.

Slide the taper plate and blocks along the beam to their approximate position in relation to the stylus, turning tool and the component to be turned which should be held in the chuck or between centres. Slide the taper plate and blocks to line up with the nearest beam holes and lock into position with the Allen type screws through the beam into the block.

Set the taper swivel plate to the required angle remembering that each engraved line irrespective of its length = 1^{o} of inclusive taper. So if the swivel plate is set five lines from parallel the component will be turned with a five degree inclusive taper. It will be seen that every other line is longer in length; these lines represent 1^{o} of angle to the **centre line.** The short lines are $\frac{1}{2}^{o}$ angles to the centre line.

The final setting is to fit the telescopic spring tubes into place, one each side of the cross slide, the hooked ends of the tubes slipping over shoulder screws. The outside tube end should be fitted to the cross-slide and the inner tube end to the saddle. They are adjustable and are screwed internally to allow them to be adjusted to the best tension for the smallest to the largest diameter work pieces. The capacity of the taper turning swivel plate is four inches per foot inclusive.

HINTS:

1. Assuming the lathe is fully set for producing the required taper and the tool is not quite in the right place or in relationship to the work piece, the toolpost can be moved an appreciable amount parallel to the bed in the tool slide tee slot without altering the setting in any way.
2. If the component after tapering needs a parallel portion turned in truth with the taper do not alter the setting. Instead, pull the cross slide away until the stylus is reasonably clear of any interference of the taper turning plate, lock the cross-slide jib with one of the adjusting screws and turn in the normal manner using the top slide for depth of cut. When releasing the jib adjusting screw DO NOT LET THE STYLUS CRASH AGAINST THE TAPER TURNING PLATE.

HOW TO USE THE COPY ATTACHMENT

The procedure of setting the copy taper turning attachment for copying follows the same sequence as setting for taper turning, except that instead of using a swivel taper plate a master of the shape to be produced must be substituted.

First examine the longitudinal traverse of the saddle. If this is moved one inch in either direction and the cross slide is moved towards the operator the same amount simultaneously, this = 45^{o} at a climbing inclination. Such a movement transmitted by either the taper turning unit already described or a conventional type of unit could develop enormous thrust times pressure. This would bend the stylus and shear the safety pins or more than likely smash some of the castings of a conventional taper turning attachment. Therefore it is important for the mechanical movement of the cross slide, that the "climbing" angle be no greater than 32^{o} inclusive. 32^{o} inclusive taper is the equivalent of zero diameter to 6.13/16 in. diameter per foot.

So far the precautions of too steep a "climbing" angle have been stressed. The alternative to this is a falling angle when the cross slide is moving away from the operator. In this case both the cross slide and stylus will follow a very fast angle 'down hill' without any stresses to the machine whatsoever. If a fast angle or radius is incorporated into a component design it can only be produced as a falling inclination, whether it be a straightforward taper or of convex or concave form.

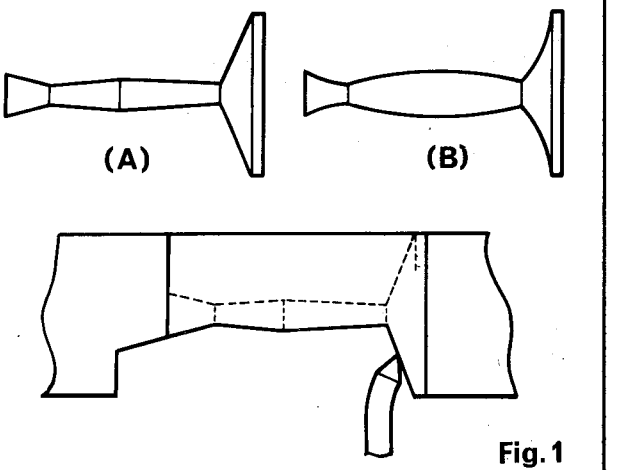


Fig.1

TYPICAL OPERATIONS:

Illustrated above (Fig.1) is a shape which could be a miniature brass candle stick or the standard for a table lamp, (A) formed in straight line tapers and (B) in gentle curves, but both embracing similar gradients. If the sketch represents a miniature candlestick in brass two diameters would be joined together to save material. The master and component would be presented to the lathe just as you are looking at the sketches. Fairly high periphery speeds and a slow feed would be needed so that the cut per revolution would be small as the stylus goes downhill on the plinth. A little help may be needed to keep the tool in contact with the workpiece because of the steepness of the plinth and its subsequent resistance whilst roughing the shape.

Help is given in the form of light pressure with the hand against the cross-slide for the two or three cuts. This pressure is only necessary whilst the stylus is on the plinth angle. After two or three cuts the operator will have gauged the amount of pressure. WHEN WINDING THE CARRIAGE BACK TO START A FRESH CUT DO NOT FORGET THAT THE CROSS-SLIDE MUST BE PULLED TOWARDS THE OPERATOR WHEN THE STYLUS REACHES THE PLINTH ANGLE. THE STYLUS POINT MUST BE CLEAR OF THE PLINTH TOP DIAMETER BEFORE CONTINUING THE CARRIAGE MOVEMENT TO THE BEGINNING OF THE NEW CUT. FAILURE TO DO THIS WILL RESULT IN THE STYLUS BEING DAMAGED'

TYPE OF STYLUS

The type of work and its accuracy when copying will decide the type of stylus to use. A small ballrace stylus and a mild steel rod stylus are supplied with the unit. The rod stylus has a 60° inclusive ball radius point. This type of stylus will follow faithfully every angle permissible and will ride into and out of an almost sharp intersection point of two angles, therefore it is ideal for accurate tracing. The ballrace stylus is supplied mainly for use with the taper turning plate but is the logical choice for masters that only have one angle e.g., a buffing mop spindle. Looking again at Fig.1 (A & B) it will be obvious that if these sketches were for a table lamp standard and the reproduction from the master did not have to be absolutely identical, the ballrace stylus would be the first choice. The ball race diameter is 13 mm so where a component can be designed with runouts or intersection points with not less than 6.50 mm radius then this is the stylus to use. This is shown in another typical example (Fig.2).

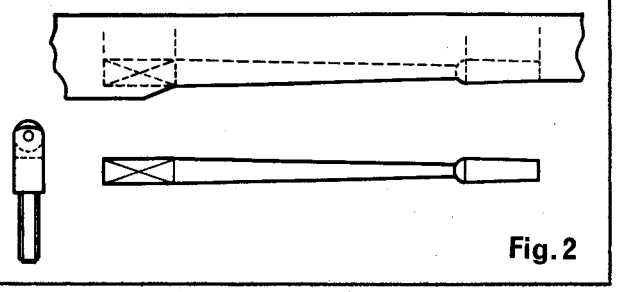


Fig.2

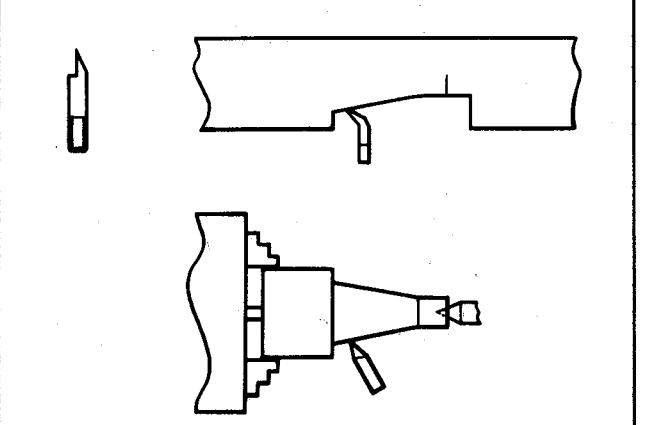


Fig.3

Fig.3 illustrates different types of stylus. These are not supplied with the unit but can be easily made as required.

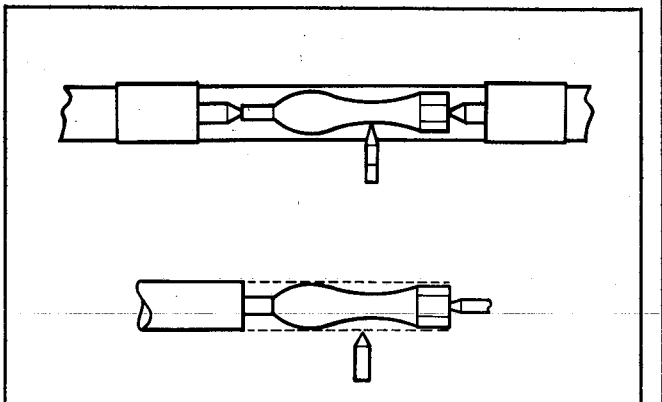


Fig.4

Fig.4 shows a pre-turned handwheel handle where the master is held between adjustable centre blocks attached to beam. Turned masters up to two inches diameter can be held in this way. The sketch also shows that when setting the toolbit for the first pass the stylus is resting against the smallest diameter with the tool bit just touching the metal workpiece. If the lathe is operated from this position the cutting tool will remove metal as the stylus passes down the fast radius onto the parting off stem. Before winding back the carriage pull the cross slide and stylus away from the master and wind the carriage towards the starting position. When the stylus is opposite the master component's largest diameter the stylus may be allowed to rest gently on the master. From here on the carriage can be wound to the starting position without damage to the stylus as the fall and rise is a gentle one. This is repeated after each cutting pass until the component being turned is to its finished size. The peening stem (shown shaded) can be finished by pulling the cross slide and stylus away from the master until the stylus is just clear of the master's largest diameter. Lock the cross slide with its own gib by tightening one adjusting screw and then turn the peening stem as normal turning.

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