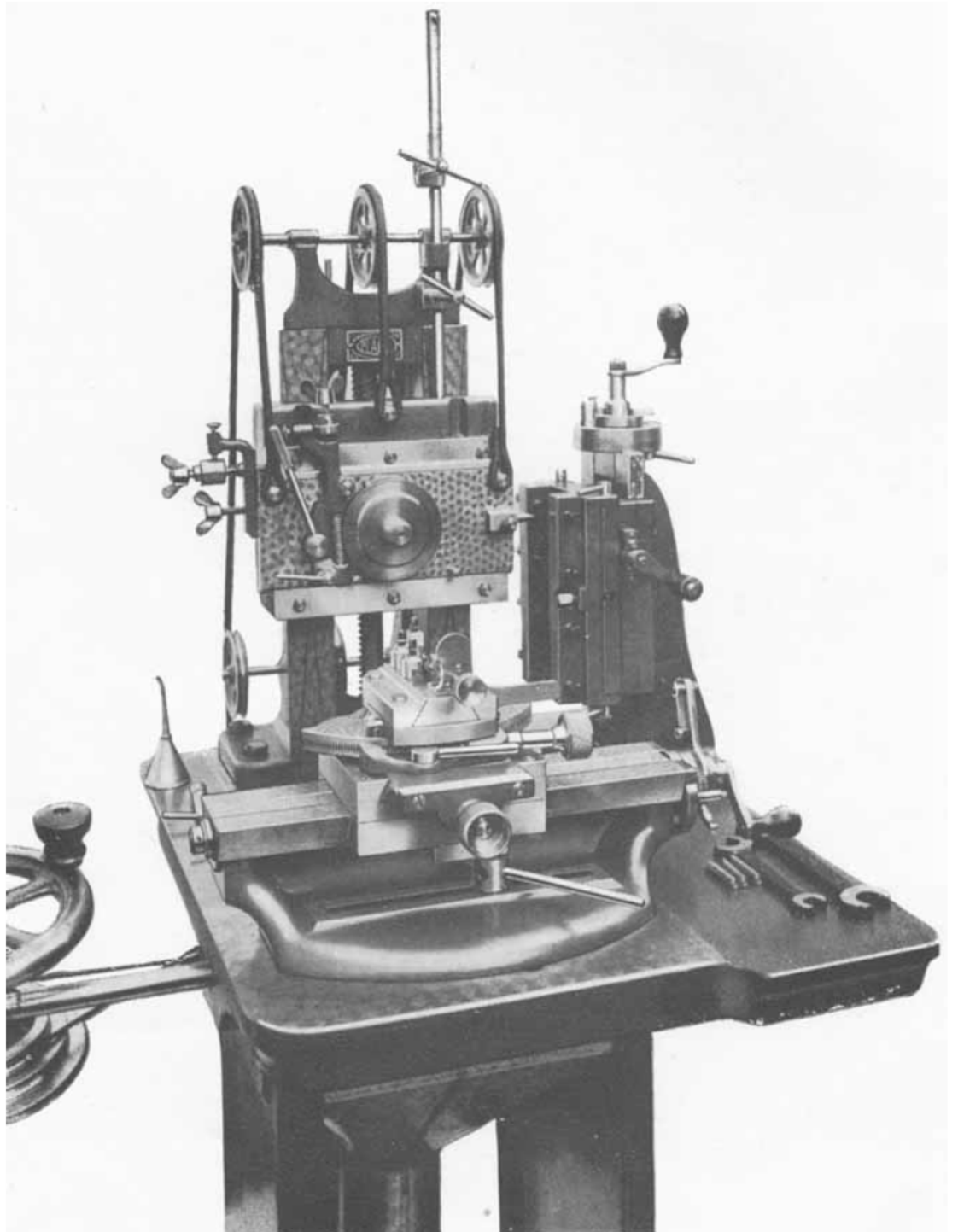


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## ***Cutting Lines: The basis of all engine turning***

The Straight Line Engine Turning Machine



*A Plant 14 inch Independent Straight Line Engine Turning Machine Manufactured in relatively large numbers in Birmingham during the first half of the Twentieth Century*

This type of machine is the mainstay of the Hand Engine Turning and is used for all types and

sizes of work from cufflinks to large picture frames and boxes. In the illustration here there is no workpiece and no chuck shown, the chuck or vice which holds the work is screwed onto the cross slide nose in the centre of the picture. The cross slide is sprung to the right to follow pattern bars held in the clamp on the right of the picture.

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The touch can just be seen at the right end of the cross slide, held in place by a single square headed screw.

The nose is set on the cross slide via a 120 tooth brass worm wheel. The worm, which can be seen on the left of the wheel can be disengaged quickly to rotate the work if required, usually for setting up or changing the direction of cutting. It is possible to cut circles rotating the piece by hand but this is not usually recommended.

The sliderest, in the foreground, holds a single tool, fixed in the x and y axis but free in the z axis to follow any

undulations in the work surface. The free toolslide is controlled by the thumb of the operator and depth of cut is regulated by the guide. The toolslide is carried upon a vaulting device called the Arc or arc slide, which is set so that the center of it's rotation is about the cutting point of the tool. This allows curved surfaces such as the front and back of a hip flask to be cut, all the while keeping the tool perpendicular to the workpiece. Obtaining an even result depends on even movement of the arc slide and is one of the many skills required of the engine turner, as is even pressure with the thumb. The arc is usually carried upon a centring slide for the above purpose and that in turn can be seen to run in the x axis along the mainslide of the sliderest.

Movement of the tool along the sliderest is done with a ratchet which determines the width of each single cut. On this machine the screw is 14tpi and the ratchet has 64 teeth giving 896 possible divisions per inch.

The Pattern Bar Clamp is set on two slides allowing vertical and horizontal movement. Vertical movement, "crossing", is used for moving the pattern up and down to create such as zig-zags, basket, barley and numerous other variations as desired. Horizontal movement allows the use of pattern bars with multiple faces and 3D surfaces. An illustration of an unusual 3D surface would be a piece of pebble glass mounted in the place of the pattern bar. This would reproduce itself by the deflection of each cut following each profile, the tool being advanced after each cut from left to right and the pebble glass being moved towards or away from the operator using the horizontal slide each cut.

Moving the work in the y axis for the cutting action is controlled with the left hand on the handwheel, half out of the picture. The length of movement can be limited with stops, the top one being at the very top of the illustration. Also at the top can be seen three wheels over which pass the belts which hold counter weights to the mainslide which balance the weight not only of the moving components of the slide but also that of the chucks and workpiece which, especially if large and filled with engine turner's cement, can be considerable. See the spread based box for how to deal with heavy work.