

ELLIS DIVIDING HEAD INSTRUCTION S

(EXPLODED VIEW ON REVERSE SIDE OF SHEET)

RATIO: The ELLIS DIVIDING HEAD ratio is 40 to 1; i.e., 40 turns of the Crank (3) drives the Spindle (20) one complete revolution.

SETTING THE HEAD FOR DIVISIONS REQUIRED: Assuming that 32 divisions of the circle are required, that is, 32 equal spaces in one revolution of the Spindle (20). Consulting the Chart, we find that the circle in the Index Plate (8) having 20 holes is used. This is the outer circle of holes in the Index Plate originally fitted to the Head. To get exactly $1/32$ of a turn of the Spindle, the Chart shows the figure $1\ 5/20$ which means the Crank (3) is given one complete turn plus five additional holes when set to register in the 20-hole circle.

OPERATION OF THE CRANK: (3) is turned in the clockwise direction. For quick and accurate selection of the holes beyond the full turn of the crank the Sector Arms (7) are used.

SETTING SECTOR ARMS: With the Indexing Pin of the Crank in the numbered starting hole at top of the Index Plate, turn the LEFT Sector Arm clockwise until it touches the Indexing Pin on the LEFT SIDE. Now turn the RIGHT Sector Arm clockwise just beyond the 5th hole from the Indexing Pin. Lock the Sector Arms together in this position by tightening Lock Screw (4). When the cut on the work is finished, and with the Sector Arms in the position just described, turn the Crank one full turn clockwise and to the last hole left uncovered by the Right Sector Arm. Now turn the Sector Arms clockwise until the LEFT Arm touches the Indexing Pin. The work is now in position for the next cut and the Sector Arms are in position to determine the next setting.

ADJUSTING THE CRANK POSITION: Loosen nut (1) so that Crank (3) can slide endwise on the groove until the Indexing Pin fits properly in the starting hole of the circle of holes desired. Lock nut (1) while crank is in this position so that Indexing Pin enters hole freely.

TO CHANGE INDEXING PLATE (8): To get a full range of divisions, three different Indexing Plates are required. To change Indexing Plates remove Nut (1), Spacer (2), Crank (3), Tension Adjusting Nut (5), Tension Spring Cup (including spring) (6), and Sector Arms (7). The Index Plate may now be changed by removing three small flat head screws.

Important Note: The Round Nut (2 sides slightly flattened and held in position by 2 Allen set screws) which adjusts the Worm end-thrust, and over which Nut (5) is threaded, should not be loosened in changing the Indexing plates.

ADJUSTING WORM END-THRUST: This is seldom required, but when necessary, loosen the two Allen set screws in Round Adjusting Nut, mentioned above; tighten the Nut against the Worm Shaft Bearing until the Worm cannot be turned, then loosen the Nut just enough so that the Worm turns without binding and yet with no end thrust after the two Allen set screws are tightened, locking the Nut in position.

TO LOCK THE SPINDLE: Tightening Spindle Lock Screw (15) applies pressure on a bronze brake shoe locking the Spindle (20) in position when work is ready for a cut.

Note: Slight pressure on the screw is sufficient to lock the Spindle. Great pressure upon the screw may damage the bronze brake shoe.

THE WORM AND WORM-GEAR: The Worm and Worm-shaft are integral, made of steel and are ground concentrically. The Worm Gear is of bronze. To obtain uniform contact between Worm and Worm-gear, these are "run-in" as matched sets.

NO-BACK-LASH ADJUSTMENT: The Ellis Dividing Head has a Life-time No-back-lash adjustment. The Worm shaft Bearing is mounted on a pivot pin near the bottom of the bearing. (This pin is not shown by Figure but the left end of it may be seen in the Body casting just above and to the right of the "boss" supporting the Spindle Lock Screw (15). This pivot allows the Bearing to hinge so that the depth of the Worm in the Worm-gear can be controlled by adjusting Allen Screws (10) and (11). Both these screws contact the top of the Worm-shaft Bearing. Tightening Screw (11) tends to lift the Worm from Worm-gear while tightening Screw (10) puts the Worm deeper into the Worm-gear. The exact adjustment is obtained by snugly adjusting these screws to hold the Worm seated in the Worm-gear at a point which allows no back-lash of the Spindle and at the same time allowing free turning of the Crank (3). The Worm and Worm-gear, being matched sets, make this possible.

INSTANTANEOUS FREE - WHEELING (without dismantling). This is a desirable feature whenever

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Direct or Quick-indexing is needed. To "Free-wheel" the Spindle, the Worm is lifted directly out of, or disengaged from, the Worm-gear merely by screwing Allen set screw (11) out about $\frac{3}{8}$ " then tip the top edge of Index-plate (8) away from the Head, leaving an opening of about $\frac{1}{4}$ " between the Worm Bearing Flange and the Body Cover Cap as shown at (9). The Spindle is now "free-wheeling" and ready for Quick-indexing. The Worm is re-engaged in the Worm-gear merely by tipping the Worm and Indexing assembly back into original position, while "feeling" the Worm into the Gear, and adjusting Allen screw (11) as formerly for no back-lash. If screw at (10) has not been disturbed while Free-wheeling the no-back-lash adjustment can be obtained in a moment.

QUICK-INDEXING: There are two quick-indexing plates supplied. The one mounted on the Spindle is drilled with 12 holes, thus giving 1, 2, 3, 4 and 6 divisions. The extra plate is blank, to be drilled by the operator however needed. To go into Quick-indexing merely "Free-wheel" as above described, then loosen the Allen lock-screw in the Quick-indexing Unit as shown at (16) thus freeing the Indexing Pin in Unit (21).

Note: The Indexing-Pin in Unit (21) must be locked out of operation before attempting to re-engage Worm in Worm-gear for regular 40 to 1 Indexing.

UNIVERSAL SWIVEL BASE: In the illustration shown the Head is mounted on the Universal Swivel Base which gives full rotation on the horizontal swivel and 100 degrees to the right and 60 degrees to the left on the vertical swivel, thus allowing a full range of positions in all directions.

TO USE THE CENTERS: Work is not mounted on the Centers when the Head is in the Swivel Base. A standard Base is provided for this purpose. To put the Head in the Standard Base, remove the three cap screws (24) and the Cap (23). The Head will now remove from the Swivel Base and is placed and held in the Standard Base the same as in the other. With the Head in the Standard Base the Spindle Center (18), which is No. 9 Brown and Sharpe taper, will line up with the Tail Stock Center. These centers allow $6\frac{1}{2}$ " swing or, with the riser blocks, which are supplied with the Swivel Base Assembly, the swing is 11".

THE SPINDLE THREAD: The Spindle Thread (20) is standard $1\frac{3}{4}$ "—8 thread.