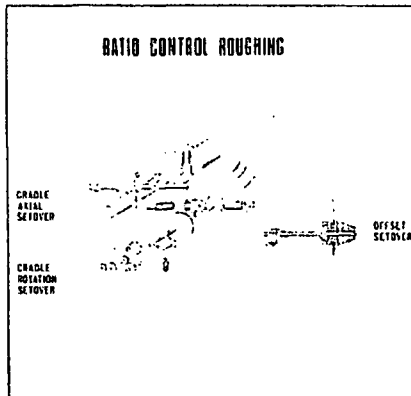


PLUNGE-CUT ROUGHING

The first cutting operation is essentially a slotting cut which removes approximately 60% of the stock. It is performed by plunge-feeding the cutter to depth, then rolling the cradle slightly to open the tooth slot at the toe. Since this cut does not go to full depth, a cutter with relatively wide point width can be used to extend cutter life.

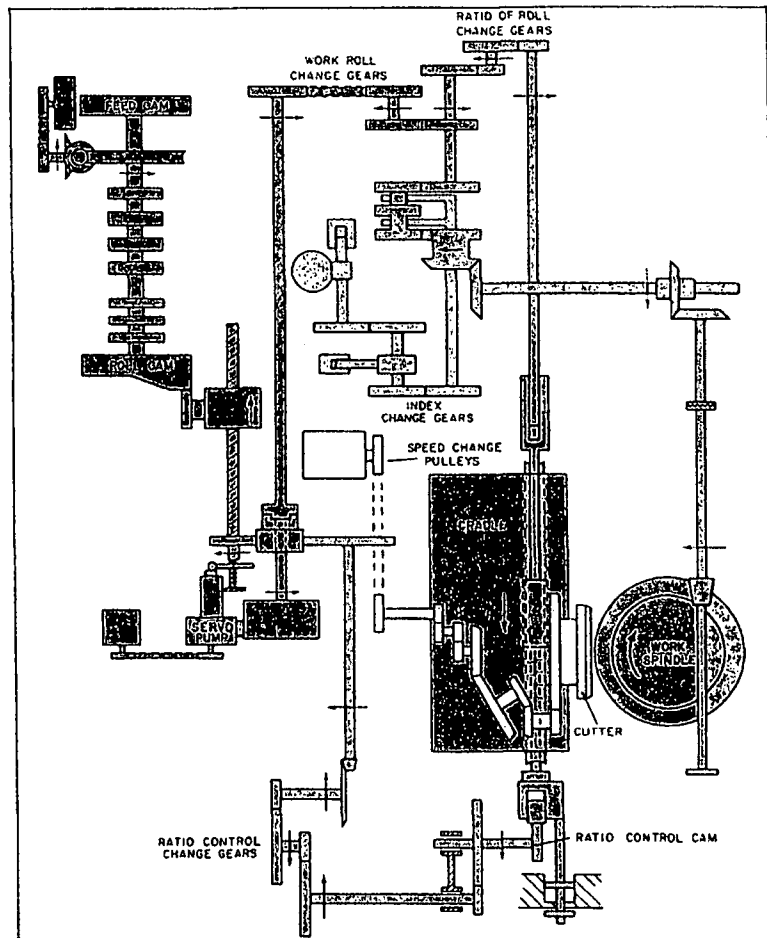


RATIO CONTROL ROUGHING WITH SET-OVER

The second cutting operation generates tooth slots which closely duplicate the subsequent path of the finishing cutter. Stock allowance for finishing is minimized.

Cutting takes place on both the down-roll and the up-roll. Four setting changes occur automatically between the two rolling motions.

Cradle angle and the ratio of roll between the cradle and the work spindle are changed as on previous roughers. In addition, two new motions take place—cradle axial and hypoid offset. As a result of these changes tooth slot taper is controlled, and profile shape, spiral angle and depth are held close to the finished specifications on both sides of the tooth slot.



GEAR DRIVE SYSTEM

Computer analysis has been used to minimize torsional vibrations in the drive train. The number of gear meshes in the system has been reduced by 50%, and shafts are shorter and stiffer.

Index gears operate only during the indexing portion of the machine cycle.

The cutter is driven by a separate motor and short drive train. As a result, cutter speed can be independently varied for optimum performance.