

now in almost universal use in all standard machine tools.

The next step was to devise a means for minimizing the stresses at the cutting edge, and the object of the pre-

By direct cutting stress we mean that part of the stress that is directly downward in a lathe. With all other conditions unchanged, we should expect to find that an acute-edged tool would offer the least resistance,

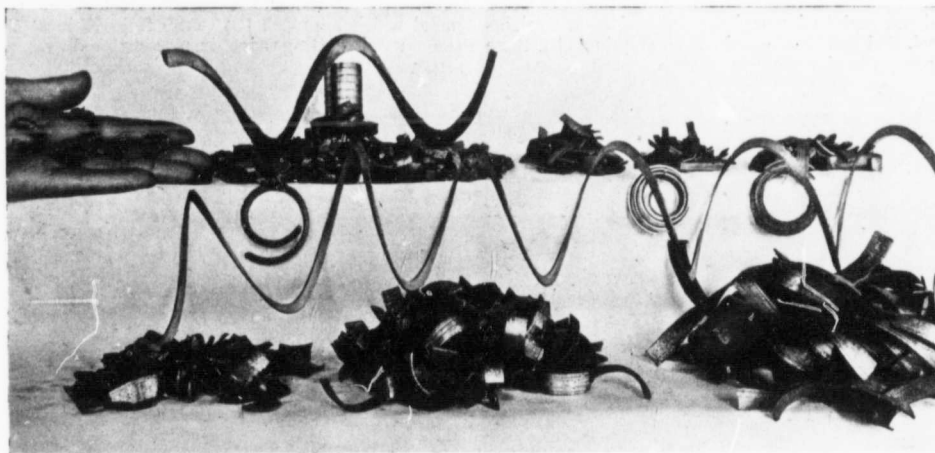


Fig. 3.—Samples of Chips: Those Held in Hand Were Produced by Blunt Side Tool Having 75 Deg. Cutting Angle. All Other Chips were Produced by Tools Having Cutting Angle of 45 Deg. or Less. The Chips in the Three Small Piles at the Right on the Top Row and Those on the Lower Row Were Broken by Chip Controller Shown in Fig. 15. These Chips Were Produced by Cutters No. 2 and 3 in Fig. 4 and 5, Running at 40 to 45 Feet per Min. (Periphery Speed) and 22 Feed per Inch; Depth of Cut 7-16 In., Reducing from $1\frac{1}{4}$ In. Down to $\frac{1}{8}$ In.

sent paper is to explain how this result has been obtained. This reduction of stresses may not be important in roughing work in which a flinching of the work or machine may be disregarded so long as the machine continues to crush off the metal, but for the kind of work mentioned in this paper it has been considered of first importance.

DIRECT CUTTING STRESS.

For the purpose of analysis the cutting stress may

and that the difference in direct cutting stresses for tools of varying cutting angles would show a marked reduction in favor of the more acute tools.

Dr. Nicolson's experiments below 60 degrees, already mentioned, showed an increase in cutting stresses and a marked loss in endurance, but these tests were on dry cutting without the benefit of a lubricant or a cooling solution. The thin edge tool is undoubtedly benefitted more than the blunt edge tool by lubricant or cutting

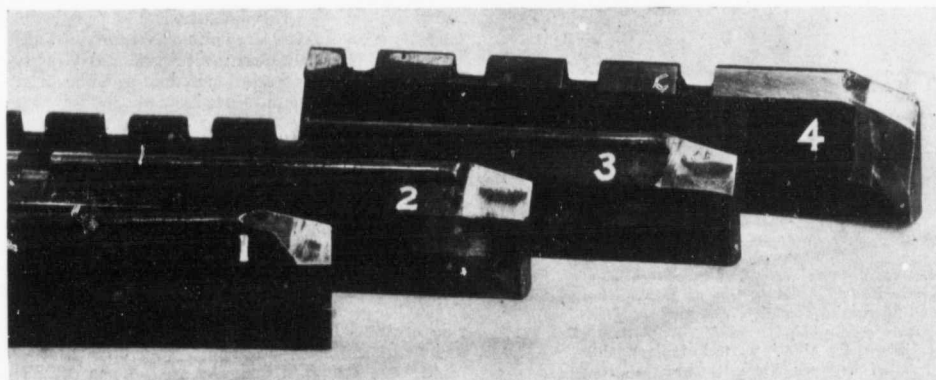


Fig. 4.—Cutters Used in the Flat Turret Lathe. Illustration Shows the Abrasive Contact of Chip on the Top Slope. No. 1, 2 and 3 Were Used in Turner, Fig. 10. No. 4 Shows one of the Earlier Forms.

be divided into three elements: the direct cutting stress, the separating stress, and the tendency to quiver, which we will consider in turn.

medium. Just what cutting angle would be the best under conditions of most efficient cooling medium may not yet be fully known.