HOW TO SET UP SHAPER TOOLS

Unit 1-P52(C) Part I Pages 167 to 172

Photo by courtesy of J. H. Williams & Co.

UNIVERSITY OF THE STATE OF NEW YORK
STATE EDUCATION DEPARTMENT
BUREAU OF INDUSTRIAL AND TECHNICAL EDUCATION

HOW TO SET UP SHAPER TOOLS

OBJECTIVES OF UNIT

1. To explain how the tool head is prepared, and how the tool and tool holder are selected.

2. To show how the tool and tool holder are set, and to illustrate a number of typical tool setups.

INTRODUCTORY INFORMATION

An important element in tool setting is one of rigidity. The tool head is provided with adjustments to eliminate vibration as much as possible, and at the same time to allow for the movement of the tool. To minimize the tendency toward vibration or chatter, the head, then, should be properly adjusted. In addition, the tool must be supported properly. The tool slide and tool should not be allowed to overhang or project beyond the point of support any more than is absolutely necessary. The tool also must be held short in the tool holder. There are times, however, when overhang is unavoidable. In these cases, light cuts should be taken and care should be observed when the tool is being fed into the work.

Another important consideration is to set the tool or holder so that the tool swings away from the work. The importance of such a setting is evident when a flat surface is being roughed out. If the tool is held in a vertical position and the side pressure of the cut causes the tool or holder to move in the tool post, the tool will swing away from the surface being machined. If, on the other hand, the tool or tool holder is pointed toward the cut and the side pressure of the cut causes the tool or holder to move in the tool post, the tool will "dig in." Here again, there are exceptions to this rule. If it is necessary to point the tool toward the cut, the tool must be watched carefully to see that it does not slip and dig into the work.

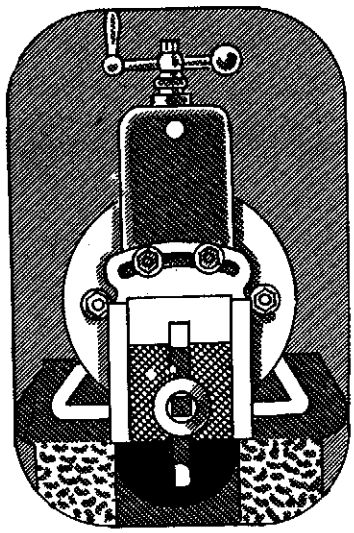
Finally, the tool may be set ahead or behind the point of support. In many cases the tool can be set ahead of the point of support. For finishing cuts, the tool may be set behind the supporting surface, the double purpose being to eliminate chatter and to produce a smoother finish.

TOOLS AND EQUIPMENT

Shear tool
Cleaning cloth
Tools for serrating
Available tool holders
Tools for cutting slots
Tools for cutting contours
Shaper and necessary wrenches
Tools for combined and vertical cuts
Tools for side cutting and chamfering
Tools for horizontal and vertical cuts

HOW TO USE SHAPER TOOLS

PROCEDURE



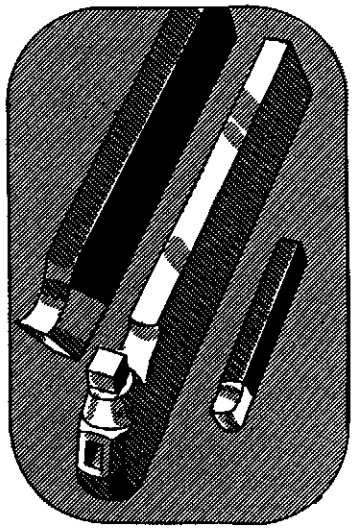
PREPARATION OF THE TOOL HEAD

1. Read the description of the tool head on page 14.
2. Clean and oil the head daily, following the instructions given on page 48.
3. Examine the clapper box and make sure that dirt, burrs, or chips do not prevent the block from working freely.
4. Be sure that no chips have lodged between the back of the block and the base of the clapper box. This would prevent the block from seating properly.
5. Move the block outwards and upwards with the hand and allow it to drop back into place.
6. Be sure that it seats solidly on its base.
7. Move the tool slide up and down by turning the down-feed crank.

NOTE: The gib on the tool slide should be adjusted so that the down-feed crank offers resistance to turning when the tool slide is moved downwards.

CAUTION Some experience, care, and judgment are necessary when the gib is being adjusted. The regulating should be done by a qualified person.

SELECTION OF THE TOOL OR TOOL HOLDER



1. Read the description of tools and tool holders on pages 153 and 158.
2. Decide whether a solid forged tool or a tool holder must be used, basing the decision on the job to be machined and the available supply of tools and tool holders.
3. Observe whether the tool is held parallel with the shank of the tool holder or is inclined at an angle if a tool holder is used.
4. Be sure that the clearance and the rake of the tool are ground to suit the manner in which the tool is held in relation to the shank of the tool holder.

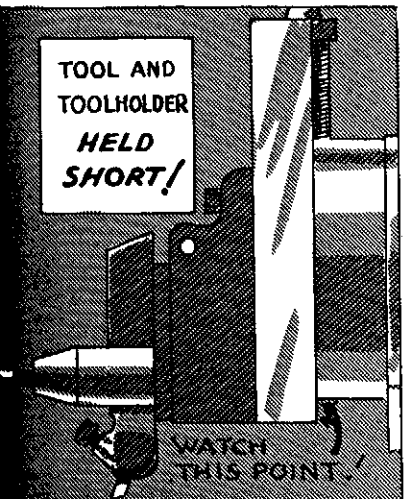


FIG.249

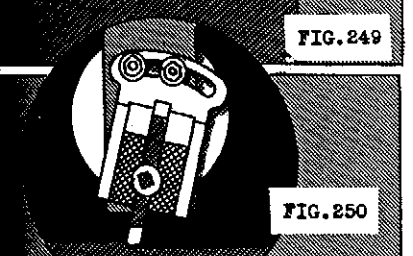


FIG.250

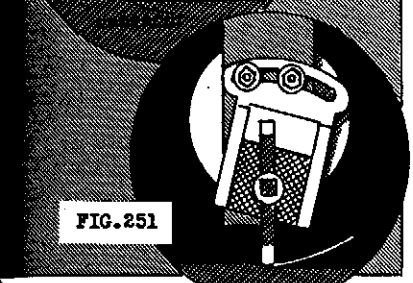


FIG.251

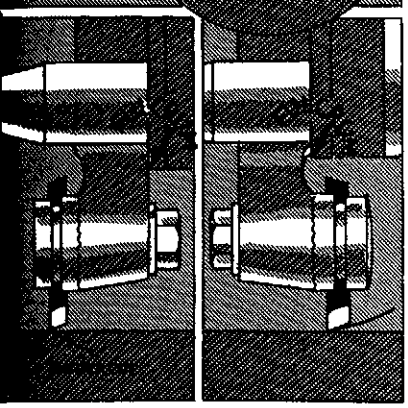


FIG.252 FIG.253

Remember that the inclination of the tool affects both the clearance and the rake as explained on page 165.

5. Choose from the special set (Fig. 214), if a set is available, a tool to suit the character of the work. These tools are ground with the correct clearance and rake, and the cutter can be changed easily to meet the requirements of the work.

SETTING THE TOOL OR TOOL HOLDER IN THE TOOL POST

1. Adjust the tool slide with the down-feed crank so that when additional cuts are taken the tool slide will not project or overhang more than one inch below the head of the ram (Fig. 249).

   NOTE: Sometimes it is necessary to move the slide beyond the limit of one inch for some cutting operations. If this is necessary, light cuts should be taken and care should be exercised; otherwise the tool slide may be broken.

2. Move the clapper box to the right (Fig. 251) if the tool is cutting on the right-hand side of the work. This will allow the tool to move clear of the work and will prevent unnecessary wear on the cutting edge of the tool. (Refer to page 179 for setting the clapper box.)

3. Move the clapper box to the left if the tool is cutting on the left-hand side of the work.

4. Set the clapper box in a vertical position for cutting off, for cutting slots, and for making similar cuts.

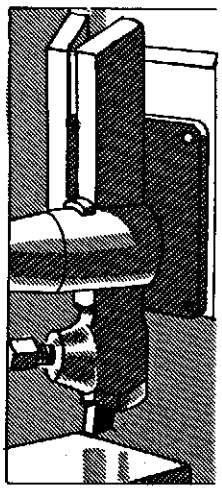
5. Move the head either to the right or to the left for angular cuts.

   NOTE: The adjustment of the clapper box to the right or to the left will depend upon the direction of the cut, whether the cut is on the right or left side of the work, and the direction in which the head is swiveled. These adjustments are fully explained in the following units.

6. Hold the tool short in the tool holder (Fig. 249).

7. Place the tool holder or tool in the tool post with the small-

est possible amount of overhang (Fig. 249). The reasons for this are to secure the tool rigidly, to prevent chatter in the tool, and to prevent undue strain on the tool slide.

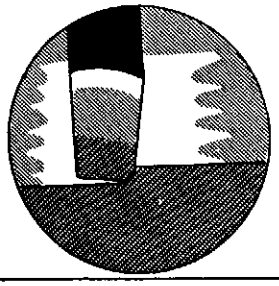


8. Place any one of the tools in the shaper tool post in the conventional manner.(Fig. 252). Notice that the cutting edge of the tool is ahead of the support or fulcrum.

9. Reverse the tool holder illustrated in Fig. 253 if a gooseneck tool is desired. This has the cutting edge behind the support to allow the tool to swing away from the work when it is under heavy cutting pressure. (Refer also to page 155.)

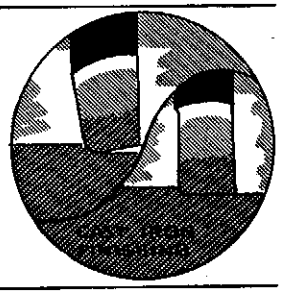
NOTE: The tool holder shown in Fig. 208 is still used in some shops, although it is being gradually replaced by the one illustrated in Fig. 209.

HORIZONTAL CUTS

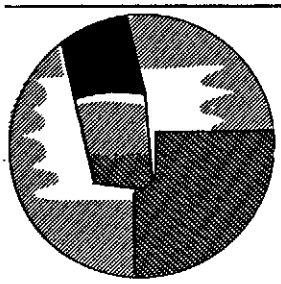


1. Tool head vertical.
2. Clapper box vertical or over to the left.
3. Tool or tool holder held vertically.

1. Tool head vertical.
2. Clapper box vertical or over to the right.
3. Tool or tool holder held vertically.

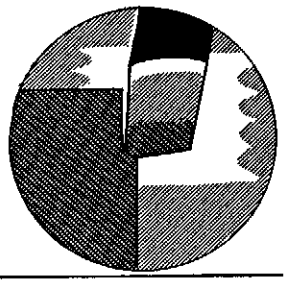


VERTICAL CUTS

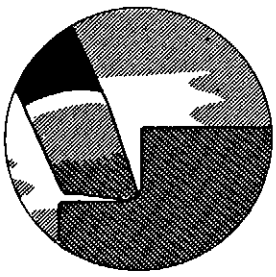


1. Tool head vertical.
2. Clapper box over to the left.
3. Tool holder inclined to give about 5° clearance on the side.

1. Tool head vertical.
2. Clapper box over to the right.
3. Tool holder inclined to give about 5° clearance on the side.

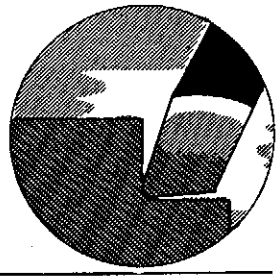


COMBINED CUTS

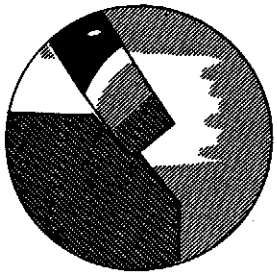


1. Tool head vertical.
2. Clapper box over to the left.
3. Tool set to have about 5° clearance with the vertical and the horizontal sides.

1. Tool head vertical.
2. Clapper box over to the right.
3. Tool set to have about 5° clearance with the vertical and the horizontal sides.

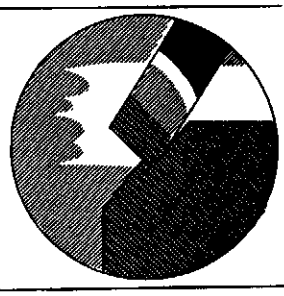


ANGULAR CUTS

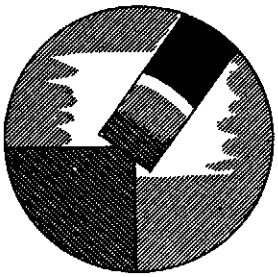


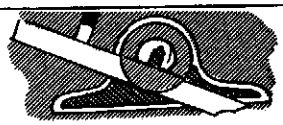
1. Tool head set to the left.
2. Clapper box over to the right.
3. Tool set to have about 5° clearance with the angle of the cut.

1. Tool head set to the right.
2. Clapper box over to the left.
3. Tool set to have about 5° clearance with the angle of the cut.

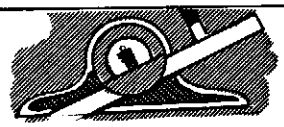


CHAMFERS

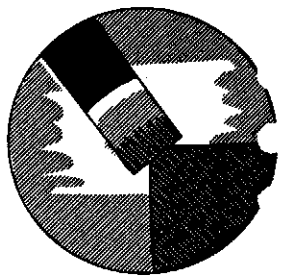




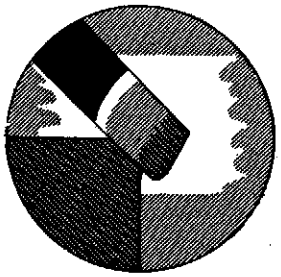
1. Tool head set to the right.
2. Clapper box parallel with the head.
3. Tool edge set approximately with a gage, or with a protractor.



1. Tool head set to the left.
2. Clapper box parallel with the head.
3. Tool edge set approximately with a gage, or with a protractor.

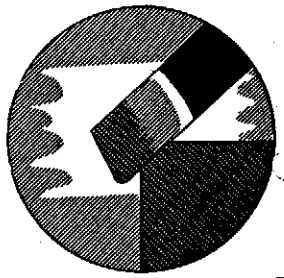


CHAMFERS

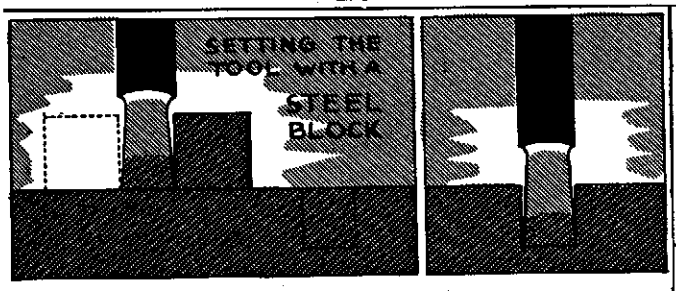


1. Tool head vertical.
2. Clapper box to the right.
3. Tool edge set approximately with a gage, or with a protractor.

1. Tool head vertical.
2. Clapper box to the left.
3. Tool edge set approximately with a gage, or with a protractor.

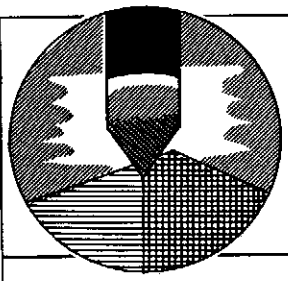


SLOTS



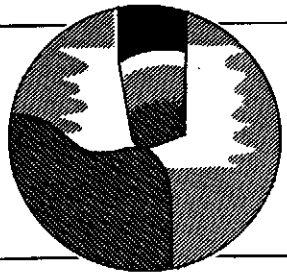
1. Tool head vertical.
2. Clapper box vertical.
3. Tool set with a horizontal surface and side of the tool set with a steel block or a small square.

SERRATIONS



1. Tool head vertical.
2. Clapper box vertical.
3. Tool vertical.

FORM CUTS



1. Tool head vertical.
2. Clapper box vertical.
3. Tool vertical.