

## MACHINE TOOLS

metal slivers and chips. Brackets of various lengths can be used, depending upon the depth of the hole to be drilled (see Fig 24-6).

Breakage of tools results most frequently from use of dull tools. A drill smaller than  $\frac{1}{2}$ -in diameter will often break and cause injury. A larger drill may "fire up" to the extent that it freezes in the hole and then breaks. Furthermore, a frozen tool may spin unclamped or insecurely clamped work, with possible injury to the operator. A frozen drill may likewise strip a gear. Although no injury is likely to result, the damage to equipment and the resulting downtime are expensive. Drills also sometimes catch in thin material and spin it.

When deep holes are being drilled beyond the flutes of the drill, the drill should be removed frequently and the chips cleaned out. If chips are allowed to pile up in such

an operation, the tool may jam, with results similar to those of freezing.

Counterweight chains should be maintained in good condition, and a shield should be installed around the counterweight.

Radial drill accidents are frequently caused by incorrect manipulation of controls. If the drill arm is raised or lowered before the bolts clamping the arm to the column have been loosened, the threads may be stripped, the elevating screw bent, or one or more of the driving gears broken. Gears of elevating screws should be out of mesh before the machine is started. Also, the bolts through the column should be securely fastened and the drill head clamped in place.

### Boring mills

Among common causes of injury in boring mill operations are:

- 1 Being struck by insecurely clamped work or by tools left on or near revolving table
- 2 Catching clothing, wiping rags, etc., in revolving parts.
- 3 Falling against revolving work
- 4 Calipering or checking work while machine is in motion
- 5 Allowing turnings to build up on table
- 6 Removing turnings by hands

The same accident prevention measures are effective on both the table type and the floor type of horizontal boring mills. The operator should never attempt to make measurements near the tool, reach across the table, or adjust the machine or work while the machine is in motion.

When the work is clamped on the table or the bed, the clamps should be placed and blocked with a secure hold on the work so that they cannot spring out of shape. The fork end of U-clamps should be placed on the work. The nuts should be tightened only with a wrench of the correct size, otherwise the wrench may slip off and injure the operator.

If a vise is used to hold the work, the operator should never tighten it by striking the handle with a hammer, because the vise may be sprung or the end of the screw which carries the handle broken off. He should make sure that the bolts holding the vise are securely fastened.

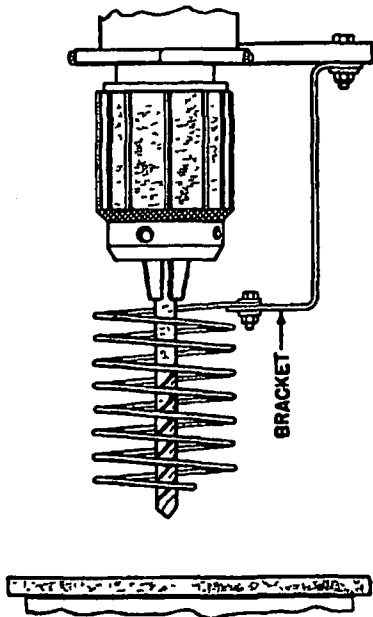


Fig. 24-6. Spring safety guard compresses as drill cuts into metal in order to contain metal slivers and chips.