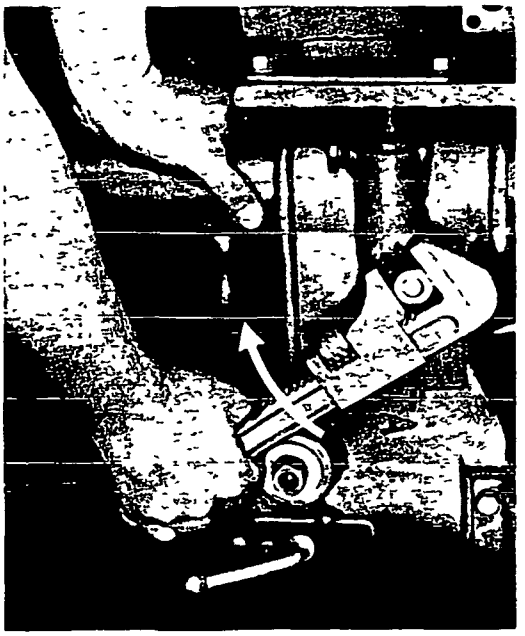


FIG 35–16.—Correct use of a wrench. The wrench is in good condition and securely gripped. Hand of workman is braced and clear in the event that the nut should suddenly turn. To protect workman's hand, wrench is pulled, not pushed.

tool does not fit securely on the bolt or nut but fits at an angle. This concentrates the entire strain at one point, making the tool vulnerable to fracture.

Open-end wrenches have strong jaws and are satisfactory for medium-duty turning. They are susceptible to slipping if they do not fit properly or are used incorrectly.

Combination wrenches have a box opening at one end and an open end at the other end. They are very handy for speeding the turning with the open end and using the box end for initial loosening or final tightening.

Torque wrenches measure the amount of twisting force being applied by means of a dial or calibrated arm. A torque wrench is safer to use than an end or box wrench of similar size because on a torque wrench an excessive amount of twisting force will be indicated. The worker can then reduce the force and thus prevent slips and falls that might occur if the wrench slips, nut twists off, or stud breaks.

A machine wrench is often misused as a hammer. As a result, it soon becomes distorted and, therefore, unsafe. A wrench of the proper size for the job should be selected. It is an unsafe practice to try to make the wrong wrench fit by using shims.

Adjustable wrenches are generally recommended for light-duty jobs or when the proper-size fixed-opening wrench is not available. They are likely to slip because of the difficulty in setting the correct size and the tendency for the jaws to "work" as the wrench is being used.

Unless the space in which the job is being done makes the method impracticable, an adjustable wrench should be placed on the nut with the open jaws facing the user. With the open jaw facing the user, the *pulling force* applied to the handle tends to force the movable jaw onto the nut. For that reason, and for reasons of safety, wrenches should be pulled, not pushed (Fig. 35–16).

According to the manufacturers, the movable jaws on adjustable wrenches are weaker than the fixed jaws. One manufacturer of forged wrenches tested a 10-in. adjustable wrench and found that when the wrench was correctly used, as described in the preceding paragraph, it easily took a 250-pound direct pull on the extreme end of the handle. Turned around with the pull against the movable jaw, the wrench began to slip at between 75 and 100 pounds of pull at the end of the handle.

Pipe wrenches. Workmen, especially those on overhead jobs, have been seriously injured when pipe wrenches slipped on pipes or fittings, causing the men to lose their balance and fall. *Pipe wrenches, both straight and chain tong,* should have sharp jaws and be kept clean to prevent their slipping.

The adjusting nut of the wrench should be inspected frequently. If it is cracked, the wrench should be taken out of service. A cracked nut may break under strain, causing complete failure of the wrench and possible injury to the user.