

a similar tool to groove the opposite side, a punch, and a polishing-wheel. The jaws are upon sliding stocks, which are moved radially by a cam-groove, to cause the necessary rotation in the presentation of the blank to the tools.

In the usual method the blanks, in length from  $1\frac{1}{4}$  to 2 inches, are (1) cut from a coil of wire, and (2) a groove is simultaneously made on each side for the reception of the thread. Successive operators perfect the needle.

The first cuts out the eye with a punch operated by a treadle; the second straightens the blanks by tapping them on a steel block with a mallet; the third takes a dozen or so between the thumb and forefinger, and rounds them by a twirling motion while held against a rapidly moving emery belt; the fourth

points them upon an emery wheel by a very similar manipulation; a fifth polishes out the grooves, using two rapidly rotating brushes, one of brass wire and the other of bristles; a sixth stamps the size or number on each needle.

A number are then placed in a muffle, the muffle in a furnace, and when heated to a cherry red, the needles are emptied into a vessel of whale-oil. This renders them extremely brittle; they are tempered by placing them on a heated copper plate and keeping them in continual motion until they turn to a light straw color, when they are permitted to cool.

The revolving brushes are again used to remove the scale and impart a final polish. The eyes are then polished by drawing rapidly backward and forward over threads charged with polishing

paste; in the case of straight needles, they are now ready for packing, after being straightened by a few blows of the hammer, but those for the Wheeler and Wilson, Grover and Baker, and other machines requiring curved needles, are bent to a curve of seven inches' radius before being packed.

**Sew'ing-ma-chine' Nee'dle.** These are straight or curved, and with an eye near the point. The straight needle is upon a bar which reciprocates in a straight path; the curved needle is upon an arm which oscillates on an axis. (See SEWING-MACHINE.) In one machine for making sewing-machine needles, the blank is grasped by one of a series of jaws and presented progressively to a cutter, a grooving tool,