

The Ring Doubler or Twister (*see illustration page 50*) is somewhat similar in principle to the ring spinning frame illustrated, but has only one line of delivery rollers instead of draft rollers. These machines are made on the English system, with the water trough behind the rollers, or on the Scotch system, with the rollers revolving in the water troughs, which is largely adopted by the thread trade.

The Self-acting Twiner (*see illustration page 51*) is another machine used for doubling. It is worked on the same principle as the self-acting mule, but has, instead of the draft rollers, a locking apparatus to hold the threads while the spindles are winding on the doubled yarn as the slide or creel goes in, and to release the threads as the slide or creel draws out. As a rule, the spindles in a twiner are in a stationary frame, in a similar position to that occupied by the roller beam in the mule, whilst the slide or creel, containing the "cops" or bobbins of yarn to be doubled and twisted, runs to and from this fixed spindle frame.

All recent improvements of the self-acting mule, that are applicable to twiners, such as rope taking-in motion, backing-off chain, tightening motion, and patent nosing motion are adopted. The framing of the headstock is exceptionally solid, and the different parts are easy of access.

Various forms of slides can be supplied, including the old wood locking slide; but the ordinary form is recommended as the simplest and most certain in its action, as it leaves the least slack yarn on unlocking. The slides are arranged for dry doubling, or with water trough, or other arrangements, for wet doubling, and with various forms of creels for doubling from "cops" or bobbins, or from winders' bobbins on which two or more threads have been previously wound. The twiners are made to suit any position of main driving shaft in the building to contain them.

Reeling.—In order to facilitate the dyeing of the yarn, it is necessary that it be in an open condition suitable for receiving the dye, and, to achieve this, it is wound from the cop or bobbin on to a swift in the form of a hank, for which purpose reels are constructed in a variety of ways, depending whether the yarn is to be wound from "cops" or bobbins.