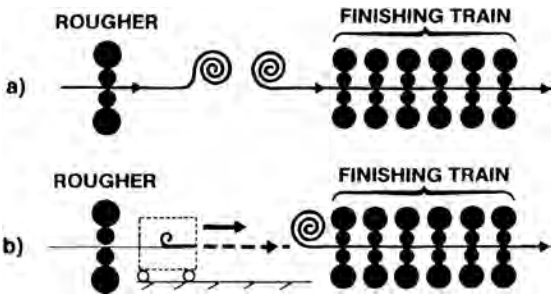

Fig. 14.15 Basic concept of Coilbox (a) and inverse arrangement (b).

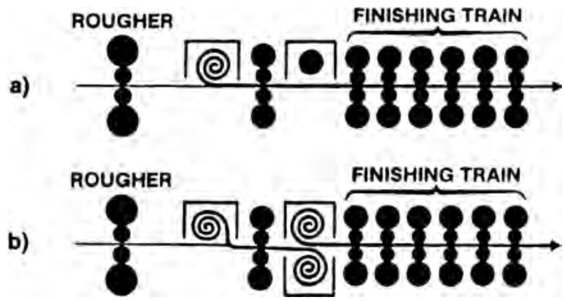

Fig. 14.16 Steckel mill as intermediate stand between roughing and finishing trains.

which reduces roll firecracking as well as secondary scale formation.

14.2.5 Supplementary Heat Conservation and Recuperation Systems

The types of heat conservation systems considered include the Coilbox, intermediate Steckel mill and thermal covers.

14.2.5.1 Coilbox

The Stelco Coilbox, which has been successfully implemented in hot strip mills around the world,[12] is installed at the entry side of the finishing train. Upon leaving the mill after the last roughing pass, the transfer bar is directed into the Coilbox entry chute and through the bending rolls (Fig. 14.15a) to form the coil. The coil is then transferred to the uncoiling position for threading through the finishing train while the next transfer bar is being coiled.

Heat conservation in the Coilbox is due to the increase in equivalent thickness of the body subjected to radiation, and to the increase in ambient temperature inside the eye of the coil. Also, the change in direction of the transfer bar helps reduce the temperature differential of the bar in the longitudinal direction. However, in some cases, special measures must be taken to prevent an excessive temperature rise, especially when the finishing train is being accelerated to increase production rate.

The Coilbox is probably the most efficient heat conservation device of the passive type. Unfortunately, because the cooling rate near the strip edges is much higher than that in the coiled body, the Coilbox efficiency would further emphasize the temperature differential in the transverse direction, which might cause problems with narrow coils.

Use of the Coilbox allows a substantial decrease in transfer table length and reduces installed rolling mill power. These features may partly offset the Coilbox initial cost. Additional maintenance and operating costs may be offset by savings due to lower temperature of the slab leaving the reheat furnace, improved yield and better gauge control.

The major drawback of the Coilbox is the difficulty in automatically controlling the longitudinal temperature gradient. The most convenient method of control is by varying the finishing train speed. However, this method is not practical because a speed increase would result in an undesirable temperature rise, whereas speed decrease would lower production rate.

This problem has been solved in the inverse of the Coilbox (Fig. 14.15b), which provides coiling of the transfer bar beginning from its tail end rather than the head end.[13] In the inverse arrangement, the coiling process begins after the transfer bar head end enters the finishing train and the tail end leaves the roughing train. This method of control allows the required temperature rundown to be maintained by adjusting the coiling rate. It can also be applied when mill acceleration is desirable.

14.2.5.2 Steckel Mill

Installation of a Steckel mill in front of the finishing train[14] can be expected to have effects combining those resulting from installation of the M stand and the Coilbox. In this arrangement, a thicker transfer bar can enter the Steckel mill (a feature similar to that with the M stand arrangement); and then, after passing through the mill stand, the material is coiled (a feature similar to that with the Coilbox).

As an example, the case when three reversing passes are being made at the Steckel mill before material enters the finishing train is illustrated in Fig. 14.16a. A major drawback of this arrangement is that it does not allow use of the Steckel mill to roll the next bar during the final finishing pass of the previous bar; consequently, it results in a lower production rate.

This problem is eliminated by introduction of a third coiling furnace[15] (Fig. 14.16b).

