It is therefore an outstanding object of the present invention to provide improved and simplified means for adjusting the guide rollers of roller receiving guides. This is accomplished by providing a single adjustment means for axially aligning the guide passageway with the roll pass capable of being operated independently from a separate adjusting means for changing the size of the guide passageway to accommodate stock of varying cross-sectional dimensions.

Another object of the present invention is to provide a roller receiving guide having means for simultaneously adjusting both guide rollers when axially aligning the guide passageway extending therebetween with the roll pass.

A still further object of the present invention is to provide means for adjusting both guide rollers without varying the size of the guide passageway extending therebetween.

Another object of the present invention is to provide means for varying the exposure of the guide rollers to the oncoming stock. This is accomplished by providing entry guides which are adjustable relative to the guide rollers.

A still further object of the present invention is to provide improved means for cooling and lubricating the guide rollers in order to extend their useful life.

Another object of the present invention is to provide means for obviating the necessity of utilizing flexible hoses to carry coolants and lubricants to the guide rollers. These and other objects of the present invention will become more apparent as the description proceeds with the aid of the accompanying drawings in which:

FIG. 1 is a plan view of a roller receiving guide according to the present invention;

FIG. 2 is a sectional view taken along line 2–2 of FIG. 1;

FIG. 3 is a sectional view taken along line 3–3 of FIG. 1;

FIG. 4 is a sectional view taken along line 4–4 of FIG. 1;

FIG. 5 is a sectional view taken along line 5–5 of FIG. 2;

FIG. 6 is an enlarged sectional view taken along line 6–6 of FIG. 1;

FIG. 7 is an enlarged sectional view taken along line 7–7 of FIG. 1;

FIG. 8 is a rear perspective view of a saddle plate mounted on the rest bar with two roller receiving guides according to the present invention mounted thereon; and

FIG. 9 is an enlarged view of a portion of FIG. 5.

Referring initially to FIGS. 1, 2 and 8 wherein are best shown general features of the invention, a rest bar 10 extends transversely across the front of the roll housing 9 which contains work rolls 12 and 14. The rest bar is provided with integrally fabricated upwardly disposed front and rear side members 16 and 18 forming an inner intermediate chamber 20. The upper face of rear side member 18 is suitably grooved to provide an angularly shaped shoulder 22 extending upwardly therefrom across its entire length.

An intermediate supporting member 24, hereinafter referred to as a "saddle plate," is provided with integrally fabricated depending leg members 26 and 28 which cooperate with the upwardly disposed side members 16 and 18 of the rest bar in locating the saddle plate thereon. More particularly, leg member 26 is grooved as at 30 to receive shoulder 22 in relatively tight slidable engagement therein. At the same time, the lower face of depending leg member 28 is suitably machined to slidably contact the upper face of side member 16 as at 32. Thus it can be seen that when mounted on the rest bar as
shown in FIGS. 1 and 2, saddle plate 24 may be slidably displaced therein in a direction transverse to the pass line. When properly located, saddle plate 24 is locked in place by means of saddle plate clamps 34 having angularly disposed upper extremities designed to seat against an angular locking face 36 on leg member 28. Bolt members 38 extend angularly through front side member 16 of rest bar 10 and saddle clamps 34 to be engaged by locking nuts 40. With this arrangement, when saddle plate 24 has been slidably displaced in a direction transverse to the pass line to the desired location on rest bar 10, locking nuts 40 are simply tightened to exert a holding force on locking face 36. This in turn results in the saddle plate being forced toward the work rolls as shoulder 22 is tightly seated within groove 39 in leg member 26. Moreover, the angular disposition of locking face 36 results in a downward force being exerted on leg member 28 tending to hold it tightly on the upper face of integrally fabricated front side member 16. Thus it can be seen that once locking nuts 40 are tightened, the saddle plate 24 is held securely in place on rest bar 10.

As can best be seen from a further combined reference to FIGS. 1, 2 and 8, saddle plate 24 is provided with a relatively flat upper surface 42 terminating at its rearward edge adjacent the work rolls in an upwardly disposed integrally fabricated shoulder stop 44 which is notched to provide a beveled angular face 46. Surface 42 is interrupted by a plurality of longitudinal grooves 48 extending inwardly from the forward edge of saddle plate 24 in a direction parallel to the pass line. It is to be understood that, although three grooves have been illustrated in the drawings, their number may be varied to suit any number of strings in a particular rolling operation without departing from the spirit and scope of the invention. Each groove 48 in turn contains a longitudinal key 50 held in place therein by several retaining screws indicated typically by reference numeral 52. When positioned within grooves 48, the keys 50 protrude upwardly above the flat upper surface 42 of saddle plate 24 and as will hereinafter be described serve as locating means for the roller guide assemblies.

The description will now proceed with particular reference to the roller receiving guide assemblies according to the invention which will hereinafter be referred to by the reference numeral 54. Each roller receiving guide assembly 54 is provided with a basic housing construction comprised in part of a base plate 56 having opposed angularly beveled edges 58 and 60 and an underlying longitudinal keyway 62 (see FIGS. 3 and 4) cut into its lower face. Beveled edge 60 is further provided with a cammed locking surface 64 used in locating the guide assembly in place. When the roller receiving guide 54 is mounted on saddle plate 24, it is accurately located and guided into place thereon by seating key 50 within keyway 62 in base plate 56. Once this has been accomplished, the guide assembly is pushed forward toward the work rolls until beveled edge 58 of base plate 56 is seated against the beveled face 46 of shoulder stop 44. At this point, a guide assembly clamp 66 which is mounted for pivotal movement about the longitudinal axis of retaining bolt 68 is rotated in a clockwise direction to cooperate with the cammed locking surface 64 on beveled edge 60 in locking base plate 56 against shoulder stop 44. To facilitate locking and unlocking of the base plate in the aforementioned manner, clamp 66 is further provided with an integrally fabricated extension 70 which may be struck by a hammer when pivoting the clamp in either a clockwise or counterclockwise direction.

As shown in FIG. 8, left roller receiving guide 54 is located in place by a holding force exerted by clockwise pivotal movement of the guide assembly clamp 66 associated therewith. The middle roller receiving guide has been removed to provide an additional illustration of groove 48 containing key 50. The right roller receiving guide 54 is shown in position on saddle plate 24, but without the guide assembly clamp 66 associated therewith being pivoted to the locked position.

Referring now to FIGS. 2-4, base plate 56 is further provided with a pair of spaced side members 72 and 74 extending upwardly from either side thereof. A cap member 76 is supported and firmly fixed to side members 72 and 74 by means of retaining screws 78 and dowels 80 to provide a box-like frame structure for the roller guide assembly. Elongated pivotal roller holders 82 and 84 are then mounted between side members 72 and 74 by means of pivot pins 86 which extend vertically therethrough. The upper and lower ends of the pivot pins are journaled for rotation within opposed vertically aligned receiving apertures in cap member 76 and base plate 56 respectively as can be best seen in FIG. 3.

The roller holders 82 and 84 are provided at the ends adjacent the work rolls 12 and 14 with rotatable guide rollers 88. The guide rollers, which may be grooved as shown in the drawings, are suitably spaced to define a guide passageway 89 having cross-sectional dimensions designed to closely approximate that of the stock passing therethrough. In this manner, the guide rollers rotatably engage the surfaces of the stock in order to provide an accurate supporting and aligning means immediately preceding the roll pass.

Each roller holder 82 and 84 is further provided at the rear end remote from the work rolls with upwardly disposed integrally fabricated ears 92 and 94 which protrude upwardly therefrom to a level corresponding to the horizontal plane containing cap member 76. A coiled spring 96 (see FIG. 1) extends outwardly from within a suitably disposed recess 98 in cap member 76 to bear against the outer face of roller holder 92 as at 104. The spring force is transmitted to roller holder 92 by means of a first adjusting screw 102 threaded through ear 94 of roller holder 84 to bear against the inner surface of ear 92. Roller holder 82 is in turn held in place against the force of spring 96 by means of a second adjusting screw 104 which is threaded through a rearward integral extension 106 of cap member 76 to bear against the outer surface of ear 92 in an oppositely disposed relationship to adjusting screw 102.

In view of the above, it should now be evident that two separate individual adjustments may be imparted to the roller holders 82 and 84 and their respective guide rollers 88 by proper manipulation of either adjusting screw 102 or 104. Moreover, particularly, the guide passageway 89 between guide rollers 88 may be adjusted to accommodate stock of varying cross-sectional dimensions by rotating first adjusting screw 102 in either a clockwise or counterclockwise direction. By so doing, upwardly disposed integral ears 92 and 94 will either by spread apart or brought together, thereby imparting a corresponding opposite adjustment to the guide rollers mounted on the opposite end of the roller holders. Constant contact between ear 92 and the end of first adjusting screw 102 will be maintained at all times by the expansive force of coiled spring 96.

Once the desired spacing between guide rollers 88 has been attained by proper adjustment of first adjusting screw 102 guide passageway 89 may then be aligned axially with the roll pass by operating adjusting screw 104. This will result in both roller holders 82 and 84 being pivoted simultaneously about their respective pivot pins 86 without varying the cross-sectional dimensions of the guide passageway. When the second adjusting screw 104 is rotated in a clockwise direction, coiled spring 96 will be further compressed. By the same token, counterclockwise rotation of second, adjusting screw 104 will allow a clockwise pivotal motion of both roller holders 82 and 84 about their respective pivot pins 86 as the coiled spring 96 is expanded. Thus it can be seen that once the proper spacing is obtained between guide rollers 88, guide passageway 89 may be freely adjusted by operating a single adjusting screw 104. This is to be contrasted to existing
roller guide assemblies where separate adjusting means are not available for controlling the spacing between the guide rollers and for axially aligning the guide passageway formed therebetween with the roll pass.

In order to provide a means of initially guiding the leading edge of the oncoming stock to the guide passageway 89, entry guide halves 108 and 110 are attached to the inner faces of roller holders 82 and 84. The entry guide halves cooperate to form an entry passageway 112 having an enlarged end as at 114 (see FIG. 5) to facilitate entry of stock therein. Entry passageway 112 is gradually tapered to terminate in an opening adjacent the guide rollers 88 (see FIG. 7) slightly larger than the guide passageway 89 formed therebetween. With this construction, the leading end of an oncoming length of stock enters the entry passageway 112 at the enlarged portion 114 and is gradually guided by intermittent contact with the inwardly tapered walls of the entry guide halves 108 and 110. Consequently, as the leading end of the stock arrives adjacent guide rollers 88, it is in substantial vertical and horizontal alignment with guide passageway 89. Final accurate alignment of the stock is achieved as it is lifted off the guide halves by continuous contact with the rotatable guide rollers. Thus it can be seen that the continuous frictional contact of conventional guides is replaced by rotatable engagement at this critical point immediately preceding the roll pass.

An additional feature of the present invention is the provision of means for adjusting the entry guide halves 108 and 110 in order to control the exposure of the guide rollers 88 to the leading ends of oncoming stock. By so doing, the vertical position of the stock is controlled and damage to the guide rollers 88 by the stock engaging the upper or lower roller shoulders 91 (see FIG. 6) is avoided. More particularly, as can best be seen in FIG. 9, each of the entry guide halves 108 and 110 is provided with a laterally extending threaded stud 116. When being installed, the guide halves are first positioned between roller holders 82 and 84 with their respective studs 116 seated within horizontal receiving slots 118 in each roller holder. The ends of the guide halves are properly located in relation to the guide rollers 88 by pushing each guide half forward until the projecting bell mouth surface 117 (see FIGS. 5 and 9) contacts the end of the roller holder to which it is being attached. As can be best seen in FIG. 9, when so located, the outer face of each guide half is in contact with the distal disposable shoulder 120 of the adjacent roller holder as at 122. A nut is then threaded down on each stud 116 and tightened to exert a force F1, which acts through a short moment arm M equal to the distance between the longitudinal axis of stud 116 and the point of contact 122 between shoulder 120 and the guide half. The resulting torque causes the guide half to pivot about point 122 into contact with the end of a set screw 124 (see FIG. 5) which is threaded through the roller holder. Thus it can be seen that by adjusting set screw 124, the guide half in contact therewith will be sprung and adjusted horizontally in relation to the downstream guide roller. In this manner the degree of guide roller exposure to the leading ends of oncoming stock can be controlled following the installation of each guide half, thereby providing a means of avoiding harmful impacts which could easily cause roller bearing damage or collaring and resulting in roller guide failures.

The means utilized in cooling the guide roller surfaces and lubricating the roller bearings will now be described with particular reference to FIG. 2. A coolant, as for example water under pressure, is fed upwardly through intermediate inner chamber 20 by means of a flexible hose 125 connected to inlet port 126 in a cover plate 128 which is attached as by welding to the lower surface of saddle plate 24. The water then proceeds through a horizontally disposed passageway 130 in saddle plate 24 to a second transverse horizontal passageway 131. From this point, some of the water will rise through vertically disposed passageways 132 and 133 in saddle plate 24 and base plate 56 to enter a second horizontally disposed passageway 134 (see FIG. 3) in base plate 56. The remainder of the water will exhaust through spray nozzles 136 to cool the grooves on the work rolls.

From passageway 134 in base plate 56, the water then rises vertically through short passageways 138 in pivot pins 86 to continue horizontally through communicating passageways 140 in each roller holder. From passageways 140, the water is then fed upwardly by connecting passageways 142 to impart a cooling effect to the surfaces of guide rollers 88. In addition, water is also taken by connecting passageway 144 and fed upwardly through a passageway 146 (see FIG. 6) through the central non-rotating shaft 148 of each guide roller to exit horizontally at 150 in order to lubricate the guide roller bearings 151. Thus it can be seen that each guide roller is both cooled and lubricated by the application of a single fluid thereto. In addition, due to the integral network of passageways extending through the rest bar, saddle plate and guide assemblies, the necessity to utilize flexible exterior hoses is completely obviated, a factor which in turn contributes materially to the ease of installation and maintenance of the unit.

It is intended to cover all changes and modifications of the examples of the invention herein chosen for purposes of disclosure which do not depart from the spirit and scope of the invention.

1. In a rolling mill, a roller receiving guide for controlling the entrance of stock into a roll pass formed by adjacent work roll's comprising the combination of: a pair of matching guide rollers spaced to define a guide passageway therebetween; structural means for rotatably supporting said guide rollers; said guide rollers being closely adjacent said roll pass, said structural means comprising of a guide housing removably attached to a base member and having spaced pivotable side members associated therewith, one end of each said side member provided with bearing means for rotatably supporting said guide rollers; means for accommodating stock of varying cross-sectional dimensions by symmetrically adjusting said guide rollers in opposite directions relative to the axes of said roll pass; means for simultaneously imparting pivotal adjustment to both said side members in a common direction in order to axially align said guide passageway with said roll pass while allowing the size of said guide passageway to remain unchanged; entry guide means for directing oncoming stock through the guide passageway formed by said guide rollers; means for adjusting said entry guide means relative to said side members in order to vary the exposure of said guide rollers to said oncoming stock; and means for hydrostatically cooling and lubricating the guide rollers during operation of said rolling mill, said means comprising a supply of fluid connected through said base member and an integral network of fluid passageways extending through said guide housing to said pivotable side members to points of application of said bearing means and the surfaces of said guide rollers.

2. In a rolling mill, a roller receiving guide for directing stock into a roll pass, said guide comprising: a base structure having a pair of spaced elements pivotally mounted thereon; a guide roller adjustment means, the said guide rollers cooperating to define a guide passageway therebetween; a first adjustment means for simultaneously adjusting each said guide rollers in opposite directions in order to change the size of said guide passageway; and, a second adjustment means for simultaneously adjusting each said guide rollers in the same direction when aligning said guide passageway with the roll pass.

3. The apparatus as claimed in claim 2 further characterized by said first and second adjustment means being operable independently of each other.
4. The apparatus as claimed in claim 3 further characterized by entry guide members removably attached to the opposed inside surfaces of each said spaced elements, said entry guides cooperating to define a tapered entry passageway for directing stock to the guide passageway formed between said guide rollers.

5. A roller receiving guide as claimed in claim 4 further characterized by a third adjustment means for varying the size of said entry passageway, thereby permitting the surface area of said guide rollers exposed to the oncoming stock to be varied.

6. The apparatus as claimed in claim 2 further characterized by said first adjustment means comprising a first screw threaded through the other end of one of said pivotally mounted elements, the end of said screw bearing against the adjacent inner side of the other of said elements.

7. The apparatus as claimed in claim 6 further characterized by spring means cooperating with said base structure to urge the other ends of said pivotally mounted elements together, thus maintaining the end of said first screw in contact with the adjacent inner side of the other of said elements.

8. The apparatus as claimed in claim 7 wherein said second adjustment means comprises a second screw threaded through said base structure, the end of said second screw bearing against the outer side of the other of said elements.

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