Aug. 20, 1935. S. A. SMITH 2,012,074

ENTRY GUIDE

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Fig. 1.

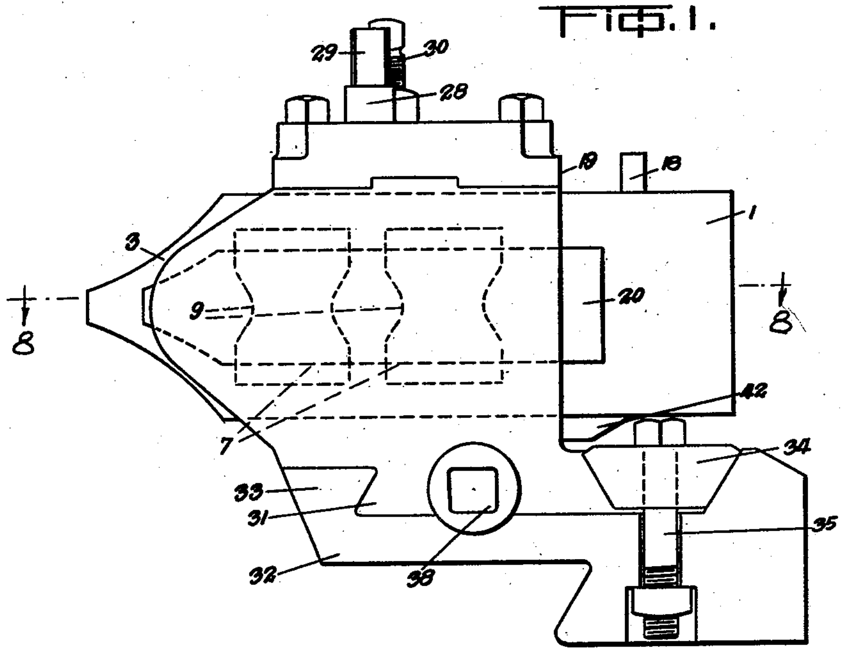

Fig. 2.

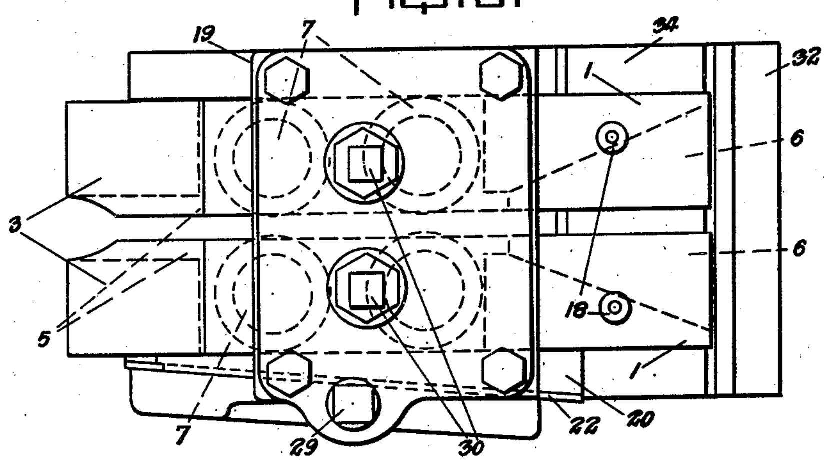

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Fig. 3.

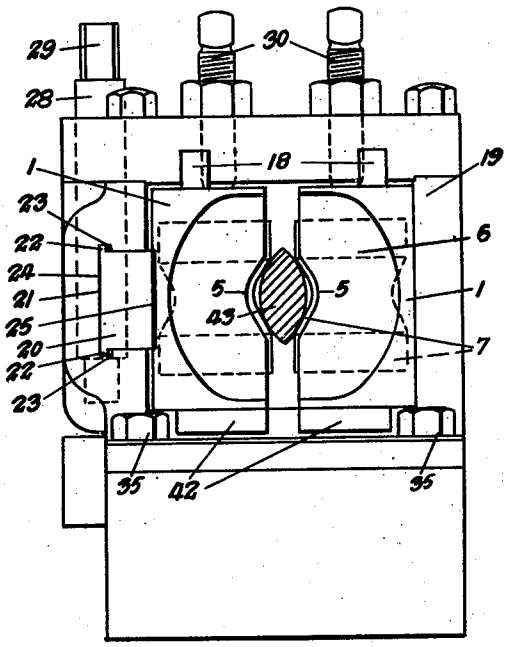

Fig. 6.

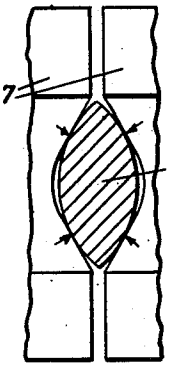

Fig. 7.

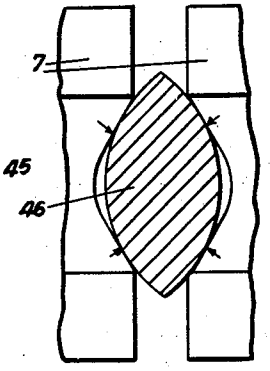

Fig. 4.

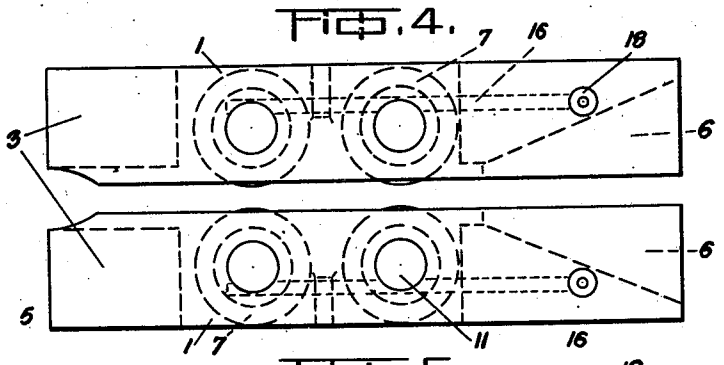

Fig. 5.

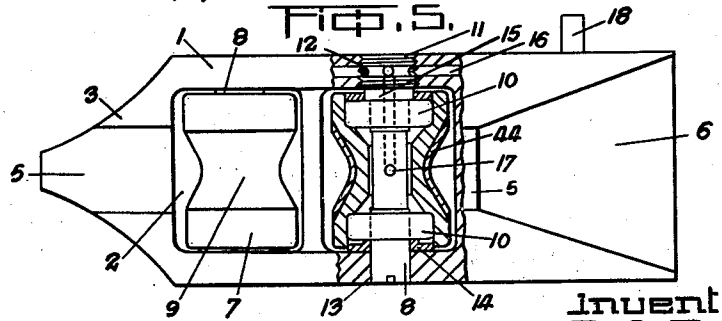

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FIG. 8.

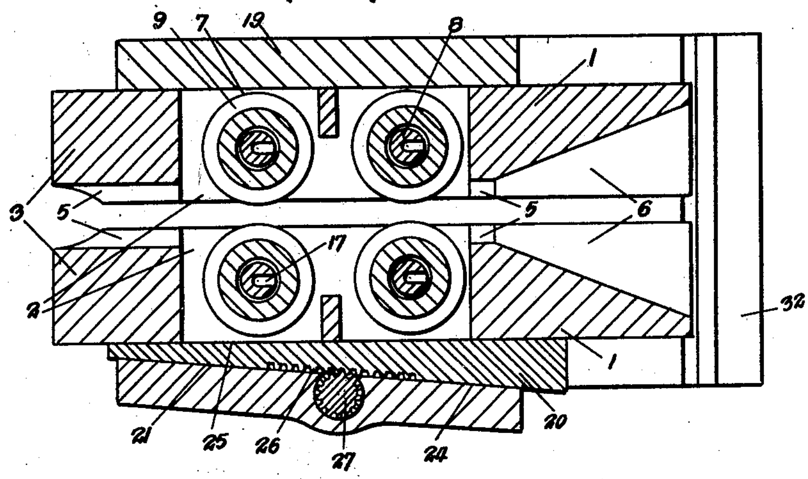


FIG. 9.

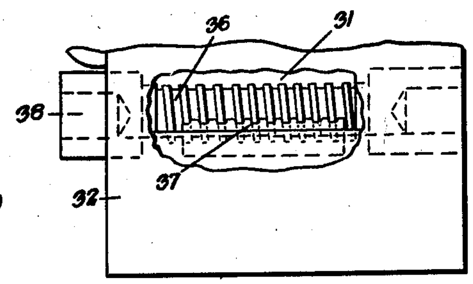
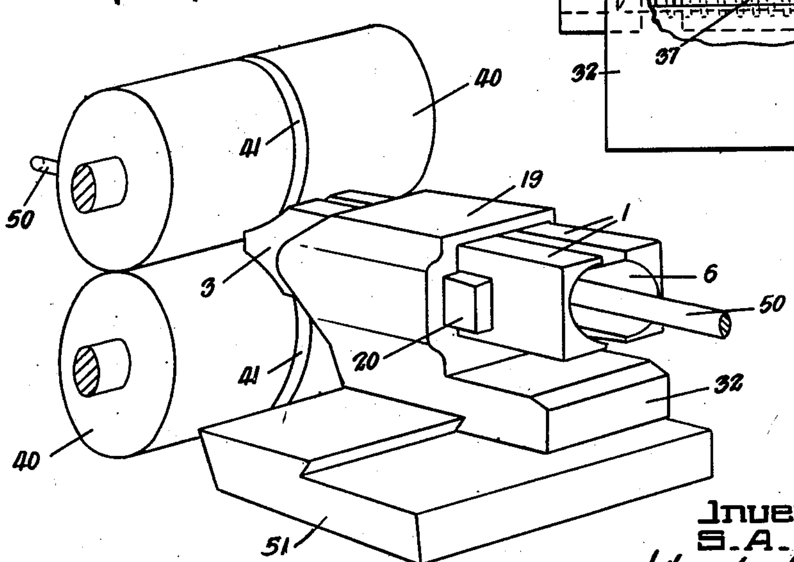


FIG. 10.



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UNITED STATES PATENT OFFICE

2,012,074

ENTRY GUIDE

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Application February 24, 1933, Serial No. 658,391

12 Claims. (Cl. 80—51)

My invention relates to improvements in entry guides used in the rolling and forming of hot metal rods, or bars, and the object of my invention is to furnish rollers in an entry guide for the purpose of supporting and guiding the rods or bars as they pass therethrough to the forming rolls. In standard practice it is generally customary to provide stationary guide pieces between which the fed rod or bar is carried and supported, and as such stationary guide pieces have a comparatively short life owing to their frictional contact with the hot metal I have provided my supporting rollers in lieu thereof.

It will be understood by those conversant with the art, that in standard practice the rod or bar to be rolled is furnished of substantially oval cross sectional form, and that such rod or bar when hot is fed between the forming rollers which squeeze it into round form of required diameter. In standard practice where stationary guides are used it is necessary to furnish a particular size of guide for each size of oval rod as, of course, the rod must have a uniform bearing against its guides in order to obviate grooving of marring as it passes rapidly therethrough, A further object of my invention is, therefore, to form the faces of my supporting rollers with grooves of predetermined cross sectional curvature so that one set of rollers can be used in conjunction with several sizes of rod, each roller only making contact with the rod at two points. As the rollers freely rotate the two-point contact between the roller and the rod does not lead to grooving or marring of the rod surface.

A further object of my invention is to provide an improved type of entry guide box in which the entry guides are contained and by the particular construction of which, the entry guides can be readily and accurately adjusted both to receive the rod fed therethrough and also to accurately direct the rod through the forming rolls, and a still further object of my invention is to provide a guide alignment mechanism in the guide box whereby the guides can be moved transversely and at the same time kept in accurate parallel relation with one another without altering the settings of the guides themselves.

My invention consists of entry guides and an entry guide box constructed and arranged all as hereinafter more particularly described and illustrated in the accompanying drawings in which:

Fig. 1 is a side elevational view of my guide box showing my roller guide members positioned therein.

Fig. 2 is a plan view of the box as illustrated in Fig. 1.

Fig. 3 is an end elevational view of the box as illustrated in Fig. 1, such view showing the entry end of the box and guides, and a rod positioned between the guides.

Fig. 4 is a plan view of a pair of guide members shown apart from the box.

Fig. 5 is a side elevational view of the upper guide member as shown in Fig. 4, one roller and part of the guide member frame being shown in section.

Figs. 6 and 7 illustrate fragmentary portions of two pair of rollers of the same size, showing two sizes of oval rod carried therebetween.

Fig. 8 is a horizontal cross sectional view taken through the line 8—8, Fig. 1, showing the provision of my adjustable wedge for securing an accurate lateral adjustment of my guide members within the box.

Fig. 9 is a fragmentary view with a portion broken away showing the adjustment means between the box and its supporting saddle, and

Fig. 10 is a perspective schematic view of my guide box and a pair of forming rollers showing the bar passing from the guide box through the rollers.

Like characters of reference indicate corresponding parts in the different views in the drawings.

In setting forth my invention I will first describe my roller containing guide members and in this connection draw particular attention to Figs. 4 and 5 wherein this feature of my invention is shown apart from the guide box. As explained in the preamble of my specification my roller guides are designed to take the place of the stationary guides as are in general use and my roller guides are, therefore, positioned within guide members having substantially the same outward form as the stationary guides and are positioned within a guide box as is done in standard practice, a pair of guide members being housed within a box and between which the hot rod or bar passes. As each of the guide members are of identical form with the exception that they are designed either to go into the right hand or left hand side of the box I shall confine my description to a single guide member as illustrated in Fig. 5.

The guide member comprises a metal frame 1 having its roller containing aperture 2 in the vicinity of its forward end. The end portion of the frame 1 containing the aperture 2 is drawn to a point 3 to permit it to extend in close proximity

to the rolls as is done in standard practice with stationary guides, and the inner face 4 of the frame is formed with a central longitudinal groove 5 running from end to end thereof, and at the feed end of the frame, i. e. the end opposite the pointed end, the groove merges into a flare 6 so that when a pair of frames are placed together the flares 6 form a large receiving orifice for the reception of the rod passing therethrough.

The aperture 2 in the frame is furnished to contain a plurality of rollers 7 which are freely mounted upon vertical spindles 8 extending upwardly of the frame, the rollers being formed with central peripheral grooves 9 in which the bar is contained and supported. The grooved portions of the rollers are provided of such a diameter and the spindles 8 so positioned in relation to the thickness of the frame that the grooved faces of the rollers are positioned beyond the groove 5 so that the bar when in contact with the roller grooves 9 is out of contact with the frame groove 5. In the drawings I have shown a pair of rollers in each guide frame but, of course, it will be understood that it is not necessary to restrict myself to the provision of two rollers as in larger sizes three or more rollers may be considered necessary, it being also, of course, understood that the rollers are set in line so that each pair of oppositely positioned rollers in a pair of guide frames are equi-distantly spaced apart when the guide frames are in parallel relation.

The rollers can be mounted in any suitable manner and in Fig. 5 I show a form of mounting which I have found to be satisfactory. In this form the ends of the roller 7 are cupped out to receive ball bearing races 10 through which the spindle 8 extends, the centre portion of the roller, of course, being hollow to receive the spindle. The spindle 8 is enlarged at one end 11 and threaded into an orifice 12 in the frame, the other end of the spindle fitting within an oppositely positioned orifice 13 in the other member of the frame. The ball races 10 are of the type adapted to take an end thrust, the inner ring of the bottom race resting against a thrust washer 14 and the inner ring of the top race abutting a shoulder 15 formed underneath the enlarged portion 11 of the spindle. The bearings are packed in grease and additional grease is supplied thereto through grease passages 16 and 17 in the frame and spindle which communicate with a grease gun nipple 18. The rollers which are in contact with the white hot bars passing therethrough have their grooved face portions veneered with some suitable heat resisting alloy 44 such as "Stellite".

As my roller guide frames are of substantially the same form and dimensions as stationary guides they can be used in lieu thereof in the standard type of guide box, but as it is somewhat difficult to obtain correct guide alignment and correct frictional contact between the guides and the rod passing therethrough with the standard box, I have devised a box which is particularly suitable for use in conjunction with my roller guides, but which can also be used to advantage with stationary guides.

This box as illustrated in Figs. 1, 2 and 3 follows standard practice in design apart from the adjustment features which I have provided and comprises a rectangular box portion 19 open at its ends and in which the guide frames 1 are positioned and from which they protrude. The box portion 19 is of greater internal width than the combined width of the guide frames and the width of the largest rod which the guides are adapted to receive, and for securing a uniform contact between the guide rollers and the rod I furnish a wedge adjustment as more particularly shown in Fig. 8. A wedge 20 is provided within a slot 21 running from end to end of one inner side face of the box 19, the rear portion of the wedge being formed with a pair of upper and lower tongues 22 which extend into grooves 23 in the rear edges of the slot whereby the wedge is permitted to slide but is retained against displacement when the guide frames 1 are removed. The rear face of the slot 21 is inclined as is the rear face 24 of the wedge, the front guide frame contacting face 25 of the wedge being parallel to the inner side faces of the box portion 19. For moving the wedge to and fro within the box for adjustment purposes I form the rear face 24 of the wedge with rack teeth 26 which engage a pinion 27 journaled within and protruding upwardly from the box portion 19, the upper end of the pinion stem 28 being formed with a spanner receiving square 29. For locking the guide frames 1 in place after adjustment I furnish the usual lock studs 30 which are threaded into the top of the box portion 19 to bear upon the tops of the frames.

In order to obtain a lateral adjustment of the box as a whole in relation to the rest bar, not shown, I form the bottom face of the box with a feather member 31 which is slidably mounted upon the saddle 32 between a stationary guide 33 and a lock guide 34 which is drawn into locking contact with the feather member by a pair of lock bolts 35 extending through the lock guide and saddle. The saddle 32 is, in turn, adjustably mounted in front of the rollers, following standard practice. For moving the guide box relatively to the saddle I provide the interior portion of the feather 31 of hollow form and furnish a worm screw 36 extending through the centre of the feather. The screw is in engagement with a threaded block 37 secured to the saddle and as the screw 36 is free to rotate within the feather but held against longitudinal movement as is also the block 37, rotative movement of the screw will slide the guide box upon the saddle. In the drawings I have shown one protruding end of the screw formed with a head having a square recess 38 therein for the reception of a handle. For adjustment purposes the bolts 35 are slackened and when the required adjustment has been achieved the bolts are tightened up to lock the box in place.

As the guide rollers freely rotate upon the supported rod passing therebetween a set of rollers of one size can be used in conjunction with bars of various sizes, for example one size of roller can be used with bars for making ¾" to 1⅛" rods, and another size of roller can be used in conjunction with bars for making 1⅝" to 2$\frac{1}{16}$" rods. In Figs. 6 and 7 of the drawings I show a pair of rollers 7 of one size as used in conjunction with an oval rod 45 for making ¾" round rod and also with an oval rod 46 for making 1⅛" round rod. In these two figures it will be seen that the oval rod contacts each roller groove at two points indicated by the arrows in its side faces. From Figures 6 and 7 it is obvious that rolls with one size of groove will provide a two point suspension for any sized rod within a given range of cross sectional sizes. It is to be noted also that the points of suspension are located inside the outer edges of the side walls of

the groove and that the relatively sharp outer edges thereof are never brought into contact with the rod to score the same. This result is accomplished by making the side walls of the groove substantially straight and diverging. In the case of stationary guides, a guide size has to be furnished for each size of oval rod as the provision of only two contacting points between the groove in a stationary guide and the rod would very quickly roughen and groove the surface of the hot rod in its rapid passage through the guide.

However, by providing guides such as described above, one guide will handle not only a plurality of variously sized rods and thus, materially reduce the number of different sized guides required, but also, the life of the guides is materially lengthened by reason of the rolling two point contact.

In Fig. 10 wherein a schematic view of the guide assembly and forming rollers is shown I show the oval rod 50 passing through the guide assembly and from thence between the forming rollers 40 which are formed with peripheral grooves 41 between which the rod is fed and in which it is pressed into round form. When the rolling mill is being set for a run a pair of frames 1 containing rollers of required size are positioned within the guide box 10 and pushed up into place so that their stops 42 engage the bottom rear face of the guide box. A piece of oval rod 43 of the size to be used in the run is then inserted between the rollers of the two frame members 1, as is illustrated in Fig. 3, and the pinion 28 rotated to move the wedge 29 and bring the adjacent guide frame 1 into a position wherein its rollers contact the rod, the other guide frame being in contact with the opposite side face of the box. When the correct supporting tension between the rod and the rollers has been obtained through movement of the wedge the locking studs 30 are tightened down. The length of rod 43 is then pushed towards the rolls 40 and the box slid upon the saddle 32 through the medium of the screw 36 until accurate alignment is obtained, it being, of course, understood that the guide box assembly is roughly lined up upon the supporting bar prior to the final adjustment. When this final adjustment is obtained the bolts 35 are tightened up whereby the guide box is secured in place upon the saddle. The rod length 43 is then removed and the guides are ready for the reception of the hot bar 50 to be fed therethrough.

From the foregoing description it will be apparent that I have provided a very useful improvement in entry guides as used in the rolling of hot metal rods wherein my roller guides have a much greater life than the stationary guides and also by the use of my roller guides there is little or no possibility of the surface of the bar becoming marred or worn in its passage therethrough, which is very frequently the case with the use of stationary guides, as stationary guides very quickly become pitted, flaked and worn due to their frictional contact with the hot metal, thus necessitating their frequent replacement, and furthermore by the provision of my freely rotatable rollers I can use one size of roller in conjunction with several sizes of rod.

Although I have shown my roller guides of a particular form and supported within a particular construction of guide box, it is to be understood that my invention is capable of various applications apart from the particular construction shown, it being obviously within the scope of my invention to provide rollers formed to support bars or rods of any other cross sectional form apart from that shown, and also that the rollers can be horizontally or vertically positioned without departing from the spirit of my invention as set forth in the appended claims.

What I claim as my invention is:

1. In the rolling of hot metal rods, a rod entry guide adapted to receive a rod of substantially oval cross section, and a plurality of rollers incorporated within the guide to solely support a rod, the faces of said rollers being each formed with a peripheral groove having substantially straight diverging side walls, said walls providing a two point suspension for said rod, said points of suspension being located inside the outer edges of said walls.

2. In the rolling of hot metal rods, a rod entry guide box, a plurality of guide members adjustably contained within the guide box and adapted to receive a rod of substantially oval cross section, and a plurality of rollers mounted in the guide members to solely support the rod, the faces of said rollers being each formed with a peripheral groove having substantially straight diverging side walls, said walls providing a two point suspension for said rod, said points of suspension being located inside the outer edges of said walls.

3. In the rolling of hot metal rods, a rod entry guide box, a pair of oppositely positioned guide members extending longitudinally through the guide box and adjustable laterally therein and adapted to receive a rod of substantially oval cross section, a plurality of rollers mounted in each of the guide members, said rollers solely supporting a rod, the faces of said rollers being each formed with a peripheral groove having substantially straight diverging side walls, said walls providing a two point suspension for said rods, said points of suspension being located inside the outer edges of said walls.

4. In the rolling of hot metal rods, a rod entry guide comprising opposed guide members, a plurality of peripherally grooved guide rollers carried by each member, means for adjusting at least one of said members to permit accommodation of any rod within a given range of thickness, said grooves having substantially straight diverging side walls, and said walls providing a two point suspension for any rod in said thickness range at points inside the outer edges of said walls.

5. In the rolling of hot metal rods, a rod entry guide box, a plurality of guide members adjustably contained within the guide box, a plurality of peripherally grooved rollers mounted in each of said members, the grooves in said rollers having substantially straight diverging side walls, and said side walls providing a two point suspension for any rod within a given range of thickness, said points of suspension being located inside the outer edges of said walls.

6. An entry guide for mills for rolling hot metal rods comprising a guide box, spaced apart pairs of rollers journalled in said guide box, a circumferential groove in the peripheral face of each roller, said grooves having side walls diverging in substantially straight lines, the rollers in each pair being spaced apart, and said side walls of each groove providing a two point suspension for a rod, said points of suspension being located inside the outer edges of said walls.

7. The structure of claim 6, adjusting means for varying the spacing of the rollers of each pair for accommodating substantially oval rods of dif-

ferent cross sectional sizes within a given range, said points of suspension of said rods on said side walls varying in accordance with the size of the rod guided.

8. A rod rolling mill entry guide comprising a guide box, a pair of opposed guide members extending longitudinally therein, a plurality of rod receiving rollers longitudinally aligned in the opposed faces of said guide members, said rollers having peripheral rod holding grooves formed therein with the walls thereof diverging in substantially straight lines, and said walls of each groove providing a two point suspension for a rod, said points of suspension being located inside the outer edges of said walls.

9. In a rod rolling mill entry guide, opposed rollers therein said rollers having rod receiving peripheral grooves formed therein with the walls thereof diverging in substantially straight lines and said walls of each groove providing a two point suspension for a rod, said points of suspension being located inside the outer edges of said walls.

10. A rod rolling mill entry guide for guiding rods of oval cross-section into the forming rolls of the mill wherein they are formed into rolls of circular cross-section comprising a guide box, a pair of opposed guide members extending longitudinally therein, a plurality of rod receiving rollers longitudinally aligned in each guide member, in spaced relation, the corresponding rollers in the respective guide members being laterally aligned, whereby the rod in its passage through the entry guide is solely supported between the corresponding rollers, a peripheral groove in each roller, the walls of said groove diverging in substantially straight lines and providing a two point suspension for said rod, said points of suspension being located inside the outer edges of said walls.

11. The structure of claim 10 and means for laterally adjusting said guide members to vary the spacing of the corresponding rollers therein from each other to receive and support oval rods of larger or smaller cross section within a given range of sizes.

12. The combination with the rest bar of a rolling mill housing, of a guide box comprising a pair of oppositely positioned guide members extending longitudinally through the guide box, means for laterally adjusting the guide members in the guide box, a saddle mounted upon the rest bar and upon which the guide box is slidably mounted and having a groove in its upper face in which the lower portion of the guide box is seated, a wedge member engaging portions of both box and saddle to hold the former in temporarily adjusted relation with respect to the former, and a worm screw for finally adjusting the guide box relatively to the saddle without loosening said wedge member between the guide box and the saddle for retaining the guide box in its adjusted position in relation to the saddle.

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