

[54] ROLLING MILLS

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[22] Filed: Apr. 14, 1971

[21] Appl. No.: 133,970

[30] Foreign Application Priority Data

Apr. 16, 1970 Germany.....P 20 18 157.1

[52] U.S. Cl.....72/234, 72/238

[51] Int. Cl.....B21b 13/08, B21b 31/08

[58] Field of Search.....72/238, 239, 234,
72/226

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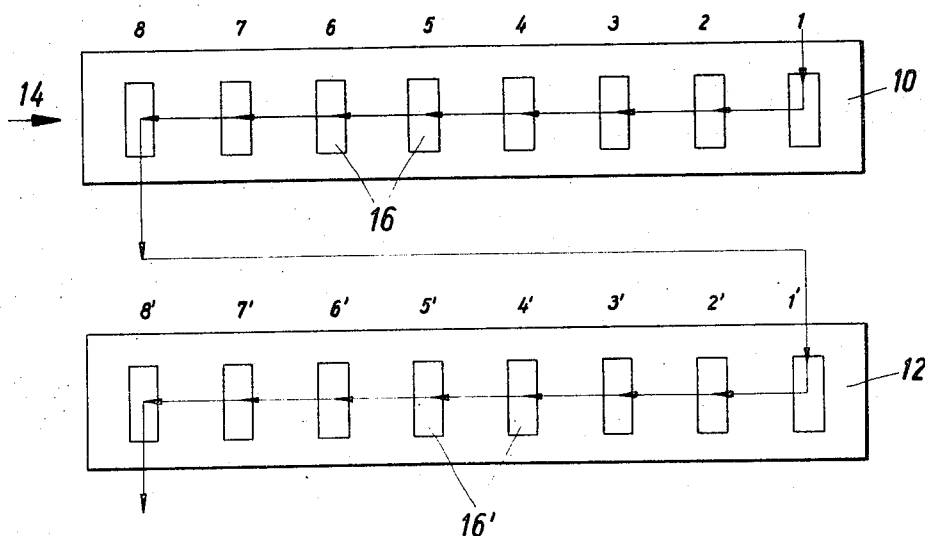
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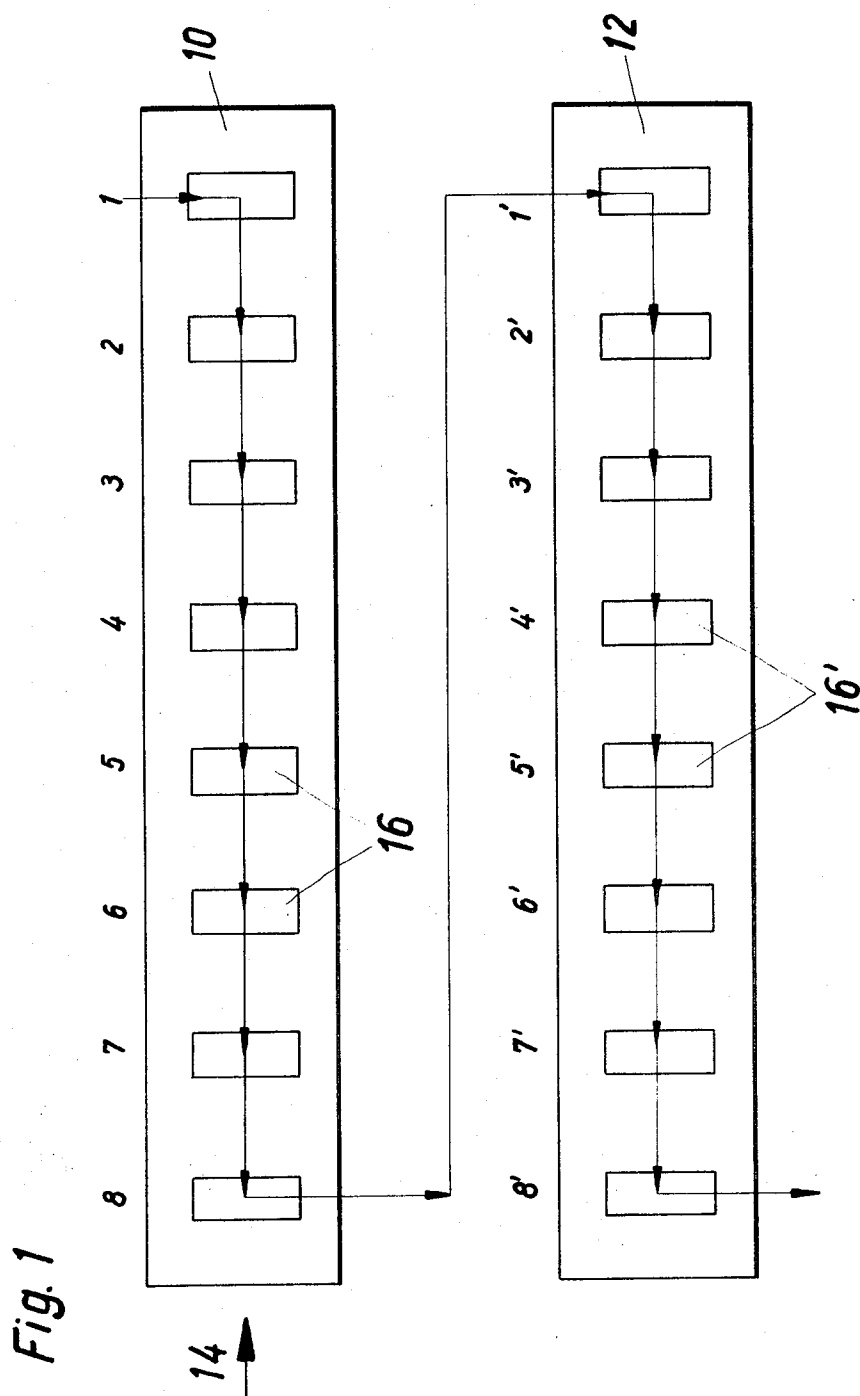
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[57] ABSTRACT

A multi-stand rolling mill comprises two or more selectively interchangeable rows of rolling stands such that only one row is operatively arranged in the rolling line while the other is being serviced. The spacing of the roller axes in all the stands of one row is substantially uniform but somewhat greater than that in the stands of the other row. To enable the rollers to be reused a large number of times, new rollers of a first larger nominal diameter are initially used in the last stage at the delivery end of the row of stands with the larger roller axes spacing. Thereafter they are progressively transferred from stage to stage, together with the stand itself, to the first stage at the input end of the row, the rollers being refinished at each transfer. The worn rollers from the first stage are turned down to a second smaller nominal diameter and used successively in the second row of roller stands, whose roller axes spacing is smaller, in the same way as in the first row.

4 Claims, 2 Drawing Figures



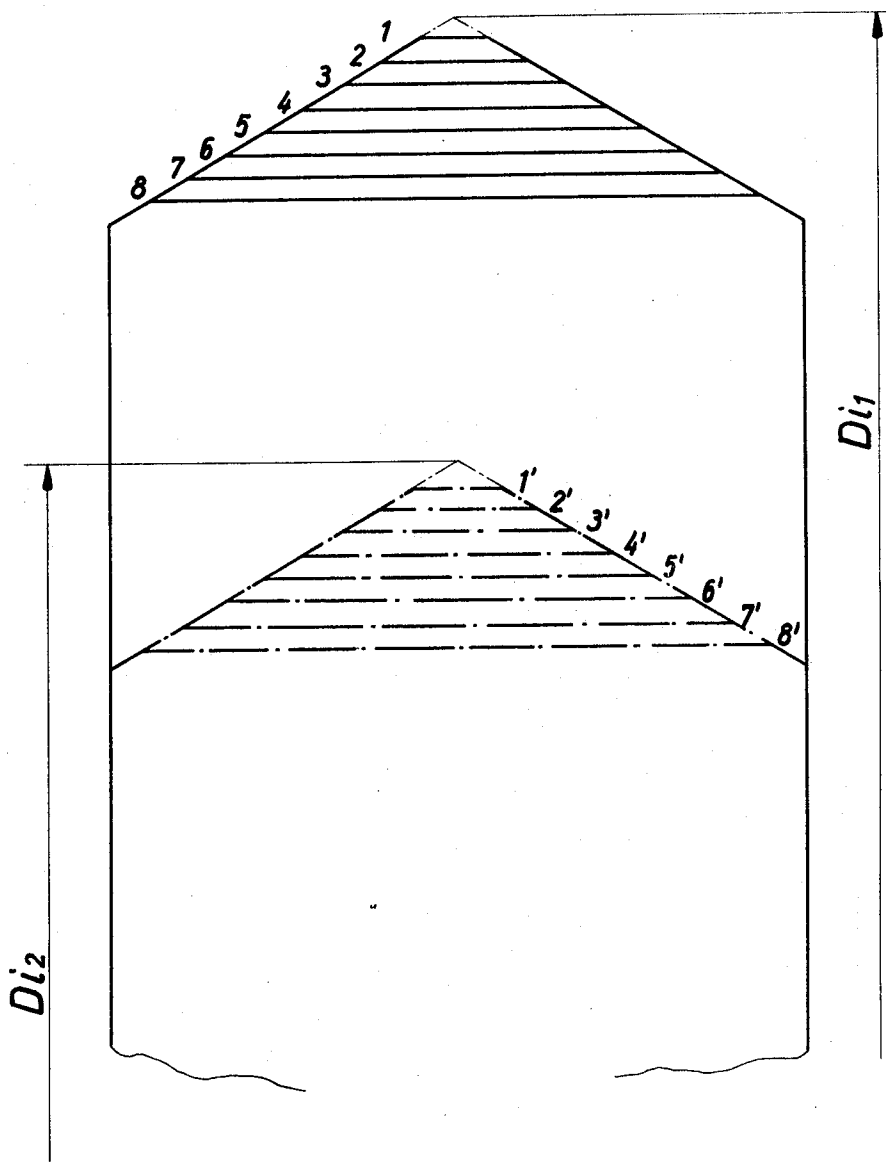


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Fig. 2



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ROLLING MILLS

The invention relates to a multi-stand rolling mill having at least two interchangeable rows of rolling stands having non-adjustable rollers, and to a method of utilizing the rollers several times in such a rolling mill by refinishing the worn rollers.

In a previously proposed multi-stand rolling mill, the worn rollers which have been made usable again by reconditioning, and whose diameters have consequently been changed, are fitted into still centrally drivable interchangeable stands having an intermediate drive mechanism adapted to the changed diameters of the rollers. With appropriate choice of the interchangeable stands, the refinished rollers can be used several times in the rolling mill at the same stand location or at different places. In this method, in which the rollers are reused frequently and may be utilized to good advantage, the rollers have to be removed from the stand and fitted into the interchangeable stand each time the rollers are exchanged.

Furthermore, in a row of roller stands having non-adjustable rollers, it has also been proposed to progressively transfer the rollers from the delivery end of the rolling line to the input end through the row of rolling stands, the nominal diameter of the rollers remaining constant or being only slightly changed each time the rollers are refinished. In this method, the rollers do not have to be removed from the individual stands, but, after refinishing, which is effected in the stand, they are placed in the prescribed position in the row together with the entire stand.

Two identical rows of stands are usually provided in order to shorten the waiting times when the rollers are exchanged, one of which rows is located in the rolling line, while the other row is being prepared for the rolling operation, and is exchanged for the row located in the rolling line by means of a change-over carriage when the rollers in the rolling line have been worn to a specific degree. However, the rollers cannot be used again after a single pass through one of other of the rows of stands.

The present invention seeks to combine the advantages of the two above-mentioned methods and to largely eliminate the disadvantages of said methods.

A multi-stand rolling mill, according to the present invention, comprises at least two interchangeable rows of roller stands having non-adjustable rollers, the distances between roller axes in the individual rows being uniform or differ only slightly from one another and the distances between axes from row to row being different. In such a rolling mill, the rollers in the first instance progress from the delivery end to the input end through the roll line having the greatest distances between axes, the worn rollers being refinished with the retention of the nominal or ideal diameter. The ideal diameter of rollers is reduced after progressing through one row and the rollers are then progressed through the row having the lesser distances between roller axes, the work rollers then being refinished with the retention of the new ideal diameter.

In accordance with the method of the invention, the rollers may progress through the same stage or station in the rolling line several times owing to the reducing distances between roller axes in the rows of roller stands and, with the exception of the change to the row

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having the lesser distances between axes, do not have to be removed from their stand.

The invention is further described, by way of example, with reference to the accompanying drawings, in which:

FIG. 1 is a diagrammatic illustration of two interchangeable lines of roller stands, and

FIG. 2 shows the portion of a roller illustrating the individual refinishing stages.

As shown in FIG. 1, two interchangeable rows 10 and 12 of rolling stands are provided. The row 10 is located in the rolling line, the rolling direction being indicated in the drawing by the arrow 14. The row 12 has been removed from the rolling line for servicing by means of a stand exchange carriage before installing the row 10 and is located at an assembly place where the worn rollers are refinished and the stands are transposed within the row. When the rollers in the stands of the row 10 become worn and require attention, the row 10 of stands is replaced by the row 12, and vice versa.

Each of the diagrammatically illustrated rows 10 and 12 of stands, which are part of a wire rolling mill for example, comprises eight stands 16 or 16' which are arranged in positions 1 to 8 in the row 10 and in positions 1' to 8' in the row 12. Each of the stands 16 and 16' contains three disc-like rollers which form the pass, one of which rollers is illustrated diagrammatically in a simplified form in FIG. 2.

The distances between the roller axes in the stands of the two rows are not adjustable and are uniform within each row, but differ from one another from one row to the other. In the present example, the distance between the roller axes in the stands 16 of the row 10 is greater than in the stands 16' of the row 12. Rollers, as illustrated in FIG. 2, having an ideal diameter D_{11} , having to be fitted into the stands 16 of the row 10, and rollers having an ideal diameter D_{12} having to be fitted into the stands 16' of the row 12. The peripheral speeds of the rollers of different diameters in the different rows can be equalized by appropriately modified gear ratios.

The refinishing stages 1 to 8 and 1' to 8' shown on the disc-like roller in FIG. 2 are associated with the stand positions indicated by the same numerals in the rows 10 and 12.

The fresh rollers are first of all installed in the stand which is located at the delivery end of the row 10 and which is indicated by position 1 in FIG. 1. The rollers, which become worn with respect to their ideal diameter D_{11} , together with their respective stands, are then progressively transferred through all the positions 2 to 8 in the row 10 without removing the rollers from their stands. At each transfer the rollers are refinished without removing them from their respective stands. The rollers subjected to wear at position 8 of the row 10 are taken out of use while they are re-machined to the ideal diameter D_{12} and are then fitted into a stand in the row 12 having the lesser distance between roller axes. This stand is first of all disposed in position 1' at the delivery end of the row 12 and is progressively transferred through the other stages 2' to 8' and the rollers are subjected to their respective refinishing operations.

The rollers which have passed through the second row 12 are scrapped or may pass through a third row (not illustrated in the drawings) with a further reduced ideal diameter.

In the foregoing specification I have set out certain preferred embodiments and practices of my invention, however it will be understood that this invention may be otherwise embodied within the scope of the following claims.

I claim:

1. In a multi-stand rolling mill, a plurality of roller stands having rollers journaled therein for rotation about non-adjustable roller axes, said roller stands being arranged in at least two interchangeable rows of successive roller stands, each row on a base, a selected one of said rows being movable to an operative position in a rolling line, the distances between said roller axes in the stands in any individual one of said rows being substantially uniform from one stand to another, and the distances between said roller axes being different from one row to another.

2. In the operation of a multi-stand rolling mill having a plurality of roller stands each having rollers journaled for rotation about roller axes, said roller stands being arranged in at least two interchangeable rows of successive roller stands on a base, of which only a selected one row is in operative position in a rolling line at any one time, a method of re-utilizing said rollers comprising the steps of using rollers of a first nominal diameter in the first instance in a roller stand at a final

rolling stage at the delivery end of a first of said rows, transferring the rollers to a preceding rolling stage and re-finishing the rollers, using the rollers at said preceding stage, removing worn rollers from the initial stage at the input end of said first row, remachining the worn rollers to a second nominal diameter smaller than the first nominal diameter, using the rollers of the second nominal diameter in the first instance in a roller stand at a final rolling stage at the delivery end of a second of said rows, the spacing between the axes of the rollers in stands of the second row being smaller than that in stands of the first row, transferring the rollers of the second nominal diameter to a preceding rolling stage in the second row and refinishing such rollers, and using the last mentioned rollers at said preceding stage.

3. A method according to claim 2 in which the spacing between the roller axes is substantially uniform in all the stands of the first row and is substantially uniform in all the stands of the second row.

4. A method according to claim 2 in which the first mentioned roller stand is transferred with said rollers therein to said preceding stage and said refinishing is performed without removing said rollers from said stand.

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