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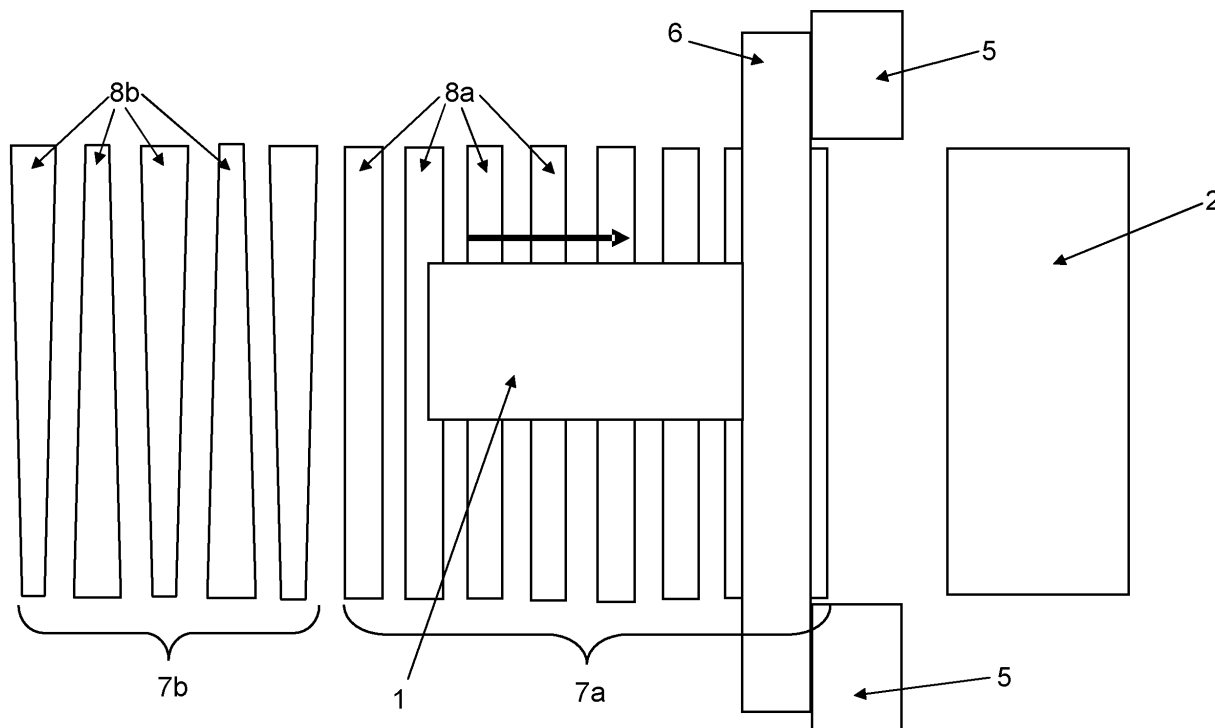
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(54) **Aligning device for high aspect ratio slabs or plates**

(57) A rolling mill is disclosed having means for aligning a work piece (1) with the work rollers (2). A beam (6) having a face or edge providing an alignment datum is introduced to the path of the work piece (1) which is con-

tacted with, and pushed against the face by the roller table. After the work piece (1) is aligned, the beam (6) is raised and the work piece (1) proceeds to the working rollers (2).

Figure 4



Description

[0001] The invention is concerned with rolling metal plates or slabs in plate mills.

[0002] When turning a slab prior to the first pass in a rolling stand or a plate in early passes, the aspect ratio of the piece can be high, i.e. the width is much greater than the length. Because the piece is only supported on a few table rollers it is usually skewed as it enters the rolling stand work roll bite. This causes one leading corner of the piece to be rolled ahead of the other resulting in a non square plate.

[0003] This problem has been addressed by a number of approaches in the prior art. In some instances the piece has been run into the faces of the work rolls, using the roller table, in an attempt to align the piece prior to rolling. The piece is then backed away a short distance before reversing and entering the work roll bite for rolling. This has been controlled by the rolling stand automation system.

[0004] This approach gives inconsistent results because the piece does not always fully align. This method also requires that the work roll gap is reduced or closed, necessitating the need for additional set-up time to open the work roll gap to the correct setting for the rolling pass, resulting in reduced productivity. This method also has potential for damaging the work rolls.

[0005] There remains a need for a reliable means for aligning slabs or plates, particularly those having a high aspect ratio, prior to entry of the rolling stand work bite.

[0006] According to the invention, a rolling mill comprises the features set out in claim 1 attached hereto. The mechanical stop may be conveniently realised as a beam located above the roller table. The beam may be moved between positions by hydraulic cylinders.

[0007] In a preferred embodiment, the roller table comprises a first region having a plurality of transport rollers of constant diameter, hereafter referred to as the linear region, and a second region, hereafter referred to as the turntable region, having a plurality of tapered or stepped transport rollers with different diameter from a first end to a second end, alternate tapered or stepped transport rollers being arranged with their first ends at a first side of the roller table and a second side of the roller table respectively and further characterized in that the linear region extends from at least two roll pitches in front of the mechanical stop along the direction of transport up to the rolling mill.

[0008] The invention will now be described, by non-limiting example, with reference to the attached figures in which:

Figure 1 illustrates the process of aligning a work piece in a rolling mill according to the prior art;
Figure 2 illustrates the alignment process using the method and apparatus of the present invention;
Figure 3 illustrates a rolling mill having a roller table comprising a turntable region and a linear region ac-

cording to the prior art and

Figure 4 illustrates a rolling mill having a roller table comprising a turntable region and a linear region according to the invention.

[0009] Referring to figures 1 a and 1 b, in a rolling mill according to the prior art, the work piece 1 is first advanced along roller table 7 (comprising transport rollers 8a) against the work rolls 2 with the roll gap 3 being reduced or closed (the thick arrows indicate the direction of movement of the work piece). This causes the leading face 4 of the workpiece to align itself parallel with the surfaces of the work rolls.

The work piece 1 is then retracted from the work rolls 2 (figure 1 c) and the roll gap 3 is opened before the work piece 1 is again advanced (figure 1d) to enter the roll gap 3 for rolling.

[0010] Referring to figure 2, the invention comprises a mechanical stop mounted on the front of the rolling mill stand housing 5. By way of example, the stop is conveniently realised as a beam 6 mounted above and across the roller table 7 and having a face or edge 9 parallel to the axes of the work rollers 2 and serving as a datum for alignment of the workpiece 1. The beam can be lowered into position or lifted clear via hydraulic cylinders. If the piece is to be aligned before entering the rolling mill work roll bite the beam is lowered into position and the piece is transported against face 9 to align it (figs 2a - 2c). Once the piece is aligned the beam is lifted clear. The piece is then transported to the work rolls 2 for the next rolling pass (fig 2d).

[0011] Referring to figure 3, a conventional rolling mill effects turning of the work piece 1 by a turntable region 7b of the roller table 7. The turntable region comprises a set of tapered or stepped transport rollers 8b arranged in an alternating pattern such that the first, third, fifth etc. rollers are arranged with their greatest diameter at one side of the table; and the second, fourth, sixth etc. rollers are arranged with their greatest diameter at the other side of the table.

[0012] Rotation of all tapered or stepped rollers 8b in the same direction causes a work piece to move linearly along the roller table whereas rotating alternate tapered or stepped rollers in the opposite direction causes a work piece located thereon to rotate.

[0013] The roller table typically includes a linear region 7a comprising a few constant diameter rollers 8a, over which the work piece passes immediately before entering the work roll bite.

[0014] The work piece 1 is particularly susceptible to misalignment when located on the turntable region 7b. Hence, in a preferred embodiment of the invention the linear region 7a is extended (Figure 4), making it easier to achieve alignment of the work piece against the beam 6 and to maintain this alignment from the mechanical stop up to the roll gap 3. The invention is particularly concerned with work pieces having a high aspect ratio such that its width is greater than its length and the short-

est work piece that can be handled is typically about two roller pitches in length. Hence the benefit of this feature is maximized where the length of the linear region 7a (in the direction orthogonal to the axes of the work rollers 2, see thick arrows) is such that it extends from at least two roller pitches in front of the beam 6 up to the work rolls 2. 5

Claims

1. A rolling mill comprising: 10

a roller table having a plurality of transport rollers, operable to transport a work piece to a pair of cooperating work rollers, 15
characterised by a mechanical stop having a face or edge parallel with the rotational axes of the work rollers, the stop being moveable between a first position in the path of a work piece being transported to the work rollers and a second position clear of said path. 20

2. A rolling mill according to claim 1, where the mechanical stop is realised as a beam located above the roller table. 25

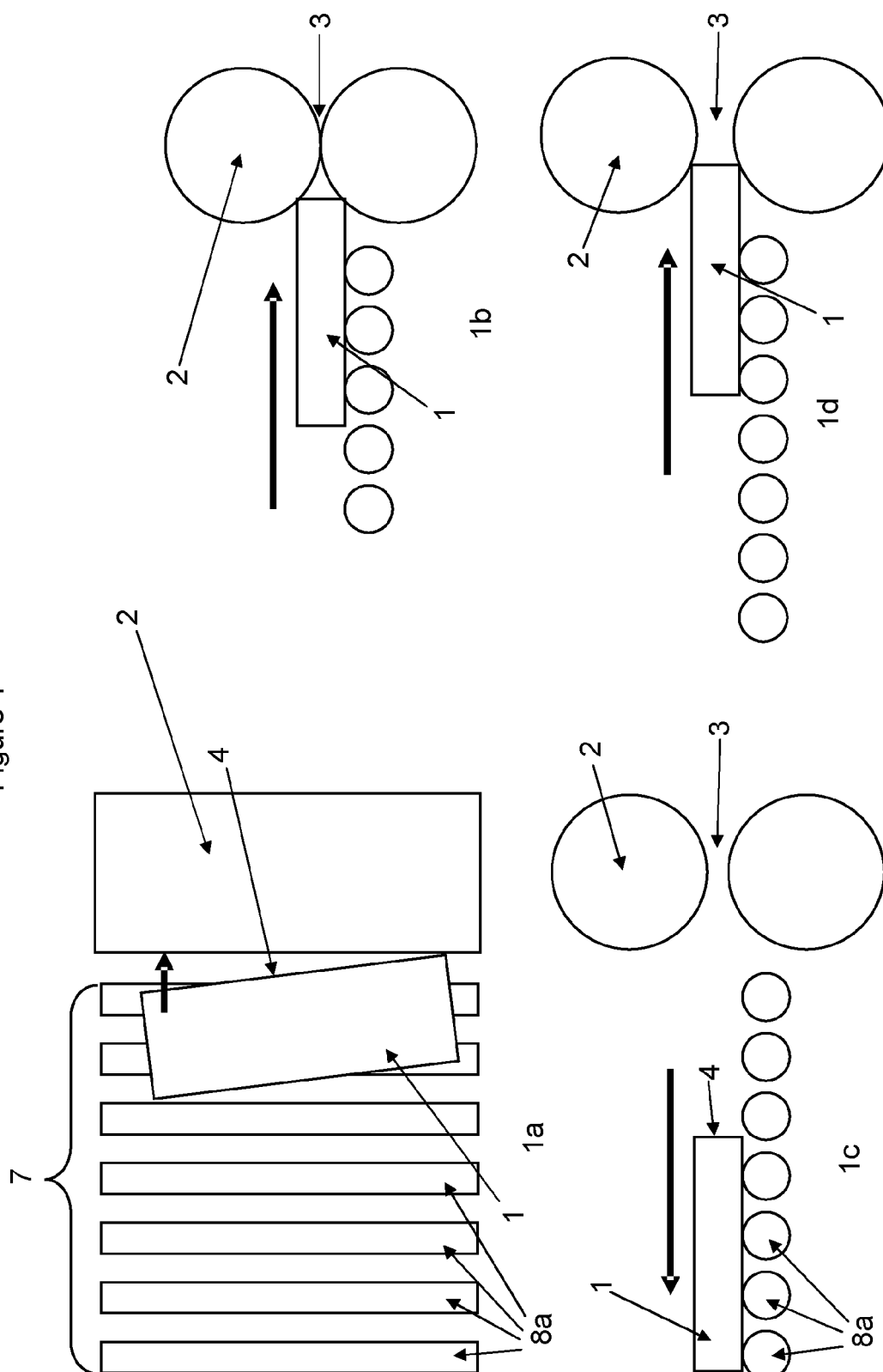
3. A rolling mill according to claim 2, where the beam is moveable between the first and second positions by operation of hydraulic cylinders. 30

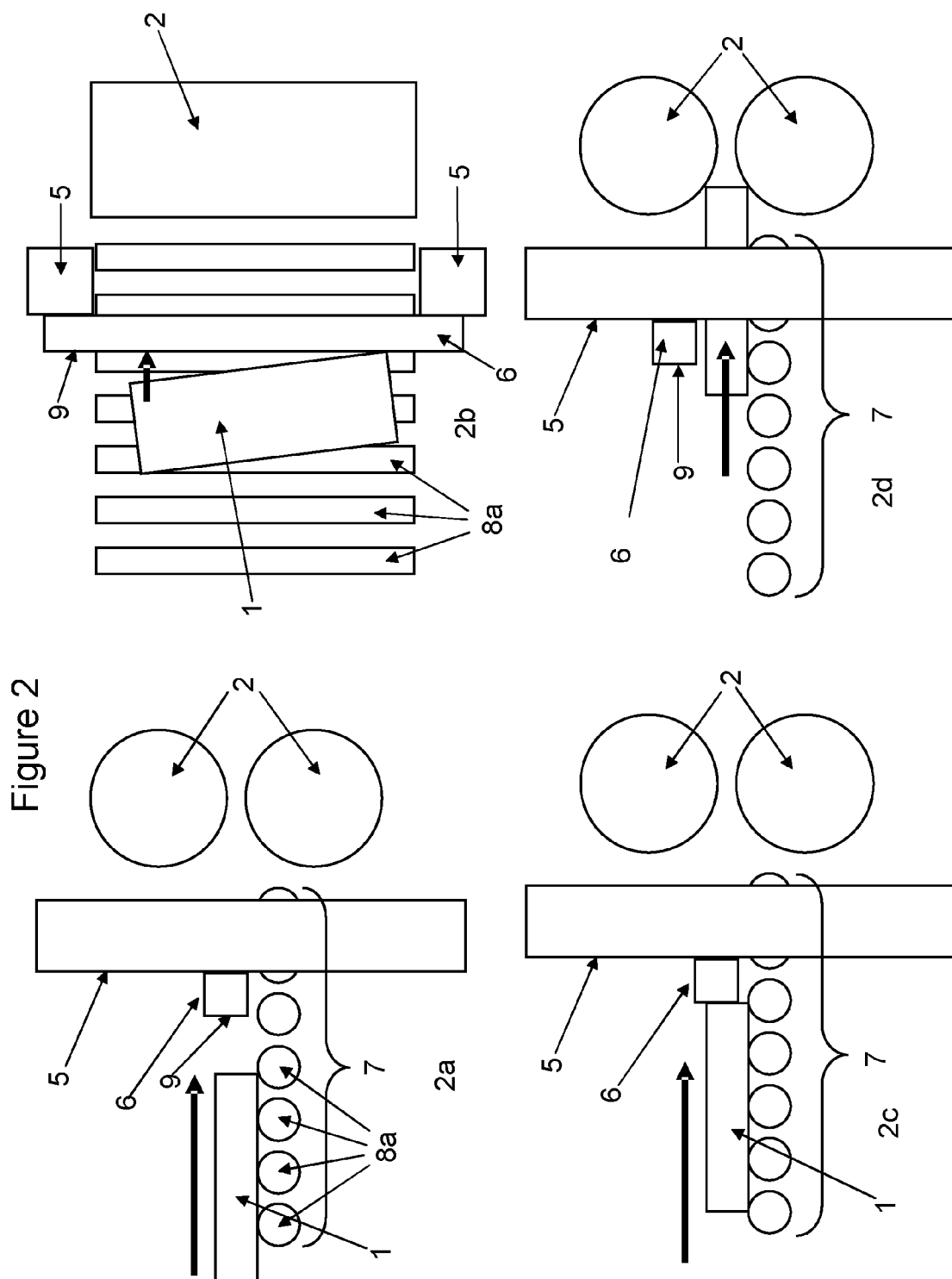
4. A rolling mill according to claim 1, 2 or 3, wherein the roller table comprises a first region having a plurality of transport rollers of constant diameter and a second region having a plurality of tapered or stepped transport rollers with different diameter from a first end to a second end, alternate tapered or stepped transport rollers being arranged with their first ends at a first side of the roller table and a second side of the roller table respectively and further **characterized in that** the first region extends along the direction of transport from at least two roller pitches in front of the mechanical stop up the work rollers. 35 40

5. A method of rolling a work piece on a rolling mill comprising: 45

introducing a mechanical stop, having a face or edge providing an alignment datum, to a path of the work piece along a roller table to work rolls; transporting the work piece, via the roller table, and driving the work piece against the face to effect alignment therewith; 50
 raising the mechanical stop clear of the path of the work piece and
 transporting the work piece to the work rolls. 55

Figure 1





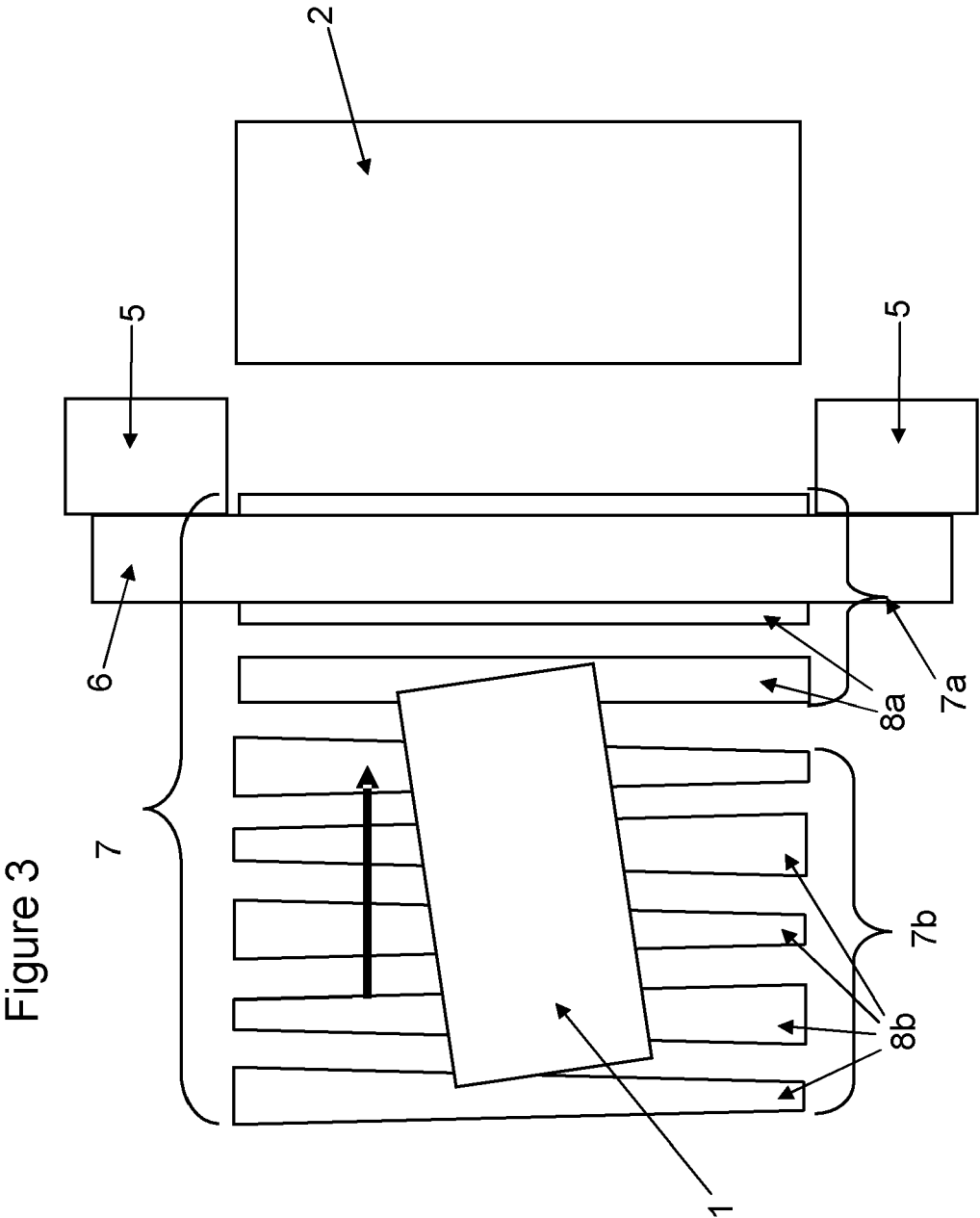


Figure 4

