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(54) Skinpass apparatus with improved roller centering adjustment device.

(57) There is disclosed a skinpass apparatus which comprises a frame (2), a pair of supporting shafts (6) pivotally mounted in the frame, integral shafts (7) each projecting eccentrically from a respective one of the supporting shafts, a pair of rollers (8) each mounted rotatably on a respective one of the eccentric shafts (7) and arranged to define therebetween a pass line (1) for product to be treated by the rollers, and adjustment means for laterally adjusting the position of the rollers (8) relative to each other and to the pass line (1).

The adjustment means comprises a worm drive arrangement (9a, 9b, 10a, 10b) coupled with the eccentric shafts (7) and operable to rotate the latter simultaneously at a reduced speed in relatively opposite directions in order to displace the rollers (8) by equal amounts and in opposite directions relative to the pass line (1).

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SKINPASS APPARATUS WITH IMPROVED ROLLER CENTERING ADJUSTMENT DEVICE

This invention relates to a skinpass apparatus having an improved roller centering adjustment device.

A skinpass apparatus is normally used in the final finish line for rolling wire rods or steel bars. Existing apparatus usually employs siding rollers which impart a circular shape to poorly-rounded semi-finished products that have issued from the surface rollers of a rolling mill, thereby to impart required final shaping to the wire product or steel bars. However, in recent years there has developed a demand for higher precision products than can be achieved by this conventional means, because the devices incorporated into the siding rollers are of a comparatively coarse adjusting type. The adjusting devices used up to now cannot achieve final product with a dimensional accuracy of less than 5/100 mm. They are limited only to form products with an axial ratio of approximately 1.02-1.25, as in an aspect ratio relative to the product.

The present invention has therefore been developed with a view to overcome the drawbacks of conventional adjusting devices in skinpass apparatus, and to make it possible to provide a finished product with a high precision (out of) roundness as required.

According to the invention there is provided a skinpass apparatus comprising a frame, a pair of supporting shafts pivotally mounted in the frame, a pair of integral shafts each projecting eccentrically from a respective one of the supporting shafts, a pair of rollers each mounted rotatably on a respective one of said eccentric shafts and arranged to define therebetween a pass line for product to be treated by the rollers, and adjustment means for laterally adjusting the position of the rollers relative to the pass line:

characterised in that the adjustment means comprises a worm drive arrangement coupled with the eccentric shafts and operable to rotate the latter simultaneously at a reduced speed in relatively opposite directions in order to displace the rollers by equal amounts and in opposite directions relative to the pass line.

One embodiment of skinpass apparatus according to the invention will now be described in detail, by way of example only, with reference to the accompanying drawings, in which:

Figure 1 is a side view of the skinpass apparatus;

Figure 2 is a plan view of the skinpass apparatus;

Figure 3 is a section taken on the line III-III in Figure 2; and

Figure 4 is a rear view of the skinpass apparatus.

Referring now to the drawings, there is shown a skinpass apparatus which is arranged to impart final treatment to semi-finished products which issue from finish rolls 3 of a rolling mill for treating product, such as wire rods or steel bars. The skinpass apparatus has a base 1, on which a frame 2 is securely mounted. Wire rods or steel bars are fed through the rolls 3, and enter the skinpass apparatus via a delivery guide 4, receive final treatment by rollers 8 mounted in the skinpass apparatus, and then issue from the apparatus via a sleeve guide 5 mounted on the frame 2, following a pass line $\underline{l}$ and are then delivered as finished products.

As shown in Figures 1 to 3, the frame 2 is provided on both sides of the pass line $\underline{l}$ with a pair of supporting shafts 6 for the rollers 8. Projecting from each supporting shaft 6 there is integrally provided a respective eccentric shaft 7, which is spaced eccentrically by distance $\underline{e}$ from the axis of rotation $\underline{m}$ of the supporting shaft 6. The eccentric spacings $\underline{e}$ of —

the eccentric shafts 7 are symmetrical relative to the pass line 1, and the eccentric shafts 7 pivotally support the rollers 8 via bearings (not shown).

The rollers 8 are arranged symmetrically about the pass line 1, and adjustment means is provided for laterally adjusting the position of the rollers 8 relative to each other and to the pass line 1. The adjustment means comprises a worm drive arrangement (9a,9b,10a,10b) which is coupled indirectly with the eccentric shafts 7, and which is operable to rotate the latter simultaneously at a reduced speed in relatively opposite direction in order to displace the rollers 8 by equal amounts and in opposite directions relative to the pass line 1.

In the illustrated embodiment, the worm drive arrangement is a two stage reduction gear arrangement, though a single stage reduction gear, or more than two stage reduction gear arrangement may be provided if desired. As shown in the drawings, the adjustment means comprises a two-stage worm drive arrangement, the first stage being shown generally by reference 9 and the second stage being shown generally by reference 10. The first stage comprises a worm 9a which is mounted securely on one end of a manually rotatable shaft 12, and a worm wheel 9b meshing with the worm 9a. The worm wheel 9b is integrally formed with, or otherwise firmly secured to a mid-region of a common rotary output shaft 13. The shaft 12, which forms an input shaft, can be rotated in either direction by operation of a hand wheel 11.

The second stage 10 of the worm drive gear reduction arrangement comprises a pair of oppositely handed screw worms 10a, one of which is mounted near one end of the output shaft 13, and the other of which is mounted near the opposite end of output shaft 13, as shown in Figure 4. (In the illustrated arrangement, the

second stage 10 is the final stage of speed reduction from input shaft 12 to the eccentric shafts 7, though in a multi-stage gear reduction the "second" stage will be merely a "further" stage). The second stage also includes a pair of oppositely handed worm wheels 10b which each mesh with a respective one of the worms 10a, and which are fixedly mounted each on one end of a respective one of the supporting shafts 6.

The input shaft 12 and the common output shaft 13 are rotatably mounted in the frame 2 by bearing members 14 and 15 respectively. They may, of course, be supported on any frame or housing portion secured to the frame 2. Further, as indicated above, the multi-stage speed reduction gear of the illustrated embodiment may be added to, or subtracted from to provide single stage speed reduction, or three or more speed reduction.

Referring to Figure 3, a pair of threaded adjusters 16 are associated with each roller 8, and serve to control up and down adjustment of the roller. Thus, an upper one of the threaded adjusters 16 engages with the upper end of the respective supporting shaft 6, whereas the lower adjuster 16 engages with the lower end of the shaft 6.

Vertical adjustment of the rollers 8 can then take place after suitable adjustment of the adjusters 16 associated with each roller, in order to align the embracing center or calibre positions g of the rollers 8. Means is provided for locking each adjuster 16 after adjustment, such means taking the form of lock bolts 17.

As indicated above, the worm wheels 10b are each mounted on one end (the upper end) of each supporting shaft 6, and an eccentric cylinder 6a is mounted on the opposite (lower) end of each support shaft 6. Thus, each eccentric cylinder 6a is fixed on a lower end of the eccentric shaft 7 which is integrally formed with the

support shaft 6. A thrust disc 18 serves to transmit adjustment movement from the lower threaded adjuster 16 to the support shaft 6, and the opposite end of the support shaft also has its position determined by a thrust disc and associated threaded adjuster 16. A pair of dust seals 20 are also provided at the upper and lower ends of the support shaft 6.

As shown in Figure 4, the central part of the hand wheel 11 incorporates an indicator dial 19 of the clock type. The pointer of the dial provides a reading of a distance F (see Figure 3) between the surfaces of the rollers 8, or the centre to centre distance as corresponding with the rotary adjustment of hand wheel 11.

There will now follow description of the movement of the rollers 8 under the action of the centre to centre adjusting device provided in the skinpass apparatus.

In order to adjust the centre to centre positions of the rollers 8, the hand wheel 11 is rotated clockwise or anticlockwise manually through a required angle. The first stage (9) of the speed reduction worm drive arrangement is then rotated, in that input shaft 12 drives the worm 9a which, in turn, rotates the worm wheel 9b. The rotary output shaft 13 is then rotated by the worm wheel 9b, thereby providing a first stage of speed reduction from input shaft 12 to output shaft 13. Simultaneously, the second stage (10) of the speed reduction is operated, in that output shaft 13 drives the oppositely handed screw worms 10a (mounted one at each end thereof), and these in turn drive the respective oppositely handed worm wheels 10b, thereby providing a further speed reduction from the output shaft 13 to each supporting shaft 6. Thus, there is now a double speed reduction from input shaft 12 to the supporting shafts 6. There will thus be a very small increment of angular

adjustment of each supporting shaft 6, for a correspondingly larger angular adjustment of input shaft 12 by the hand wheel 11.

The eccentric shafts 7 are similarly angularly adjusted by a small increment with the respective supporting shafts 6, and this causes corresponding small lateral displacement of the rollers 8, in that shafts 7 are eccentric shafts provided on the supporting shafts 6. This therefore provides a very accurate small incremental adjustment of lateral positioning of the rollers 8, in order to vary the distance F between the surfaces of the rollers, or the centre to centre distances.

CLAIMS:

1. A skinpass apparatus comprising a frame (2), a pair of supporting shafts (6) pivotally mounted in the frame, a pair of integral shafts (7) each projecting eccentrically from a respective one of the supporting shafts, a pair of rollers (8) each mounted rotatably on a respective one of said eccentric shafts (7) and arranged to define therebetween a pass line (1) for product to be treated by the rollers, and adjustment means for laterally adjusting the position of the rollers (8) relative to the pass line (1):

characterised in that the adjustment means comprises a worm drive arrangement (9a,9b,10a,10b) coupled with the eccentric shafts (7) and operable to rotate the latter simultaneously at a reduced speed in relatively opposite directions in order to displace the rollers (8) by equal amounts and in opposite directions relative to the pass line (1).

2. A skinpass apparatus according to claim 1, characterised in that the worm drive arrangement comprises an input shaft (12), a first worm gear (9a) coupled with the input shaft (12), a first worm wheel (9b) mounted on an output shaft (13) and arranged to be driven by the first worm gear (9a), a pair of second worms (10a) mounted one on each end of the output shaft (13), and a pair of second worm wheels (10b) each coupled with a respective eccentric shaft (7) and arranged to be driven by a respective second worm (10a) in order to rotate the eccentric shaft (7), whereby a double speed reduction is transmitted from the input shaft (12) to the eccentric shafts (7).

3. A skinpass apparatus according to claim 2, characterised in that the worm drive arrangement provides a multi-stage speed reduction from the input shaft (12) to the eccentric shafts (7).

4. A skinpass apparatus according to any one of the preceding claims, characterised by a threaded adjuster (16) associated with each roller (8) and operable to adjust the roller along its axis of rotation, and means (17) for locking each adjuster (16) after adjustment of the roller.

5. A skinpass apparatus according to any one of the preceding claims, characterised in that the worm drive arrangement (9a,9b,10a,10b) is coupled with the eccentric shafts (7) indirectly, in that a pair of oppositely handed worm wheels (10b) are fixedly mounted one on each end of a respective one of said supporting shafts (6).

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FIG. 1

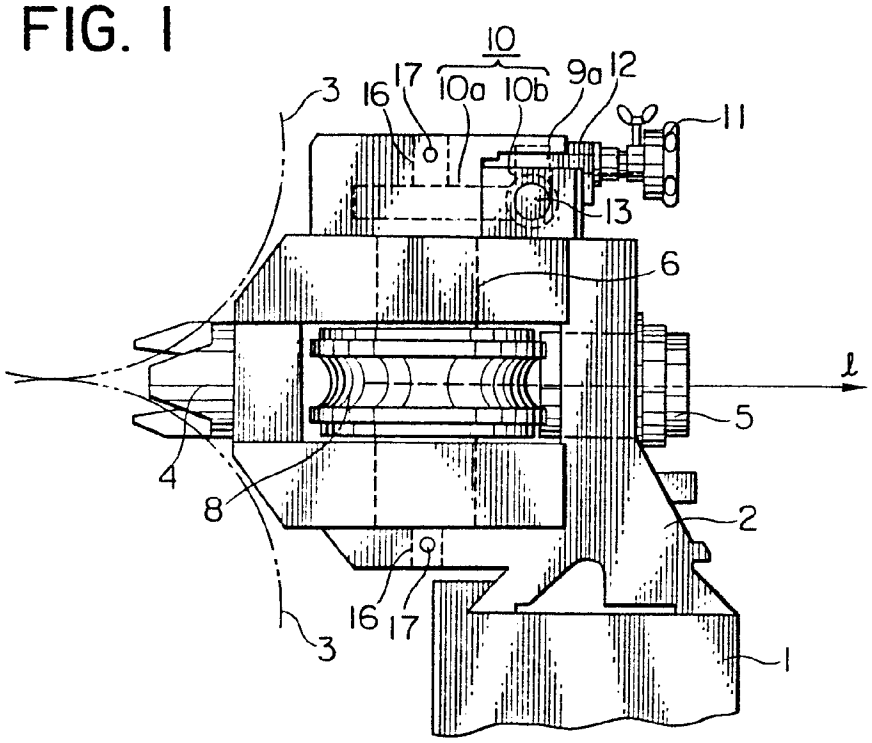

FIG. 2

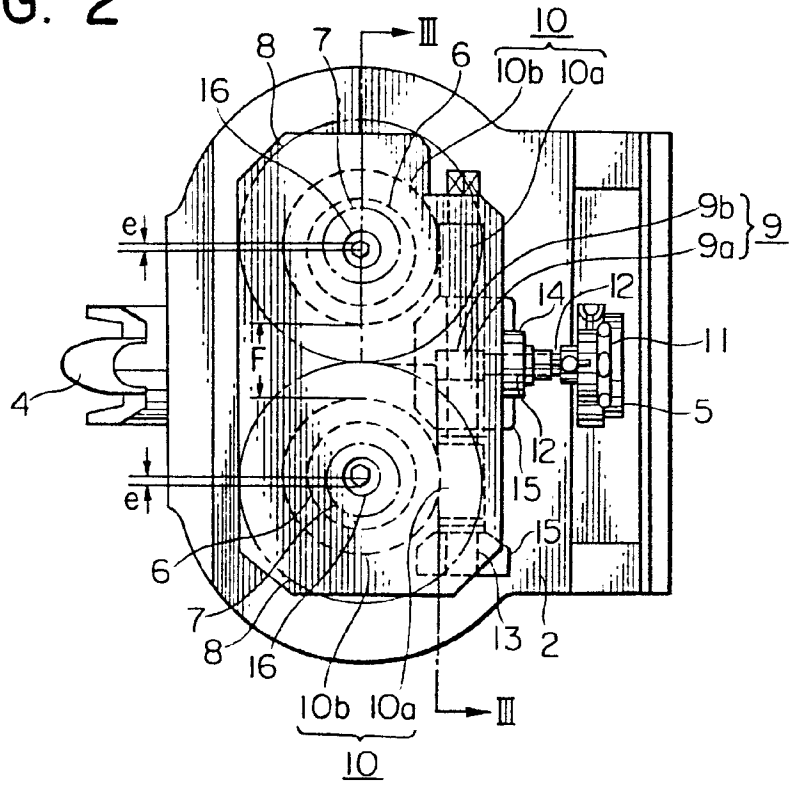

FIG. 3

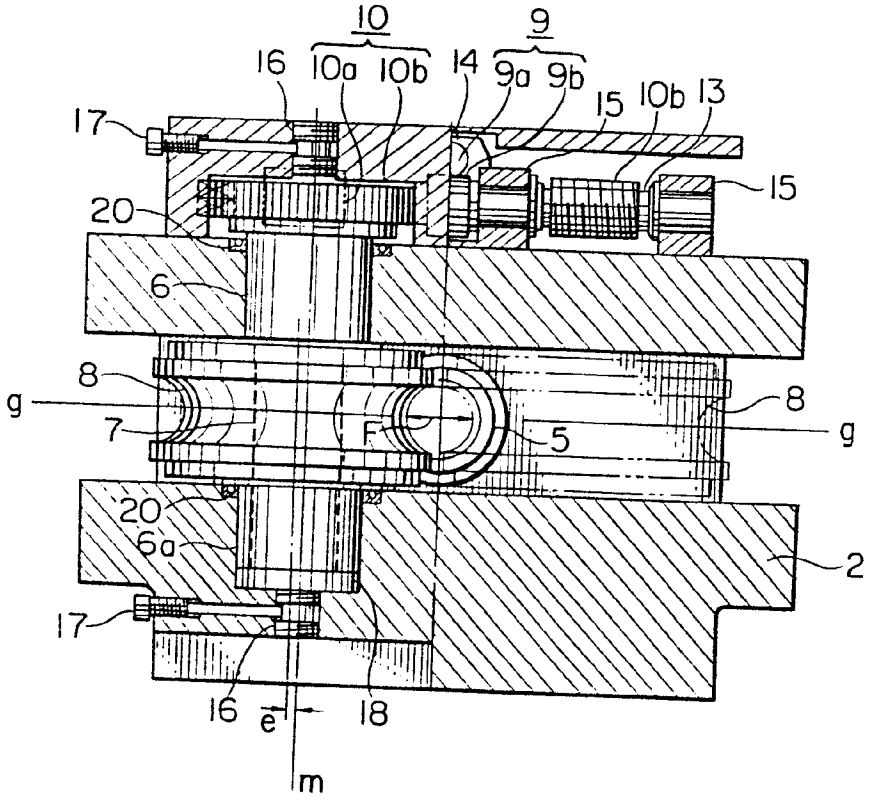
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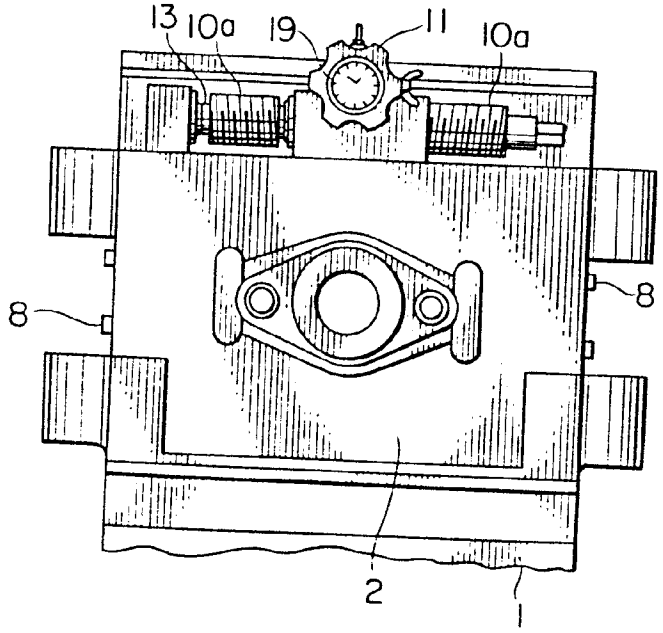
FIG. 4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EUROPEAN SEARCH REPORT

0181707
Application number

EP 85 30 7439

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int Cl 4)
X	EP-A-0 013 671 (KOTOBUKI SANGYO K.K.) * Figures 4,5; page 6, lines 9-35; page 7, lines 1-25; abstract *	1-5	B 21 B 39/16
A	EP-A-0 013 672 (KOTOBUKI SANGYO K.K.) * Figures 1,2; abstract *	1-5	
A	DE-B-1 010 037 (DEMAG AG) * Figures 1,2 *	1	TECHNICAL FIELDS SEARCHED (Int Cl 4) B 21 B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	05-02-1986	NOESEN R.F.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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