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None

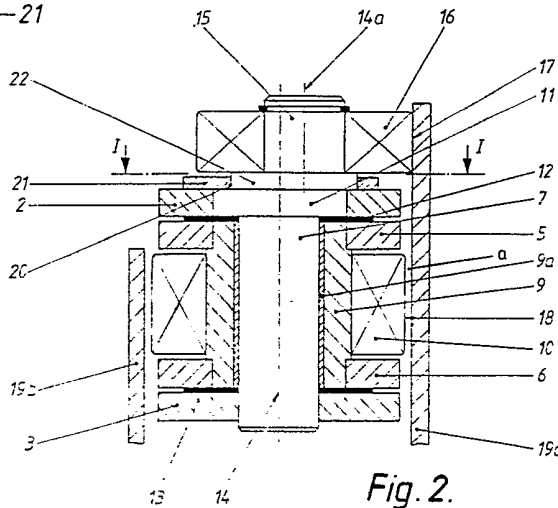
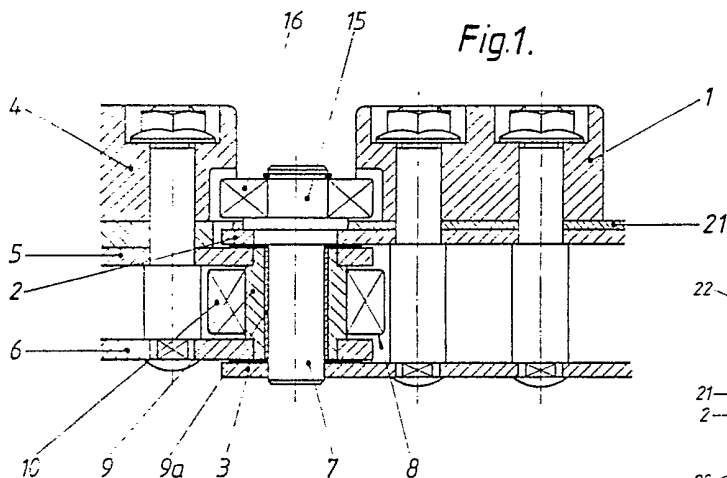
(58) Field of search

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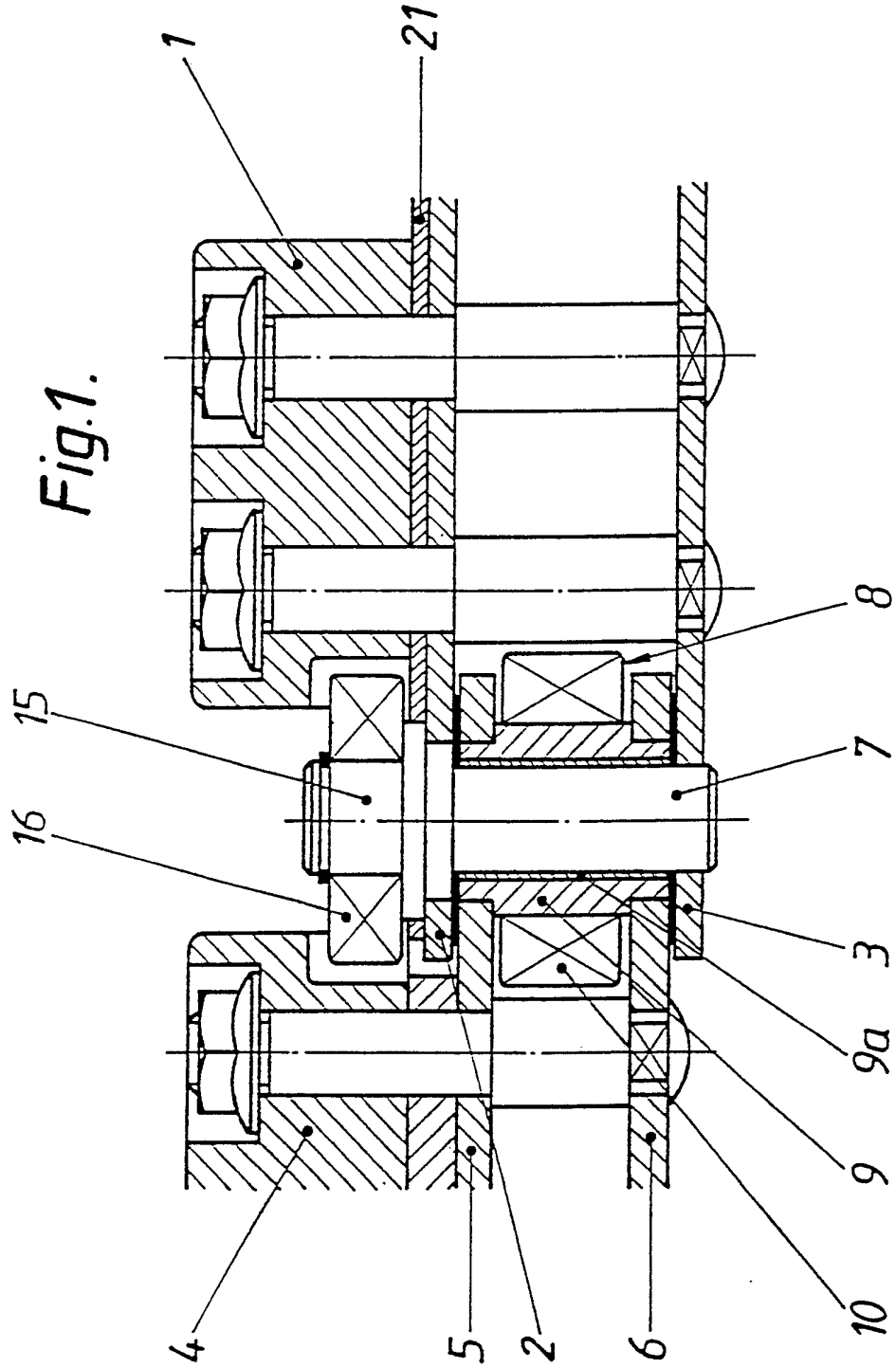
INT CL<sup>5</sup> D06C, F16G, F16H

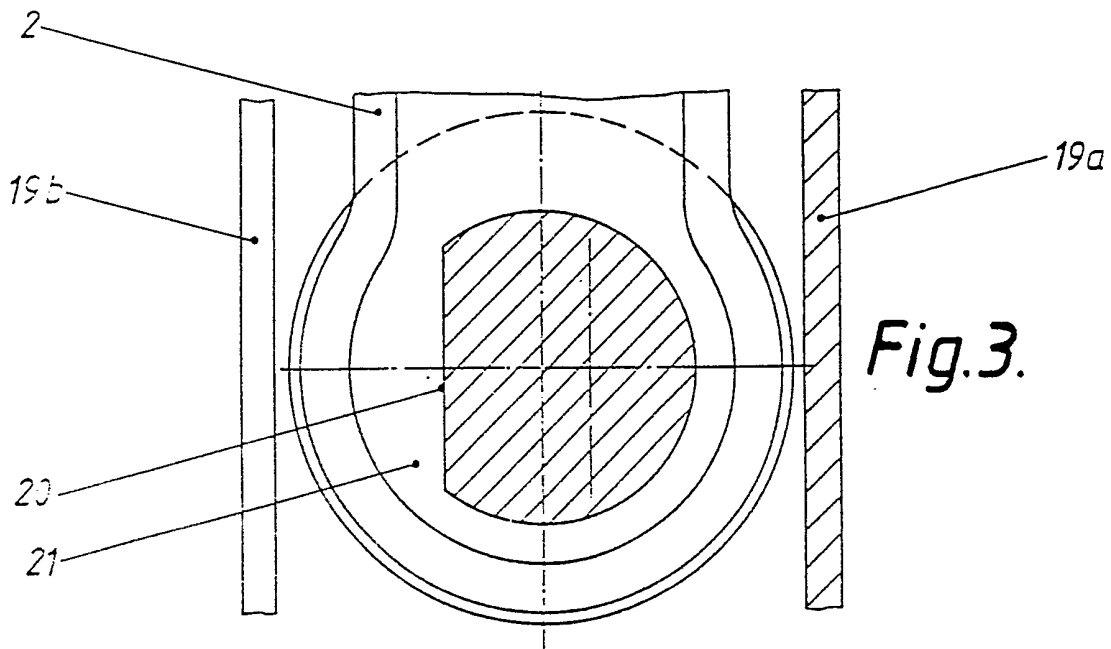
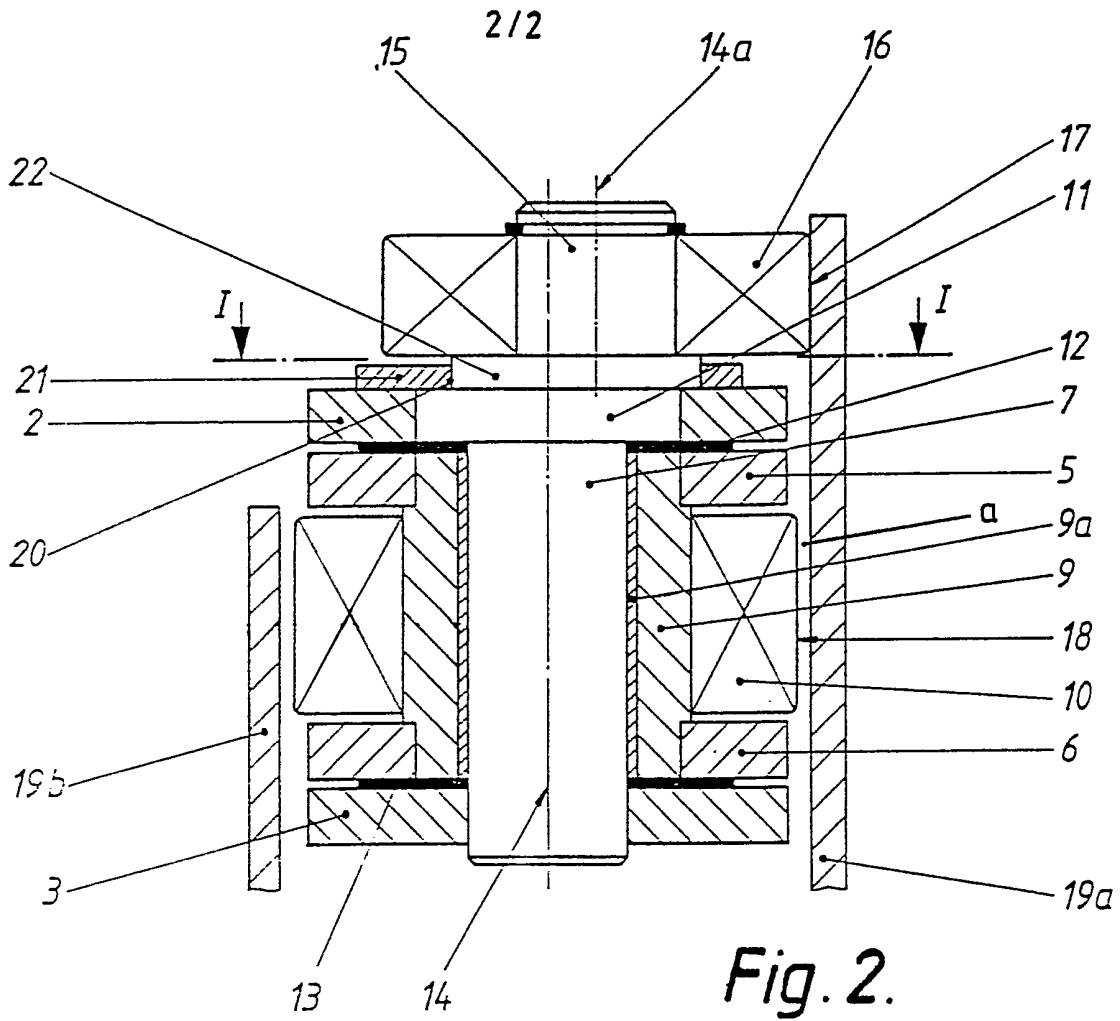
(54) Tentering clip chain

(57) In a tentering clip chain movable longitudinally between parallel guide tracks 19a, 19b, each vertically supported clip 1, 4 is guided horizontally by a pair of track rollers 10, 16, with one of the rollers 16 being disposed eccentrically with respect to the other 10 by way of link pin 7, 15. The individual clips 1, 4 are articulatedly connected together by pairs of link plates 2, 3, 5, 6, with each roller 10 being mounted on a link pin 7 between the plates by means of a sleeve 9 and bush 9a. A cylindrical pin extension 15 mounts the second roller 16.



At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.





TENTERING APPARATUS HAVING A CLIP CHAIN MADE UP OF TENTERING CLIPS

This invention relates to a tentering apparatus having a clip chain, for example for stretching a plastic film. Inside the chain is movable longitudinally between parallel guide tracks and a clip is vertically supported by at least one support roller and is guided horizontally by a pair of track rollers which are rotatably mounted with their axes parallel and which take up the horizontal forces acting on the clip during operation. The rotatable mounting of the track rollers may be provided in each case by a chain link which at the same time co-operates with link plates to form a pivotal connection between individual clips forming a clip chain.

Tentering clips are known in which the clip itself forms part of a link of the clip chain. In one embodiment, a horizontally mounted track roller is arranged between the link plates of two successive clips. This track roller is supported by a link pin connecting the link plates of adjacent successive tentering clips. It is found, however, that when a film stretching operation proceeds at a particular speed, these track rollers and their bearings are subject to rapid wear owing to their change of direction of rotation in those regions of the guide tracks which are not subjected to the stretching forces. Also the change in direction of rotation also increases the wear on the guide tracks. This means that the higher the speed of the clip chain and the lower the tension in it, the greater is the tendency of a clip to be set into vibration and so accelerate wear on the contact surfaces between track roller and guide tracks.

It is an object of this invention to impart positive horizontal guidance to the individual clips, that is, to associate the clip with one of the two guide tracks in order to eliminate the constant change in direction of rotation of the track rollers due to alternate contact with the two guide tracks which occurs especially at high operating speeds.

According to this invention there is provided a tentering apparatus having a clip chain movable longitudinally between parallel guide tracks, the chain including tentering clips, and at least some of the clips each being vertically supported by at least one support roller and being guided horizontally by a pair of track rollers having parallel axes of rotation, one of the track rollers being disposed eccentrically with respect to the other such that the said one track roller is shifted in vertical alignment with respect to the other track roller. Also according to this invention there may be provided a tentering apparatus having a clip chain movable longitudinally between parallel guide tracks, the chain including tentering clips, and at least some of the clips each being vertically supported by at least one support roller arranged symmetrically in the body of the clip, the clip guided horizontally by a pair of track rollers rotatably mounted in link plates connecting adjacent clips and arranged with their axes of rotation parallel, which track rollers take up the horizontal forces acting on a clip during operation, the rotatable mounting of the track rollers being provided by a link pin which at the same time establishes the pivotal connection between adjacent clips, wherein one of the track rollers is arranged on the link pin eccentrically with respect to the other track roller on the link pin, the said one track roller being shifted in vertical alignment with respect to the said other track roller. The link pin, which connects adjacent clips by way of link plates, serves as pivot for both the track rollers. This link pin rotatably carries the said one or second track

roller at its free end facing the direction of clip opening. The eccentric mounting of the second track roller on the link pin ensures that the second track roller will be in surface contact with the outer guide track. That is to say, 5 when the chain is to run adjacent the outer guide track, there will be surface contact between that guide track and the second track roller and not the first track roller. Thus the apparatus of the invention can avoid the constant braking and acceleration of the first track rollers during 10 a stretching operation. This has a positive effect in reducing wear on the track rollers and their bearings, as well as reducing wear on the guide tracks. Further, the invention can give the advantage over previous clips in enabling the apparatus to operate more rapidly.

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An embodiment of the invention will now be described by way of example, with reference to the drawings, in which

Fig. 1 is a vertical section through part of a clip chain, showing two clips and a link pin; 20

Fig. 2 is a vertical section at right angles to that of Figure 1 through the link pin showing a second track roller arranged eccentrically to a first track roller; and 25

Fig. 3 is a horizontal section on the plane I-I of Figure 2 through the link pin, showing a safety plate.

30

Referring to Figure 1, a first clip 1 has inner and outer link plates 2, 3 and a second clip 4 has inner and outer link plates 5, 6. The two clips, which form part of a closed clip chain longitudinally displaceable in a guide 35 track, are pivotally connected together by a link pin 7. A bearing unit 8 with a sleeve 9 carries a first track roller 10 between the link plates 5, 6 which are non-rotatably

connected to the bearing unit 8. The link plates 5, 6 are rotatably connected to the link pin 7 by way of the sleeve 9 and a bush 9a. This arrangement ensures that movement can occur between the sleeve 9 and the link pin 7. Respective  
5 discs 12, 13 (Figure 2) are arranged between the end faces of the sleeve 9 and the link plates 2, 3 and between a collar 11 (Figure 2) of the link pin 7 and the link plates 5, 6 of the second clip 4 to prevent metallic friction between the parts.

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As shown in Figure 2, the link pin 7 has a cylindrical extension 15 arranged at its free upper end in an eccentric position with respect to its own longitudinal axis 14, for carrying a second track roller 16. The track surface 17 of  
15 the second track roller 16 extends beyond the track surface 18 of the first track roller 10 in vertical projection by the amount "a" (Figure 2) and is in surface contact with the outer guide track 19a. It is important to note that the amount by which the second track roller 16 can extend  
20 beyond the first track roller 10 may vary according to the eccentricity of the second track roller 16 on the cylindrical extension 15 and in dependence upon the ratio of the diameters of the first and second track rollers 10, 16. The eccentric arrangement of the second roller 16 with  
25 respect to the first roller 10 ensures that the respective roller takes over independent guidance of the clip, so that the latter can be guided against both the outer and inner guide tracks 19a and 19b.

30 To prevent vertical displacement of the link pin 7 in the direction of removal of the link pin from the sleeve 9, the link pin 7 has a flat 20 (Figure 3) in the region of the upper link plate 2. The link plate 2 engages with this flat 20 which effectively prevents rotation of the link pin 7.  
35 Instead of providing this safety device against rotation, a safety plate 21 surrounding the collar 22 of the link pin 7 resting on the link plate 2 may be provided. This safety

plate also rests on the link plate 2 and prevents both rotation and upward movement of the link pin.

The flat 20 on the collar 22 of the link pin 7 gives rise to an end face on this collar, on which the safety plate 21 also rests. The safety plate 21 forms part of the clip and is arranged between the link plate 2 and the clip body 1.



Claims

1. Tentering apparatus having a clip chain movable  
5 longitudinally between parallel guide tracks, the chain including tentering clips, and at least some of the clips each being vertically supported by at least one support roller and being guided horizontally by a pair of track rollers having parallel axes of rotation, one  
10 of the track rollers being disposed eccentrically with respect to the other such that the said one track roller is shifted in vertical alignment with respect to the other track roller.
  
- 15 2. Tentering apparatus having a clip chain movable longitudinally between parallel guide tracks, the chain including tentering clips, and at least some of the clips each being vertically supported by at least one support roller arranged symmetrically in the body of  
20 the clip, the clip guided horizontally by a pair of track rollers rotatably mounted in link plates connecting adjacent clips and arranged with their axes of rotation parallel, which track rollers take up the horizontal forces acting on a clip during operation, the rotatable mounting of the track rollers being  
25 provided by a link pin which at the same time establishes the pivotal connection between adjacent clips, wherein one of the track rollers is arranged on the link pin eccentrically with respect to the other track roller on the link pin, the said one track roller  
30 being shifted in vertical alignment with respect to the said other track roller.
  
3. Tentering apparatus according to claim 1 or claim 2  
35 wherein the axis of rotation of the said other roller extends eccentrically to the axis of rotation of the said one track roller.

4. Tentering apparatus according to any preceding claim wherein the track surface of the said other track roller extends beyond the track surface of the said one track roller in vertical projection.
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5. Tentering apparatus according to claim 2 wherein the said other track roller is rigidly connected with a cylindrical extension of the link pin.
- 10 6. Tentering apparatus according to any preceding claim wherein the said other track roller is in surface contact with one of the parallel guide tracks.
7. Tentering apparatus according to claim 6, wherein the  
15 said other the second track roller is in surface contact with the outer guide track.
8. A tentering clip with a roller bearing, the clip being  
20 arranged to be supported vertically by at least one support roller located symmetrically in the body of the clip and to be guided horizontally by a pair of track rollers rotatably mounted in link plates for connecting adjacent lips and arranged with their axes of rotation parallel, which track rollers take up horizontal forces  
25 acting on the clip during operation. The rotatable mounting of the track rollers being provided by a link pin which at the same time establishes the pivotal connection between the adjacent clips, wherein one of the track rollers is arranged on the link pin  
30 eccentrically with respect to the other track roller on the link pin, the said one track roller being displaced vertically with respect the said other track roller.
- 35 9. Tentering apparatus instructed and arranged substantially as herein described with respect to the drawings.