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Macclesfield Cheshire, SK11 0DF (GB)(54) **False twist apparatus.**

(57) A false twist apparatus (10) of the type having three sets (11, 12, 13) of overlapping friction discs mounted on respective parallel spindles (14,15,16) located at the corners of an equilateral triangle, has first (14) and second (15) spindles connected by a first drive belt (17) and mounted on a fixed support (24), and a third spindle (16) connected to the first spindle (14) by a second drive belt (18) and mounted on a movable support (25). The movable support (25) is pivotally mounted on the fixed support (24) so that the third spindle (16) pivots about an axis (26) spaced from the axis (19) of the first spindle (14) to the opposite side thereof from the axis (21) of the third spindle (16). Such movement opens the apparatus (10) for threading purposes and then closes it to an operating position for false twisting yarn.

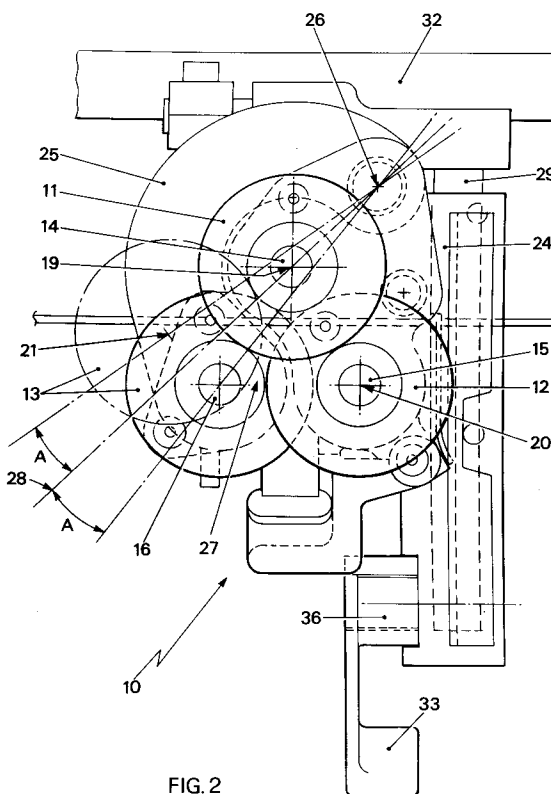


FIG. 2

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This invention relates to false twist apparatus, and more particularly to apparatus of the type in which three sets of friction discs are mounted on respective spindles which are located at the corners of an equilateral triangle, the discs of each set overlapping the discs of the other two sets so as to provide a zig zag helical path for a yarn to pass through the apparatus and be false twisted by contact with the rims of the discs.

One of the problems associated with apparatus of this type is that of threading the yarn into the apparatus. One method by which an attempt has been made to overcome this problem is that of providing a threading device comprising movable tines or fingers which in moving guide the yarn into the centre of the apparatus. An alternative method is that of moving at least one of the shafts relative to the others so that two sets of discs do not overlap each other, thereby providing a gap through which the yarn can be introduced into the centre of the apparatus, and then moving the shafts or shaft back into their operational positions when the yarn has been threaded. This latter method can introduce another problem, in that either the use of a simple transmission belt arrangement coupling the three shafts for rotation is prevented, or means for maintaining the tension in the belt as the distance between the three shafts changes must be provided. In the former case a complicated and costly drive arrangement is required and in the latter case the necessary reverse bending of the belt around a tensioning pulley leads to a shortened belt life and high power consumption. To overcome this problem, many known devices have an arrangement in which at least one of the shafts is pivotal about the axis of another of the shafts, whereby the relative spacing of the movable shaft and the fixed shaft remains constant and a belt can pass around the two shafts without the need for a tensioning pulley. However, even this relatively simple arrangement is not entirely satisfactory since it creates complex "bearing within a pivot" assemblies and a large diameter to length pivot ratio, leading to premature bearing wear.

In US Patent No. 4485617 it is proposed to mount two of the spindles on a common support which is pivotal, relative to a fixed support carrying the third spindle, about an axis displaced from the axes of the three shafts so that two of the sets of discs can be moved into a non-overlapping disposition and at the same time the drive to the apparatus is disengaged. However, with such an arrangement, the running yarn will come into contact initially with the three sets of discs whilst they are stationary or moving slowly and then will be in contact with the discs as they accelerate to the operating speed. In consequence there will be very high risk of yarn breakage during this procedure,

and also a risk of the yarn cutting the surface of a polyurethane friction disc.

It is an object of the present invention to provide a false twist apparatus of the three sets of overlapping discs type which avoids or minimises the disadvantages of the above described known types.

The invention provides a false twist apparatus comprising three sets of friction discs mounted on respective spindles, with first drive means connecting first and second spindles which are mounted for rotation about respective fixed, mutually substantially parallel axes, the third spindle is mounted on a movable support for rotation about a third axis which is substantially parallel with the first and second axes with second drive means connecting the first and third spindles, and the movable support is pivotal about a pivot axis substantially parallel with but spaced from the first axis to the opposite side thereof from the third axis, whereby the third spindle is movable between a disc operating position in which the three spindles are at the corners of an equilateral triangle with the three sets of discs mutually overlapping and a threading position in which the discs on the second and third spindles are mutually spaced to provide a threading gap therebetween.

Preferably the first and second drive means provide that the three spindles rotate in the same direction at substantially the same speed. The first and second drive means may comprise toothed belts.

The third axis when in the disc operating position may be equi-spaced from, but to the opposite side of, a plane containing the first axis and the pivot axis, as it is when in the threading position.

The first and second spindles may be mounted on a first support on which the movable support is pivotally mounted. The first support may be mounted on a frame of textile machine for sliding movement between two unit operating positions providing for rotation of the spindles in opposite directions. In one of the unit operating positions a wharve on the first spindle contacts one side of a transmission belt, whilst in the other unit operating position a wharve on the second spindle contacts the other side of the transmission belt.

One embodiment of the invention will now be further described with reference to the accompanying drawings in which,

Fig 1 is a side elevation.

Fig 2 is a plan view, and

Fig 3 is a plan view of the drive arrangement.

Referring now to the figures, there is shown a false twist apparatus 10 comprising first, second and third sets of friction discs 11, 12, 13 mounted on respective first, second and third spindles 14, 15, 16. First drive means in the form of a toothed

belt 17 connects the first and second spindles 14,15, and second drive means in the form of a toothed belt 18 connects the first and third spindles 14,16 so that the three spindles 14,15,16 rotate at the same speed in the same direction about first, second and third, substantially parallel, axes 19,20,21. In the disc operating position, shown in full lines in the figures, the three axes 19,20,21 lie at the corners of an equilateral triangle with the three sets of discs 11,12,13 in mutually overlapping disposition. In this position a yarn (not shown) travels through the apparatus 10 from an inlet guide 22 to an outlet guide 23 (see Fig 1) in a zig-zag helical path so as to be false-twisted and forwarded by the apparatus 10 in known manner.

First and second spindles 14,15 are mounted in a body 24 in which the axes 19,20 are fixedly located. Third spindle 16 is mounted in a movable support 25 which is itself mounted on the body 24 so as to be pivotal about a pivot axis 26 which is substantially parallel with axes 19,20 and 21. This enables the third spindle 16 and the set of discs 13 thereon to be moved from the disc operating position referred to above to a threading position shown in broken lines in Figs 2 and 3. In the threading position the second and third sets of discs 12, 13, do not overlap each other, but are mutually spaced to provide a threading gap 27 therebetween (see Fig 2) through which a yarn may be introduced to the centre of the apparatus 10 by the threading tines 37 and the inlet guide 22 which are mounted by means of a post 38 to move with the movable support 25. The pivot axis 26 is arranged in the body 24 so that the third axis 21 and the pivot axis 26 are on opposite sides of the first axis 19. Furthermore it is arranged that the third axis 21 when in the disc operating position is equi-spaced from, but on the opposite side of, the plane 28 containing the pivot axes 26 and the first axis 19, as it is when in the threading position, ie the angles A in Figs 2 and 3 are equal. With such an arrangement, since the radius of the path of movement of the third spindle 16 is greater than the distance between the first and third axes 19, 21, the belt 18 will slacken slightly from its operating tension and then tighten to its operating tension as the third spindle 16 is moved from the disc operating position to the threading position. In consequence the slackening of the belt tension is kept to a minimum thereby minimising any transmission problems and maintaining the optimum belt life.

The body 24 is slidably mounted on a rail 29 (Fig 1) so that a wharve 30 on first spindle 14 can engage or disengage a transmission belt 31 extending along a textile machine on the frame 32 of which the rail 29 is mounted, whereby the apparatus may be driven or disengaged from the drive 31. Such sliding movement of body 24 is effected by

means of a handle 33 mounted on the rail 29 and having a cam surface 34 which engages the body 24. A spring (not shown) biases the body 24 so as to cause the wharve 30 to engage the transmission belt 31 when the handle 33 is lowered from the disengagement position shown in Fig 1. Alternatively or additionally, a wharve 35 may be provided on second spindle 15, a second cam surface 36 provided, on the handle 33 and the spring position changed to bias the body 24 in the opposite direction so as to cause the wharve 35 to engage the transmission belt 31 to change the apparatus from Z twist to S twist if desired. The sequence of the discs 11,12,13 as contacted by the yarn will also have to be changed to 11,13,12, as is well known in the art.

By means of the invention a simply constructed arrangement is provided whereby the yarn can be readily threaded into a false twist apparatus of the three discs stack type, whilst maintaining a minimum of disturbance to the drive means for the disc stacks and ensuring the maximum bearing and belt life, with a minimum of power consumption. In addition the arrangement minimizes the tendency for yarn breaks during its engagement with the friction discs or damage to the surface of the friction discs during such engagement.

Claims

1. A false twist apparatus comprising three sets of friction discs (11,12,13) mounted on respective spindles (14,15,16), with first drive means (17) connecting first and second spindles (14,15) which are mounted for rotation about respective fixed, mutually substantially parallel axes (19,20), and the third spindle (16) is mounted on a support (25) for rotation about a third axis (21) which is substantially parallel with the first and second axes (19,20) with second drive means (18) connecting the first and third spindles (14,16), characterised in that the support (25) is movable and is pivotal about a pivot axis (26) substantially parallel with but spaced from the first axis (19) to the opposite side thereof from the third axis (21), whereby the third spindle (16) is movable between a disc operating position in which the three spindles (14,15,16) are at the corners of an equilateral triangle with the three sets of discs (11,12,13) mutually overlapping, and a threading position in which the discs (12,13) of the second and third spindles (15,16) are mutually spaced to provide a threading gap (27) therebetween.
2. A false twist apparatus according to claim 1, characterised in that the first and second drive

means (17,18) provide that the three spindles (14,15,16) rotate in the same direction at substantially the same speed.

3. A false twist apparatus according to claim 1 or claim 2, characterised in that the first and second drive means (17,18) comprise toothed belts. 5

4. A false twist apparatus according to any one of claims 1 to 3, characterised in that the third axis (21), when in the disc operating position, is equi-spaced from, but to the opposite side of, a plane (28) containing the first axis (19) and the pivot axis (26), as it is when in the threading position. 10
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5. A false twist apparatus according to any one of claims 1 to 4, characterised in that the first and second spindles (14,15) are mounted on a first support (24) on which the movable support (25) is pivotally mounted. 20

6. A false twist apparatus according to any one of claims 1 to 5, characterised in that a threading device (37,38,22) is mounted to move with the movable support (25) to guide a yarn into the centre of the apparatus (10) when the third spindle (16) is moved to the disc operating position. 25
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7. A false twist apparatus according to claim 6, characterised in that the threading device (37,38,22) comprises an input guide (22). 35

8. A false twist apparatus according to claim 6 or claim 7, characterised in that the threading device (37,38,22) comprises a plurality of tines (37). 40

9. A false twist apparatus according to claim 5 or any claim dependent thereon, characterised in that the first support (24) is mounted on a frame (32) of a textile machine for sliding movement between two unit operating positions providing for rotation of the spindles (14,15,16) in opposite directions. 45

10. A false twist apparatus according to claim 9, characterised in that in one of the unit operating positions a wharve (30) on the first spindle (14) contacts one side of a transmission belt (31), whilst in the other unit operating position a wharve (35) on the second spindle (15) contacts the other side of the transmission belt (31). 50
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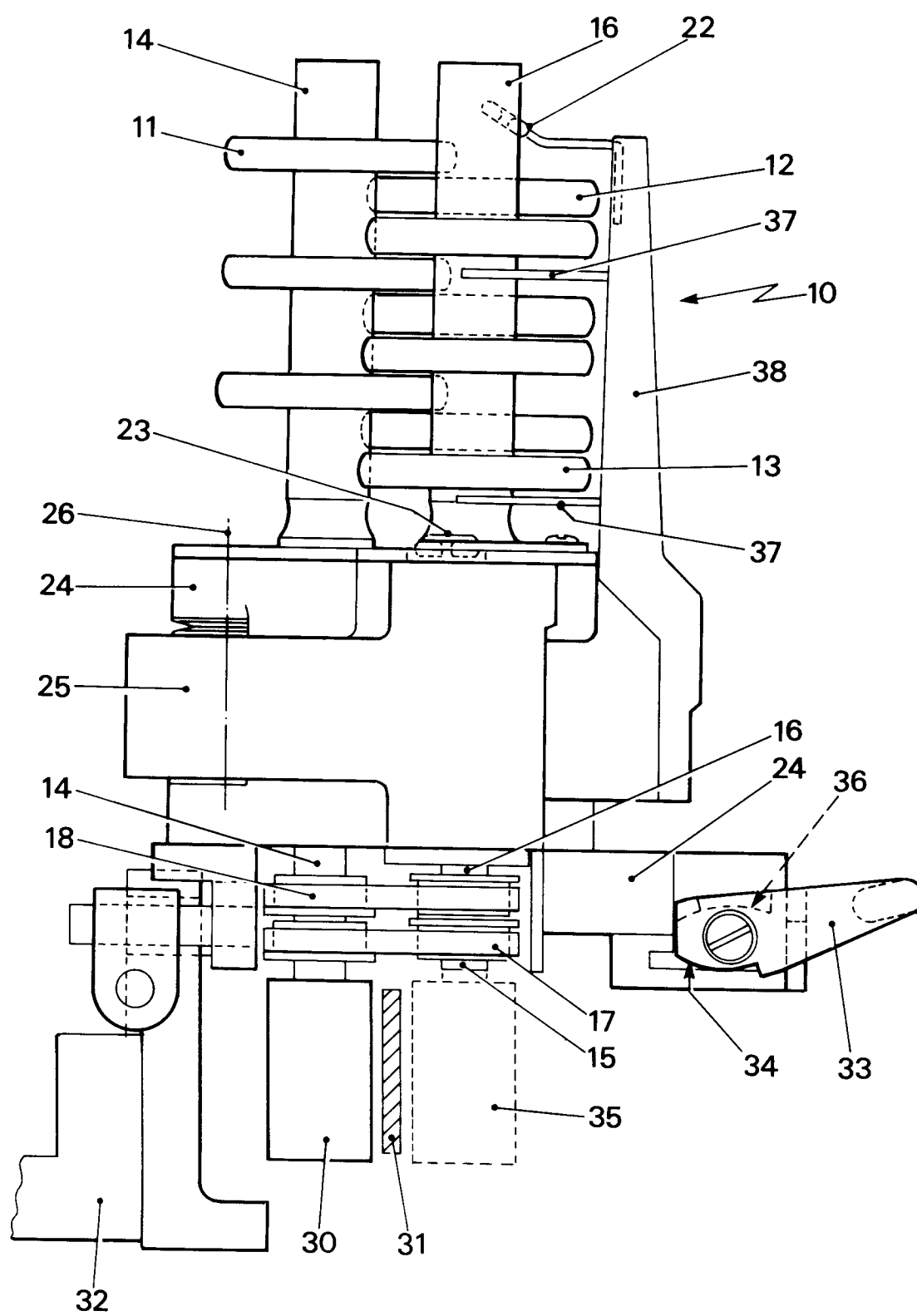
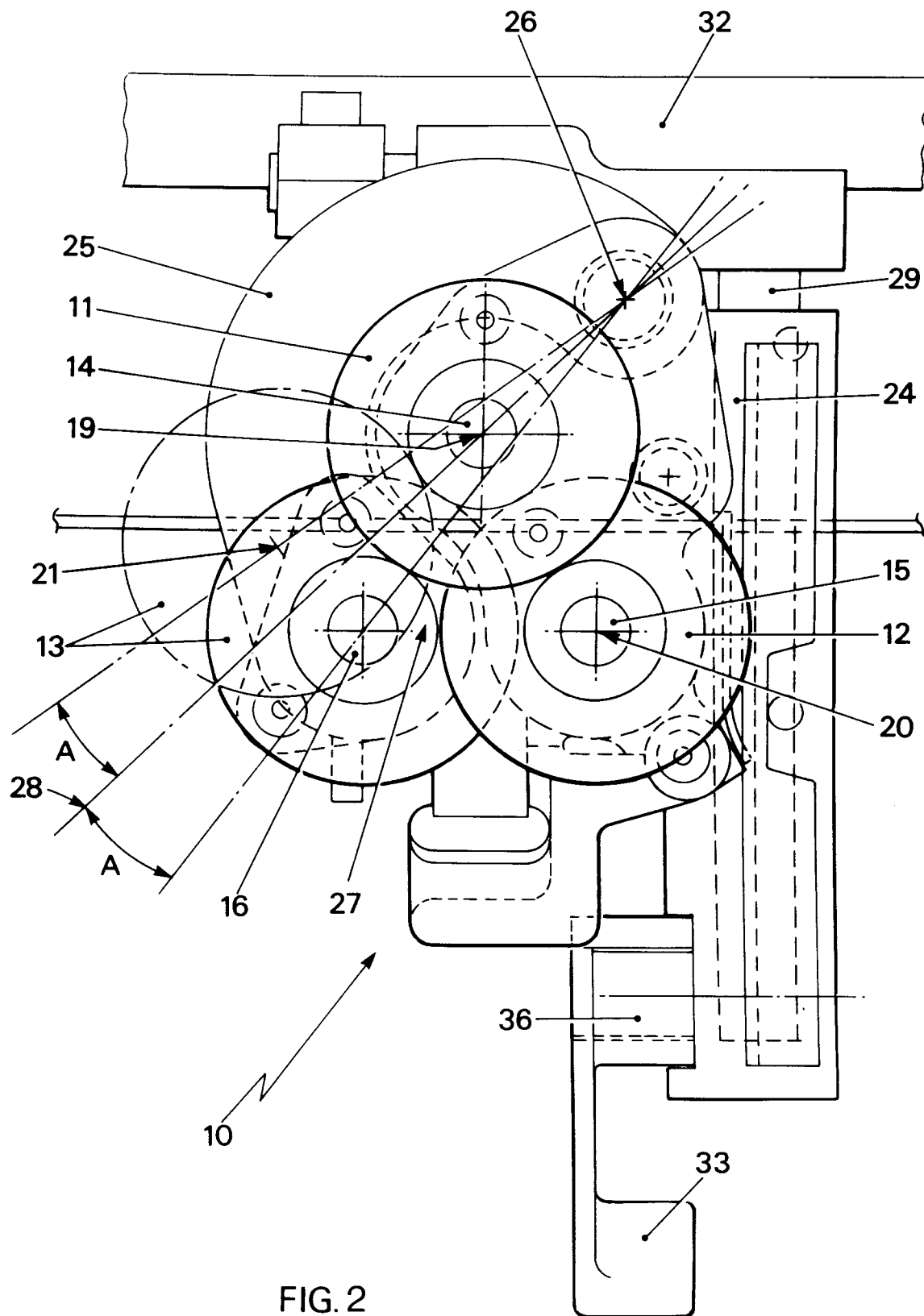


FIG. 1



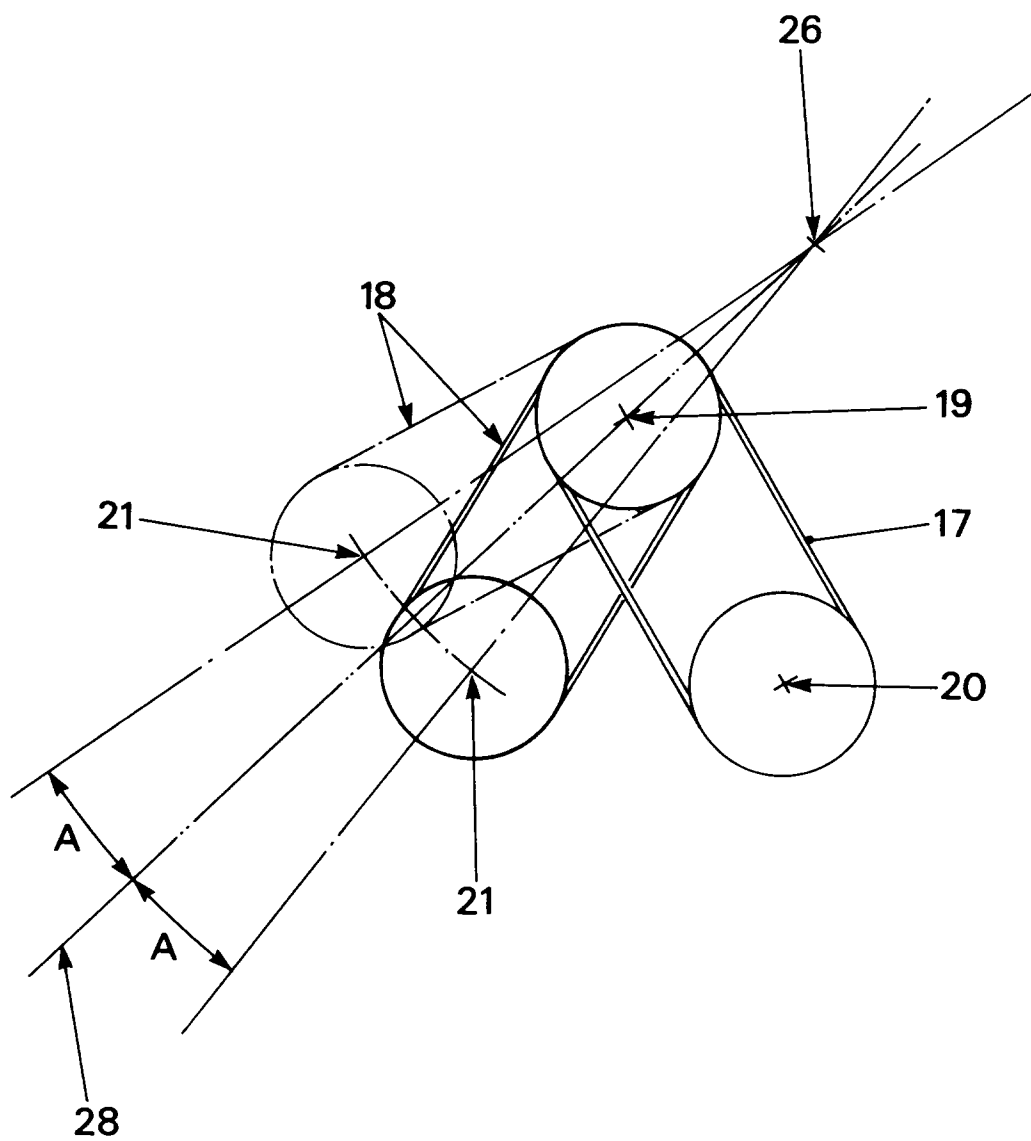


FIG. 3



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EUROPEAN SEARCH REPORT

Application Number
EP 93 30 4950

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.5)
X A	GB-A-2 099 465 (FAG KUGEL FISCHER) * whole document * ---	1-3,5 4	D02G1/08
A	GB-A-2 058 156 (BARMAG) * whole document * ---	1,6-8	
A	US-A-4 333 308 (SCHLEYER ET AL.) * column 2, line 13 - column 3, line 5 * ---	1,9	
A	US-A-4 235 071 (DILLON) * column 3, line 33 - column 5, line 7 * -----	1,6-8	
			TECHNICAL FIELDS SEARCHED (Int.Cl.5)
			D02G
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 15 November 1993	Examiner VAN BEURDEN, S
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