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(71) Applicant: **FRATELLI MARZOLI & C. S.p.A.**
Via Durante, 1
I-25036 Palazzolo sull'Oglio Brescia(IT)

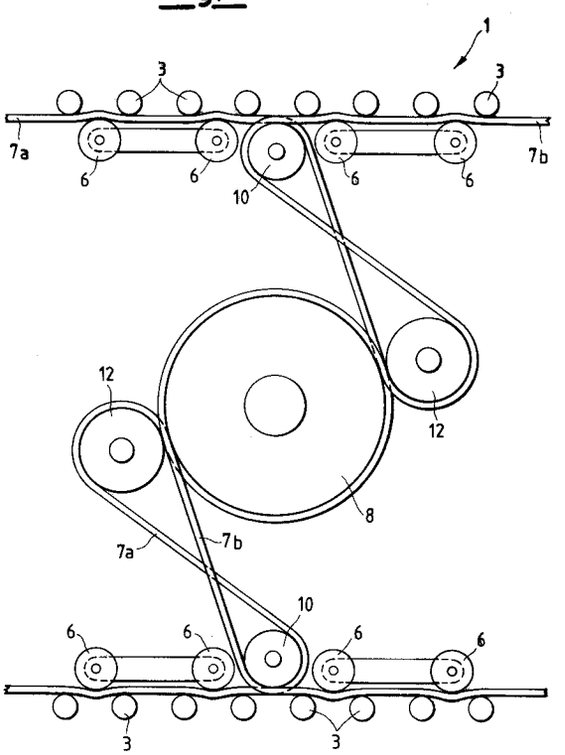
(72) Inventor: **Pezzoli, Luigi**
Vicolo Duranti, 1
I-25036 Palazzolo Sull'Oglio (Brescia)(IT)
Inventor: **Cossandi, Santino**
Via Pontoglio, 22
I-25036 Palazzolo Sull'Oglio (Brescia)(IT)

(74) Representative: **De Carli, Erberto et al**
ING. BARZANO' & ZANARDO MILANO S.p.A.
Via Borgonuovo, 10
I-20121 Milano(IT)

(54) Device for driving the spindles in a ring spinning machine or the like.

(57) In a ring spinning machine the spindles are rotated sectionally by providing several pairs of endless drive belts (7a, 7b), the belts of each pair rotating an equal number of spindles on the two faces of the spinning machine (1). Each pair of belts (7a, 7b) is driven by its own drive member arranged symmetrically to the paths of the belts of the respective pair. The drive member consists of a drive pulley (8) driven either directly by a motor (9) or via a transmission connected to a central motor. Deviation pulleys (12) are associated with each drive pulley to cause the belts (7a, 7b) to pass about opposite sides of the pulley (8) through large winding angles involving the entire periphery of the pulley (8) or more, and thus improve the traction effect of the pulley (8).

Fig.3



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This invention relates to a device for driving the spindles in a ring spinning machine or the like.

In ring spinning machines it is known to rotate the individual spindles, arranged on the two faces of the spinning machine, by a single drive belt which extends endlessly in tangential contact with the rotation pulleys of all the spindles, the belt being driven by a motor. To ensure sufficient tangential contact, suitable tensioning rollers are provided between pairs of adjacent spindles.

This arrangement however suffers from starting difficulties when the number of spindles to be driven is very large.

It has already been proposed to drive the belt by several drive units distributed along the machine on the inside of the belt perimeter. The belt is deviated towards the drive unit at each of these latter by two deviation pulleys. To prevent belt portions moving in two different planes the two deviation pulleys are positioned in the same plane and spaced apart in the longitudinal direction of the spinning machine, but this means that those spindles in positions corresponding with the deviated portion cannot be driven by the belt.

It therefore becomes essential to provide a second belt at each drive unit to drive the spindle or spindles not engaged by the main belt, this second belt being driven by the relative pair of deviation pulleys.

This however complicates the spinning machine structure at each drive unit. In addition, it must be ensured that on starting, all the drive units accelerate at the same rate to prevent the main belt slipping or undergoing tension irregularities, with consequent increased wear and reduced life of this belt.

This known arrangement also has the drawback that the winding angle of the main belt about the drive pulleys of the drive units is limited and cannot exceed a certain value because of the arrangement of the deviation pulleys. The result is that for equal spindle numbers and characteristics, a greater number of drive units is generally required to prevent slippage.

The object of the present invention is to overcome these drawbacks and limitations by providing a drive device of the stated type by which the drive conditions of the various spindles are improved in the sense of preventing slippage as far as possible, within the context of low constructional effort and cost.

This object is attained according to the invention by a device for driving the spindles in a ring spinning machine or the like in which the spindles are rotated by tangential contact between respective spindle pulleys and an endless drive belt, characterised in that several pairs of drive belts are provided, the belts of each pair rotating an equal number of spindles on the two faces of the spinning machine, each pair being driven by its own drive member arranged substantially symmetrical to the paths of the belts of the respective pair.

Advantageously the two belts of each pair pass about the same drive pulley on circumferentially opposite sides thereof and in different planes, so that the entire periphery of the drive pulley is used for traction, which would not be possible with a single belt wound as in the known art. The result is that with the present device the drive conditions are better, enabling either the number of drive units to be reduced or the number of driven spindles to be increased for the same number of drive units, and in addition the slippage margins are greater so decreasing drive belt wear.

The drive members can consist of relative drive pulleys, each associated with its own motor or receiving motion from a transmission connected to a single motor.

A device according to the invention does not require the provision of auxiliary belts for driving spindles excluded from the main drive, and in addition does not involve constructional complications in that the single belt arrangement requires only the provision of relative deviation members, which can be common for adjacent belts. As the individual drive units are associated with independent pairs of belts, any acceleration differences during the starting of one unit compared with another have no effect on the belts.

Further details and advantages of the invention will be more apparent from the description of some preferred embodiments thereof described hereinafter and illustrated by way of example on the accompanying drawings, in which:

Figure 1 is a schematic plan view of a first embodiment of a drive device according to the invention;

Figure 2 is a schematic side elevation of the same device;

Figure 3 is an enlarged view of the device of Figure 1 at the drive units;

Figure 4 is a schematic side elevation of a second embodiment of a device according to the invention.

The figures show very schematically a ring spinning machine 1 provided with a plurality of spindles 2 arranged on two faces of the spinning machine (only some of the spindles are shown, for simplicity), each spindle being provided lowerly in known manner with a drive pulley 3 to be tangentially engaged by a drive belt.

The tailstock of the spinning machine 1 carrying the control members for the drafting units 4a is indicated by 4, whereas the spinning machine headstock, which mainly carries the suction members, is indicated by 5. Tensioning rollers 6 are

arranged between pairs of pulleys 3, all in known manner.

For driving the spindles 2 the invention provides for sectional drive, the number of sections being two in this particular case.

The spindles 2 of the sections are driven by respective pairs of drive belts 7a, 7b such that the belts of each pair rotate the same number of spindles 2 on the two faces of the spinning machine 1. It is not necessary for each pair of belts 7a, 7b to drive the same total number of spindles 2. This can also be deduced from Figure 1, in which the belt pair 7a, 7b on the left drives a smaller number of spindles 2 than the pair on the right. For constructional economy reasons it may however be appropriate to divide the drives such that each belt pair 7a, 7b drives the same number of spindles 2.

Each belt pair 7a, 7b is driven by its own drive member 8 consisting of a main drive pulley positioned substantially symmetrical to the trajectory of the associated belt pair 7a, 7b. The pulley 8 can be operated directly by its own electric motor 9.

Each belt pair 7a, 7b travels about deviation pulleys 10, 11 of vertical axis, these pulleys being common for adjacent belts 7a, 7b and operating the drafting units 4a by known means (Figure 2). As can be seen in Figures 2 and 4, this arrangement means that the adjacent belts 7a, 7b move in alternately different horizontal planes, but each belt remains entirely in its own plane, so that regular operation of the respective spindles 2 is ensured.

Within the drive units there are provided a further two deviation pulleys 12 in diametrically opposite positions about the relative drive pulley 8, and in different planes. The pulleys 12 are positioned such as to cause the belts 7a, 7b to undergo substantially S-shaped paths by passing about opposite sides of the pulley 8 through relatively wide winding arcs which in total occupy the entire periphery of the pulley 8.

The arrangement as described and illustrated enables the entire periphery of the pulleys 8 to be used (although in different planes) as traction surfaces. By thus splitting the belts and arranging them symmetrically about the drive members 8 it is therefore possible to obtain a total winding angle which is at least equal to 360°, which would not be possible if only one belt were present, passing about the pulley 8 in known manner. It will be apparent that for equal numbers of driven spindles, the improved total winding angle obtainable by a device according to the invention provides a greater margin of protection against slippage, or alternatively allows the number of drive points along the spinning machine 1 to be reduced, and thus results in lesser drive synchronization problems.

It will be noted that by suitably positioning the deviation pulley 12, for example on a diameter parallel to the longitudinal direction of the spinning machine 1, the winding angle of each belt 7a, 7b exceeds 180°, so that the total winding angle of the two belts 7a, 7b exceeds 360°.

The greater expense of arranging a plurality of belts is therefore compensated by a greater regularity of spindle drive. Any operational irregularities can be remedied directly within that part of the spinning machine in which they occur, as they do not affect the rest of the spinning machine.

Instead of providing individual motors 9 for each drive member 8, it is possible to provide a single central motor 13 for example in the headstock 5 of the spinning machine 1, to drive the various pulleys 8 via a transmission 14 with branches 15, as shown in Figure 4.

With the present device the spindle drive can also be separated from the drafting unit drive, to the advantage of operational regularity of both drives, by adding to the mechanical part of the drafting units 4a a driver synchronized with the spindle 2, such as a motor 4b controlled by an inverter 4c in accordance with the frequency.

The number of separate spindle drive units can be different from that illustrated by way of example, and the path taken by the belts 7a, 7b at the drive members 8 could also be varied, possibly by providing further deviation pulleys to further improve the winding angle of the belts about the pulleys 8.

Claims

1. A device for driving the spindles in a ring spinning machine or the like in which the spindles are rotated by tangential contact between respective spindle pulleys and an endless drive belt, characterised in that several pairs of drive belts are provided, the belts of each pair rotating an equal number of spindles on the two faces of the spinning machine, each pair being driven by its own drive member arranged substantially symmetrical to the paths of the belts of the respective pair.

2. A device as claimed in claim 1, characterised in that said drive members consist of respective drive pulleys, each operated by its own motor.

3. A device as claimed in claim 1, characterised in that said drive members consist of respective drive pulleys operated by a single central motor via a transmission.

4. A device as claimed in one of the preceding claims, characterised in that at least one pair of deviation pulleys are provided at each drive member and are associated therewith in dia-

metrically opposing positions and in different planes, so as to cause the belts to undergo substantially S-shaped paths by passing about opposite sides of said drive member through winding angles which in total involve the entire periphery of said drive member.

5. A device as claimed in one of the preceding claims, characterised in that the belts of adjacent pairs slide about common deviation pulleys in correspondence with adjacent portions.

6. A device as claimed in one of the preceding claims, characterised in that the adjacent belts move in two alternately different horizontal planes.

7. A device as claimed in one of the preceding claims, characterised in that the belts of different pairs engage different numbers of spindles.

8. A device as claimed in one of claims 1 to 6, characterised in that the belts of different pairs engage the same number of spindles.

9. A device as claimed in one of the preceding claims, characterised in that deviation rollers are provided at said drive members to cause the belts to undergo paths such that they pass about the drive members through angles exceeding 180° in different planes respectively.

Fig.1

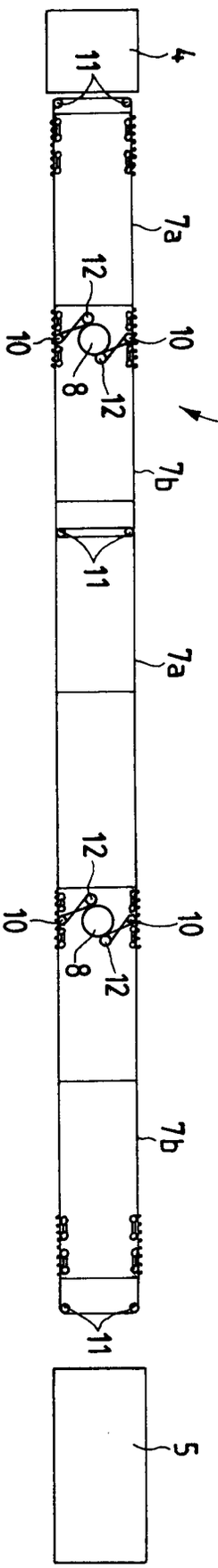


Fig.2

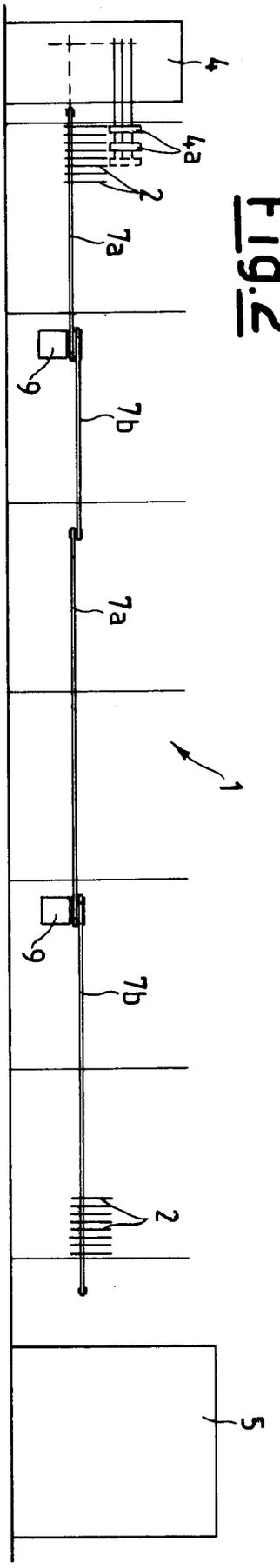


Fig.4

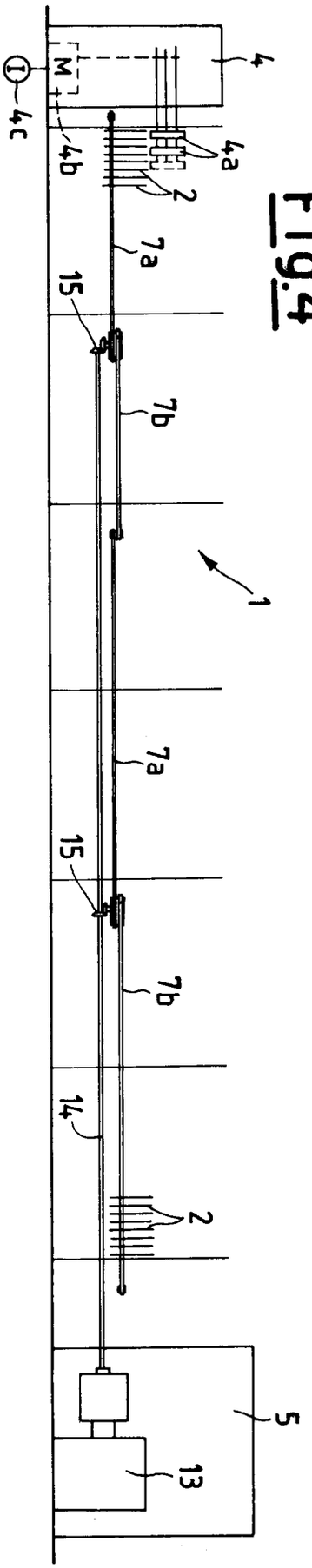
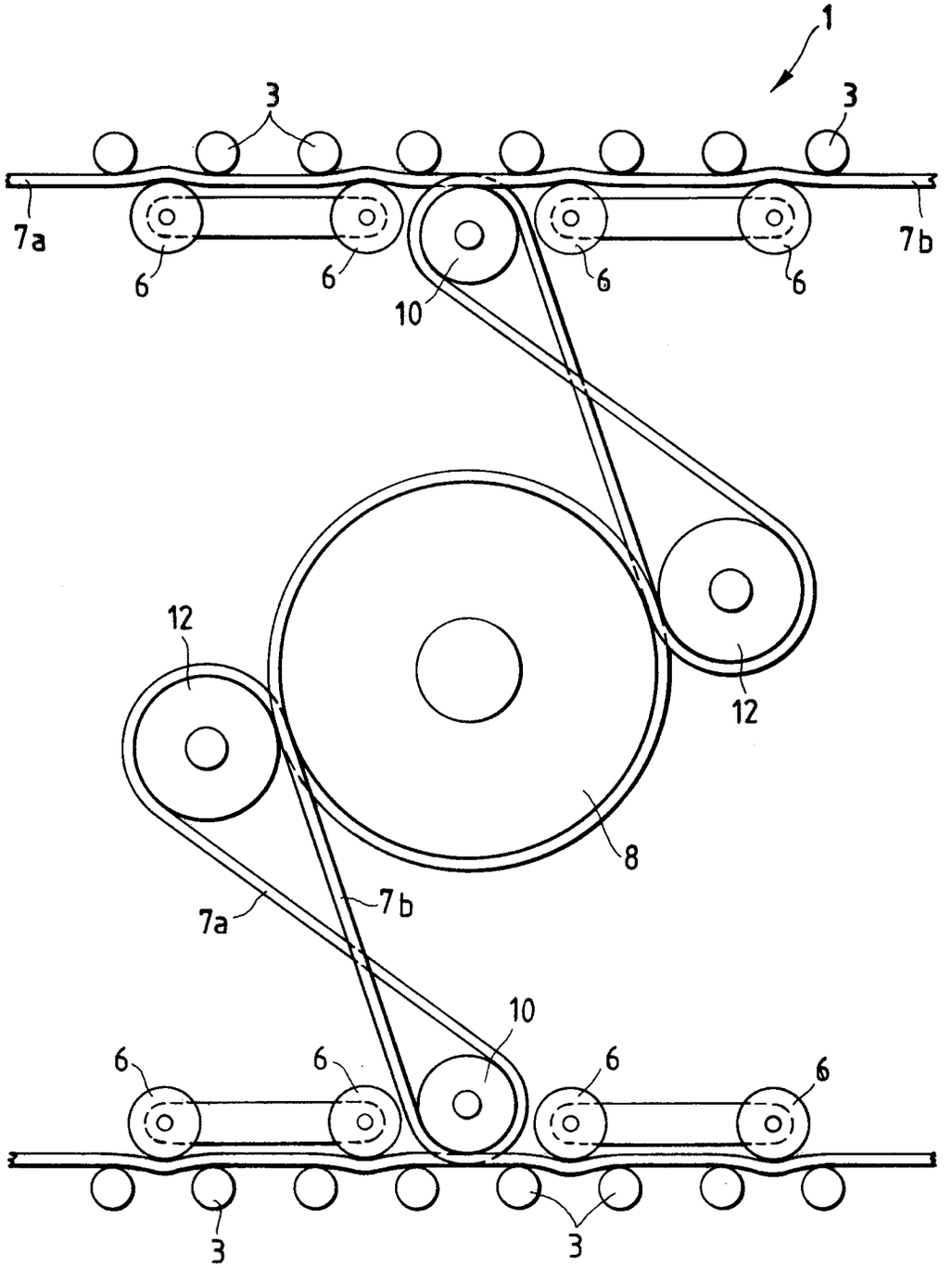


Fig.3



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EUROPEAN SEARCH REPORT

Application Number

EP 91 20 2353

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	DE-B-1 141 571 (SKF KUGELLAGERFABRIKEN) * figures 4,5 * *	1,3,5,6,8	D 01 H 1/241
Y		2,4,9,10	
Y	EP-A-0 326 003 (ZINSER) * figures 10-12 * *	2,4,9,10	
Y	US-A-1 442 037 (BAMFORD) * figure 2 * *	9	
A	WO-A-8 607 101 (ZINSER) * figures * *	4,9	
A	FR-A-2 249 187 (FIRMA EVOLUTION) * figure 7 * *	9	

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

D 01 H

The present search report has been drawn up for all claims

Place of search	Date of completion of search	Examiner
The Hague	16 December 91	RAYBOULD B.D.J.

CATEGORY OF CITED DOCUMENTS

- X : particularly relevant if taken alone
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