April 10, 1928. 1,665,422

R. SETZER

DEVICE RELATING TO RING SPINNING AND TWISTING FRAMES

Filed May 2, 1927 4 Sheets-Sheet 1

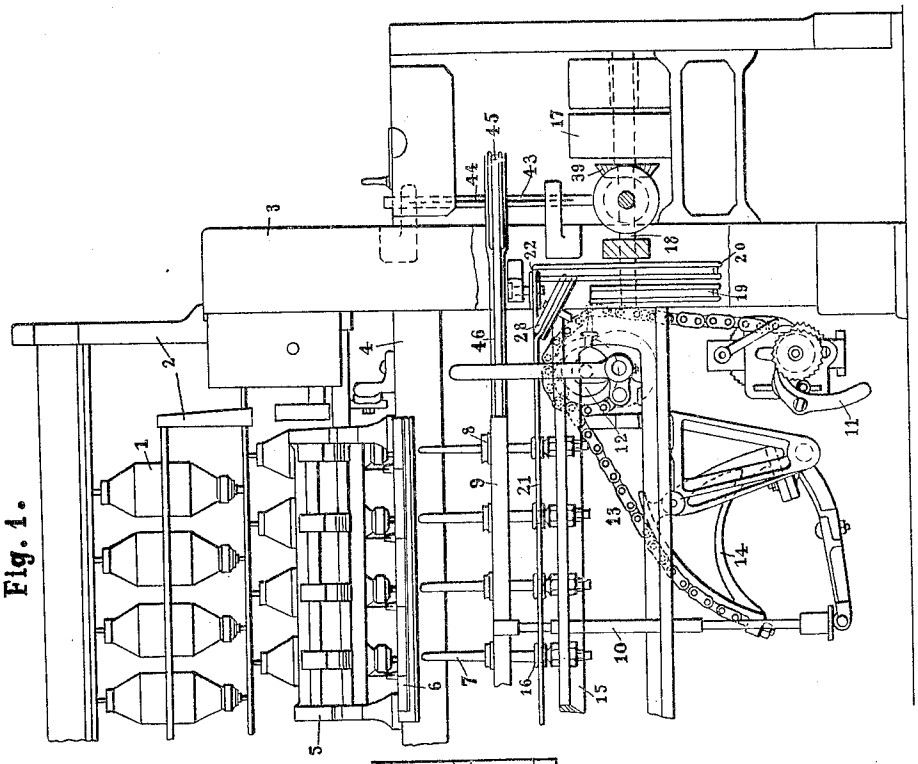


Fig. 1.

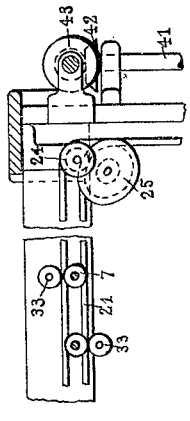


Fig. 2a.

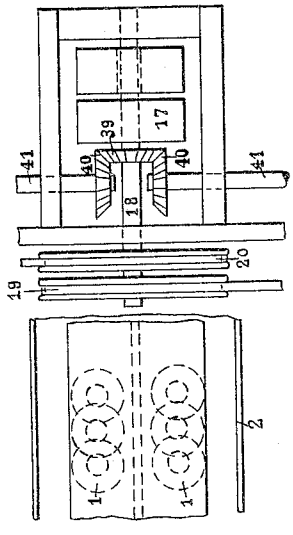


Fig. 2.

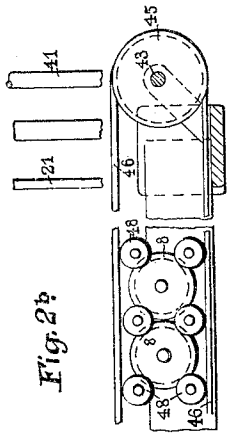


Fig. 2b.

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DEVICE RELATING TO RING SPINNING AND TWISTING FRAMES

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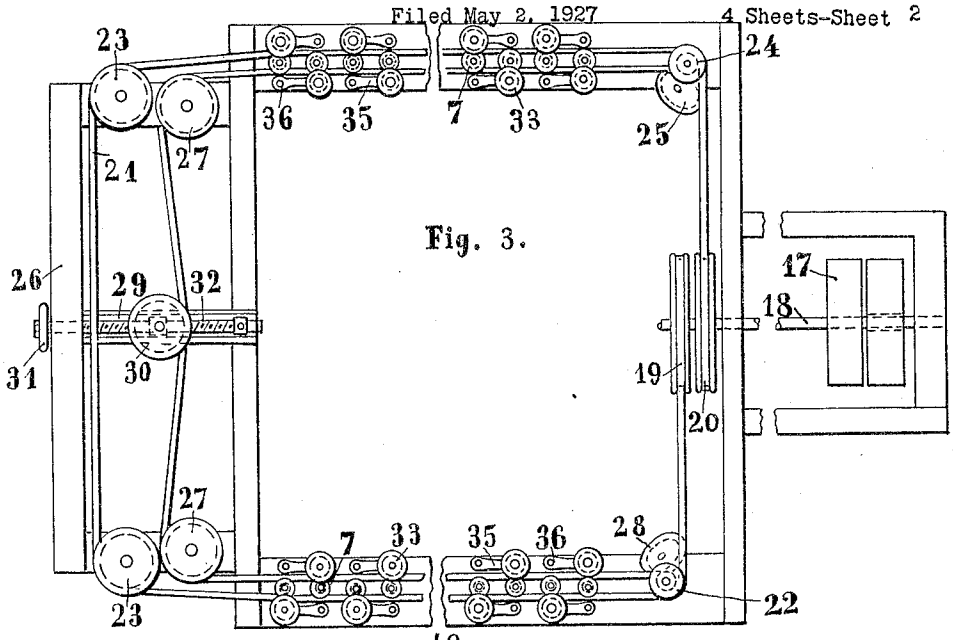


Fig. 3.

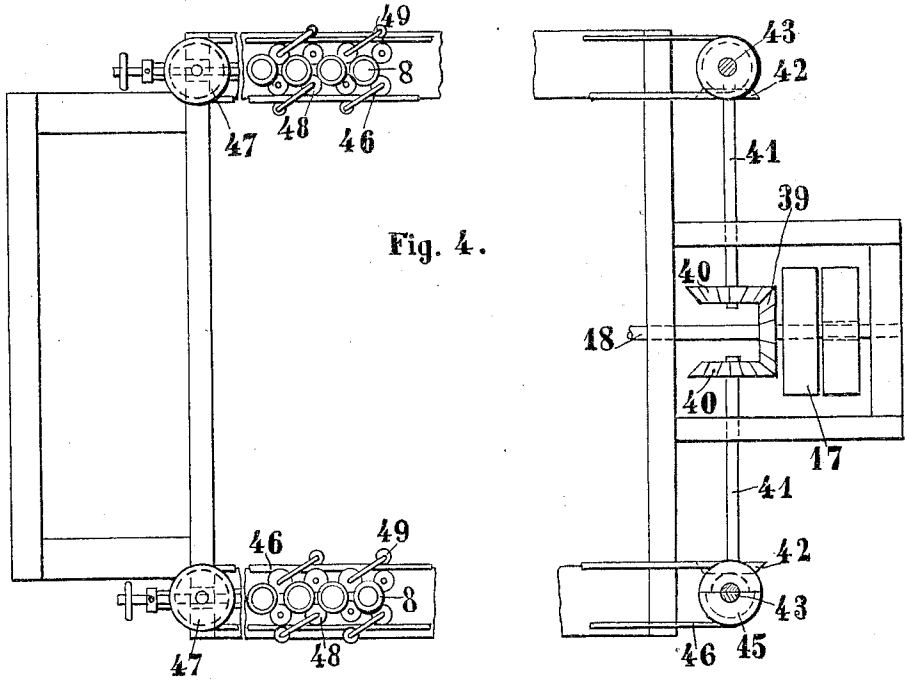


Fig. 4.

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DEVICE RELATING TO RING SPINNING AND TWISTING FRAMES

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Fig. 5.

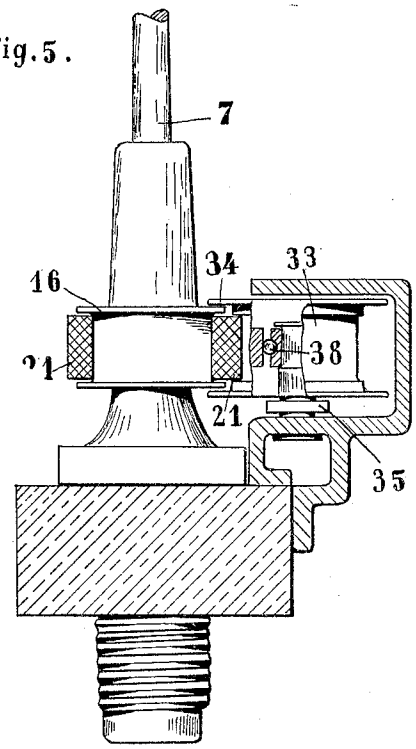
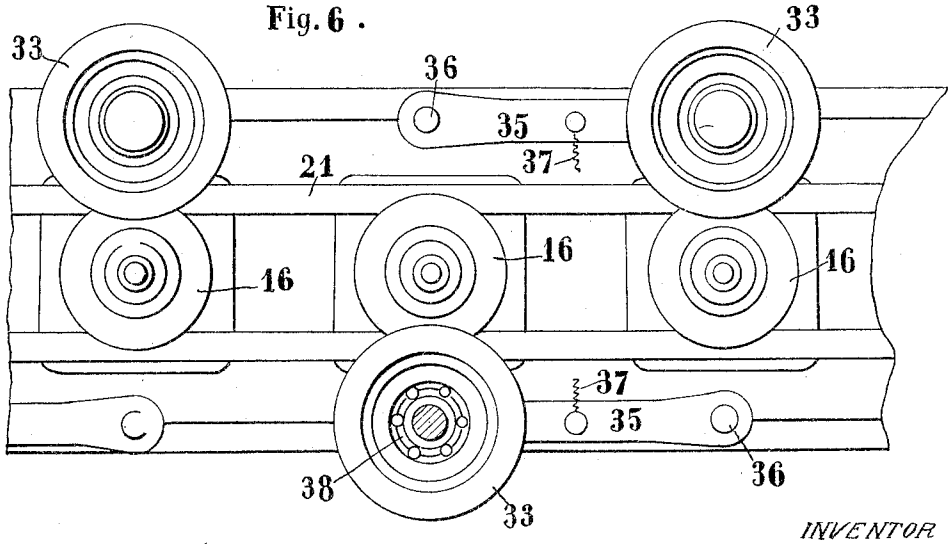


Fig. 6.



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DEVICE RELATING TO RING SPINNING AND TWISTING FRAMES

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Fig. 8.

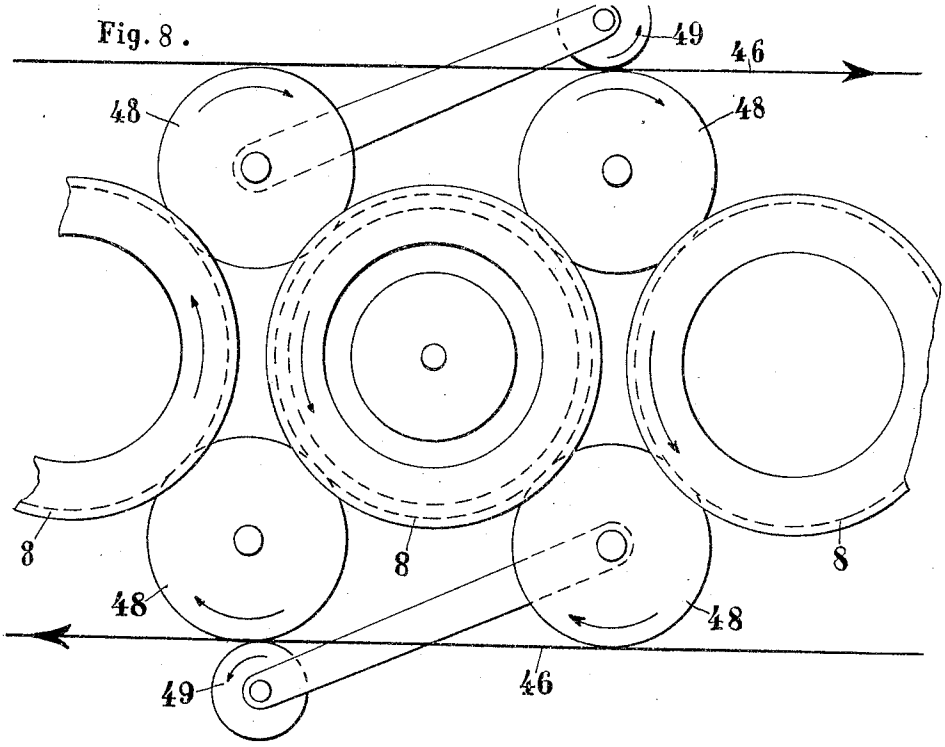
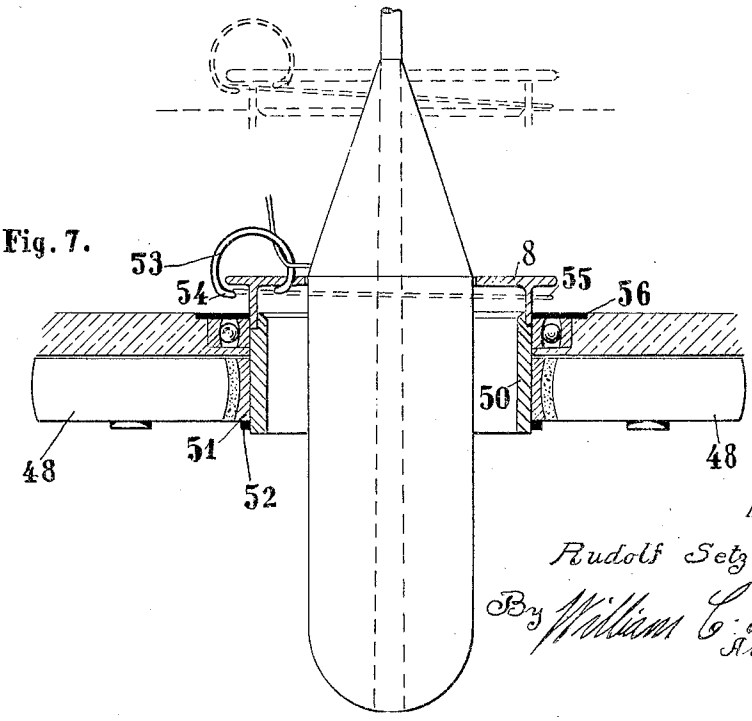


Fig. 7.



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UNITED STATES PATENT OFFICE.

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DEVICE RELATING TO RING SPINNING AND TWISTING FRAMES.

Application filed May 2, 1927, Serial No. 188,272, and in Germany April 1, 1927.

This invention relates to improvements in ring spinning and twisting frames and has for its object to provide an improved device for operating the spindles and rings by means of a guiding and driving device.

With this object in view the essential feature of the invention consists in operating the spindles and rings by means of two belts running parallel to one another but in opposite directions and revolving the spindles and rings by tangential friction so that shocks and uneven drawing are excluded. In the device claimed the wharves of the spindles and the rings of the ring rails are rotated together by a driving means arranged on both sides and guided by yieldingly arranged press rollers. From the existing devices of similar type the preesnt invention differs in so far as the spring-actuated yielding pressure of the movably arranged press rollers is of the alternating type the said rollers pressing first the front side and then the back of the next spindle or ring. This means a considerably simplified structure of the spindle drive as, in the first place, the press rollers themselves secure the spindles and, on the other hand, the spindle rail is hardly subjected to any change at all so that the new device can be attached to old frames, too. Furthermore, the simplicity of the arrangement offers the advantage that the weights to be moved by the spindle rail are increased only within very narrow limits, which means that less power is required.

When applying this drive to the rings it is advisable to have the latter not touch the driving means directly but to arrange pulleys between driving means and ring, because the rings will then be rotated more uniformly and without shock. The advantages thus obtained are very considerable as it becomes possible thereby to spin on short tubes in a similar manner as on self-acting mules.

The fundamental idea of this device, contrary to existing arrangements, consists in rotating the ring, too. The traveller of the ring will then be more or less in a position of rest relative to the ring according to whether the ring rotates at a speed equal or not equal to that of the spindle. However, as there can be only one winding when the traveller moves relative to the ring, care must be taken that the movement of the traveller is correspondingly accelerated or retarded if necessary. As only one spindle-winding has to be considered in ring spinning frames, the spindle must therefore lead the traveller.

It is a well-known fact that in ring spinning frames the traveller changes its position on the ring according to the prevailing tension of the yarn. If the yarn is tight, no matter what the cause may be, the next thing to happen is that the balloon of the yarn is tightened, which in turn causes the traveller to be pressed against the inside of the upper flange of the ring and, at the same time, to be raised, the raising on the inside of the ring being larger than on the outside according to the center of gravity of the traveller.

The further course of the spinning process is now very simple. Should the winding of the yarn cease because of the cooperative movement of the traveller, which, for the present, is considered as constant, the yarn begins to slack on account of the simultaneous continuous delivery of the drawing rollers, the traveller is lowered and thus gets into more or less contact with the brake lining attached to the outside of the ring. This has the effect that the traveller is slightly retarded, which in turn causes corresponding winding-on of the yarn, whereby the yarn will be tightened again so that the traveller is raised and its contact with the brake lining interrupted. The process is then repeated, it being, strictly speaking, not a continuous spinning process but a process divided into two steps, i. e., the giving of twist and the winding on, but these steps follow each other so closely that they are not visible to the eye.

As already mentioned, the friction ring is arranged on the outside of the spinning ring and, although raising or lowering of the traveller on the inside would be more advantageous, the following explanations will show that such an arrangement would involve the construction of a too complicated apparatus which is not necessary as outside braking produces the same satisfactory results.

From the spinning principle applied to this device follows that the speeds relative

to the spinning ring are very low and amount to only a very slight fraction of the speed of the traveller when the ring is stationary. This means that wear of the traveller will be extremely slight and the consumption of travellers be reduced to at least one-tenth.

It was assumed that the ring and the spindle rotate at the same speed, but this is not advantageous, and it is better to have the rings lead slightly so as to effectively prevent the spindles from leading when starting the frame owing to slipping of the belt etc. This would make the yarn too tight and result in breaking all threads, and this danger can be avoided by letting the rings lead slightly. The arrangement can also be utilized for nosing by slightly braking the gearing of the spinning rings every time the ring rail is in its highest position and thereby causing a slight increase in the tension of the yarn.

According to the known ring spinning principle it is impossible to spin on spindles of small diameter, to say nothing of spinning on bare spindles, as the radial tension applied to the yarn increases hyperbolically in proportion to the reduction of the diameter of the bobbin and causes the yarn to break. This injurious effect of radial tension on the yarn is avoided in the present arrangement and utilized for the regulation of winding so that the tension of the yarn remains constant during the entire spinning process regardless of the diameter of winding or, in other words, that the balloon, the visible criterion of the tension of the yarn, has always the same size. The result of experiments made confirms this statement, no appreciable change in the balloon being noted whether spinning took place on a bare spindle or any other winding diameter.

It follows from what has been said above that not only can spinning take place on the bare spindle but that working with very slight twists becomes possible, i. e. that any yarn of soft twist can be used. Furthermore, in fixing the speed of the spindle one is no longer dependent on the tension of the yarn at present connected with even the smallest diameter of the bobbin but one may choose any speed the yarn in question will stand; the maximum speed obtained in ring spinning frames having a variable spindle speed can be constantly maintained.

In order that the invention may be more readily understood one embodiment of the same is, by way of example only, illustrated in the accompanying drawings, in which:

Fig. 1 is a side view of a ring spinning frame according to the present invention,

Fig. 2 is a detail of the frame showing the main drive,

Figure 2^a is a detail of one corner of the frame showing the spindle drive mounting,

Figure 2^b is a similar view of the opposed corner of the frame illustrating the ring drive mounting,

Fig. 3 a view of the spindle drive,

Fig. 4 a view of the ring drive,

Fig. 5 a view of a single spindle with its drive,

Fig. 6 a top view of this spindle,

Figure 7 is an enlarged section of a ring drive,

Fig. 8 a top view of the ring drive on an enlarged scale.

The roving bobbins 1 are secured to a creel 2 arranged on the frame 3 and the support 4. On the support 4 is arranged the so-called drawing mechanism 5 through which the slubbing of the roving bobbins 1 is drawn out, i. e., refined, and whence it passes through the thread guide wires 6 to the spindles 7 while the thread is guided by travellers arranged on the rings 8. The rings 8 rest on the ring rail 9, and by means of the faller legs 10, a ratchet motion 11, a tension roller 12, a chain 13 with segment 14 a raising and lowering motion is produced, the final position of the ring rail approaching increasingly its initial position in order to insure an increasing circumference of the bobbin. The spindles 7 are secured to the spindle rail 15, and each movable part of the spindles is provided with a wharve 16 which is caused to rotate. The motion of the frame is taken up by the pulleys 17 in a three-fold manner. In the first place, the rotation is taken up to operate the drawing rollers 5, which is of no interest here and therefore omitted, second, the rotation for the spindles, and third, for the rings. The rotary motion for the spindles is taken up from the shaft 18 carrying the pulleys 17 by means of two pulleys 19 and 20 arranged on the shaft. Over these pulleys 19 and 20 runs a belt 21 which is endless and which runs from the pulley 19 over a snatch block 22 along the outside of the spindles 7, passes by means of two additional snatch blocks 23 attached to the frame 26 to the other side of the spinning frame where it also runs along the spindles 7 and is guided to the pulley 20 over a snatch block 24. The belt passes around this pulley and then runs over the snatch block 25 past the back of the spindles. On the frame 26 it is guided to the other side of the said frame by means of the snatch blocks 27 where it runs again behind the spindles while touching them and is guided back to the pulley 19 by means of the snatch block 28. The frame 26 is provided with a tension appliance 29 and a tension roll 30 set by means of a hand wheel 31 and a spindle 32 in order to cause the driving means 21 to touch the spindles tightly. The spindles and driving means as shown in Figs. 5 and 6 are as follows:

On the spindle 7 is found a wharve 16

against which a roll 33 presses yieldingly. The rims 34 of this roll overlap the wharve 16 of the spindle 7 and thus keep it in position. Between the wharve 16 and the roll 33 passes the driving means 21 which on its return touches the wharve 16 on the back. The rolls 33 are attached to one-armed levers 35 which are pivotally arranged at 36. These rolls as better shown in Fig. 6 are preferably alternately mounted on each side of the spindle frame, and urged towards the spindle 7 through springs 37, thus serving as a spring actuated guide for the driving belt 21 while supporting the spindles 7 by means of flanges 34 engaging the wharves 16. To facilitate their movement the rolls 33 are provided with ball bearings 38.

The drive for the rings is constructed in a similar manner, except that it slides vertically with the ring rail. For this purpose the following arrangement is provided. The driving shaft 18 carries a bevel gear 39 in mesh with two other bevel gears 40 which transmit the drive by means of the shafts 41 to the bevel gear 42 on the sides of the frame. These bevel gear wheels 42 are connected with the bevel gear wheels of a vertical shaft 43 on which a pulley 45 with the ring rail slides up and down over a key 44. From this pulley 45 the belt 46 passes along the front side of the ring rail over a tension roll 47 at the end of the rail to the back of the latter and returns to the pulley 45. This belt 46 does not touch the rings directly, but between every two rings 8 are provided in front and in rear, the rolls 48 which touch the rings and which in turn are touched by the driving means 46. The latter is pressed against the intermediate friction rolls 48 by means of spring-actuated tension rolls 49 alternately mounted on each side of the ring supporting frame. All rolls and rings may run in ball bearings to facilitate their movement. The rings 8 are arranged in a sleeve 50 provided at its bottom side with a roller 51 and a fastener 52 for fastening. A turn of the sleeve 50 will also rotate the ring, and the ring carries the traveller 53 through which the thread is guided to the bobbin. The traveller 53, with its outer member 54, supports a thin disk 55 which is freely adjustable and which can swing according to the speed of the ring and the traveller. If the speed is great enough, the disk 55 will completely hug the upper side of the ring 8 and not brake the traveller at all. If the speed decreases, the disk 55 will be lowered and, if the retardation continues, rest on a rough lining 56 to increase the braking of the traveller 53 as shown by the dotted lines when the ring rail is in its highest position, and this retarding of the ring relative to the spindle will bring about the tight winding of the noses as mentioned before.

I claim:

1. In a spinning and twisting frame a plurality of spindles arranged in a row and having a friction roller to drive them by means of an endless belt arranged to travel tangentially on one side and return on the other, means for driving the said belt continuously at a suitable speed and keeping it under tension, in combination with spring-actuated, yielding and alternately arranged tension rolls, the upper and lower flanges of the said tension rolls overlapping the wharves of the spindles and thus simultaneously limiting the lift of the spindles.

2. In a spinning and twisting frame a plurality of spindles in a row and having a friction roller to drive them by means of an endless belt arranged to travel tangentially on one side and return on the other, means for driving the said belt continuously at a suitable speed and keeping it under tension, in combination with spring-actuated, yielding and alternately arranged tension rolls, the upper and lower flanges of the said tension rolls overlapping the wharves of the spindles and thus simultaneously limiting the lift of the spindles, and a driving device for the rings rotated by the main shaft, the rotation driving the driving means tangent to the rings on both sides by means of laterally arranged vertical shafts and a driving wheel sliding on the said shaft together with the ring rail, driving pulleys being preferably arranged between the driving means and the rings for driving the latter, the said driving means being pressed against the said pulleys by means of alternately mounted spring-actuated tension rolls.

3. In a spinning and twisting frame a plurality of spindles arranged in a row and having a friction roller to drive them by means of an endless belt arranged to travel tangentially on one side and return on the other, means for driving the said belt continuously at a suitable speed and keeping it under tension, in combination with spring-actuated, yielding and alternately arranged tension rolls, the upper and lower flanges of the said tension rolls, overlapping the wharves of the spindles and thus simultaneously limiting the lift of the spindles, and a driving device for the rings rotated by the main shaft, the rotation driving the driving means tangent to the rings on both sides by means of laterally arranged vertical shafts and a driving wheel sliding on the said shaft together with the ring rail, driving pulleys being preferably arranged between the driving means and the rings for driving the latter, the said driving means being pressed against the said pulleys by means of alternately mounted spring-actuated tension rolls and capable of serving for both sides or one side.

4. In a spinning and twisting frame a plurality of spindles arranged in a row and

having a friction roller to drive them by means of an endless belt arranged to travel tangentially on one side and return on the other, means for driving said belt continuously at a suitable speed and keeping it under tension, in combination with spring actuated, yielding and alternately arranged tension rolls overlapping the wharves of the spindles and thus simultaneously limiting the lift of the spindles, and a driving device for the rings rotated by the main shaft, the rotation driving means tangent to the rings on both sides by means of laterally arranged vertical shafts and a driving wheel sliding on the said shaft together with the ring rail, driving pulleys being preferably arranged between the driving means and the rings for driving the latter, the said driving means being pressed against the said pulleys by means of alternately mounted spring-actuated tension rolls and capable of serving for both sides or one side, means for braking the traveller, the said braking means being adapted to the rings and turning freely with them, whereby during the acceleration the braking ring having the same speed as the ring for the traveller no influence is given to the traveller, but by retardation of the said ring, there is a difference of speed between the ring and its braking ring, which becomes greater and then the braking ring comes in friction with the ring rail and with the traveller, thereby retarding the latter.

In witness whereof I have hereunto set my hand.

RUDOLF SETZER.