P. A. MAYER.

RING SPINNING AND TWISTING MACHINE.

APPLICATION FILED DEC. 2, 1906.

905,205.

Patented Dec. 1, 1908.

2 SHEETS—SHEET 1.

Fig. 3

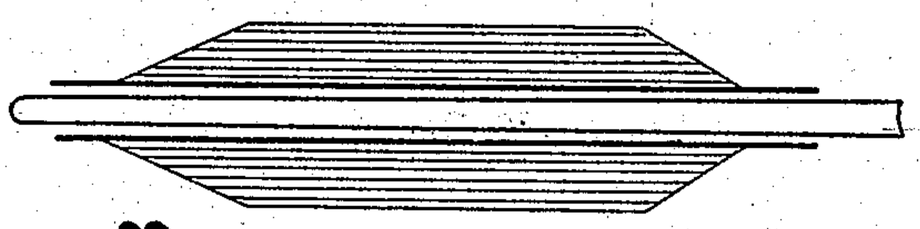

Fig. 2

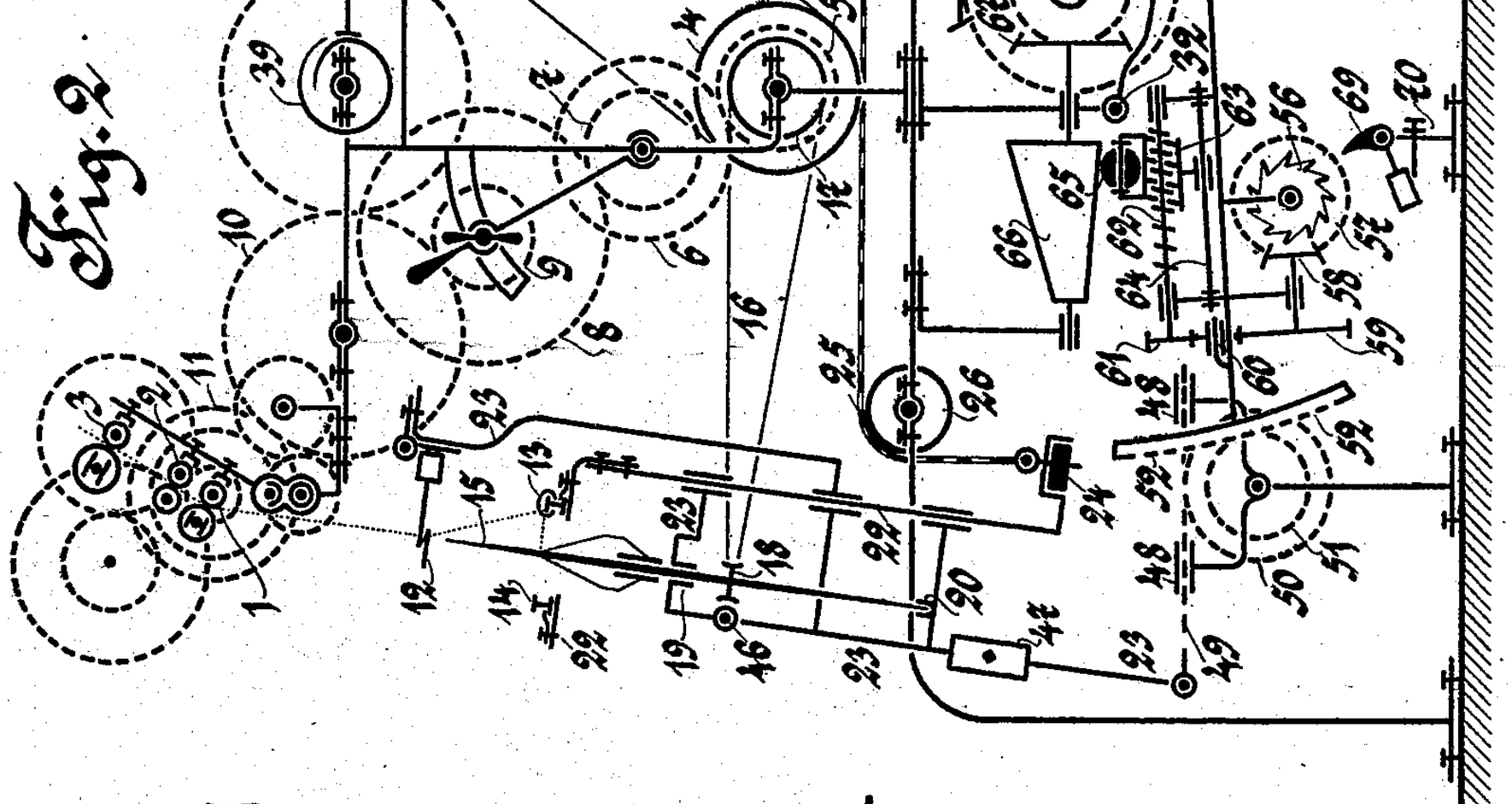

Fig. 1

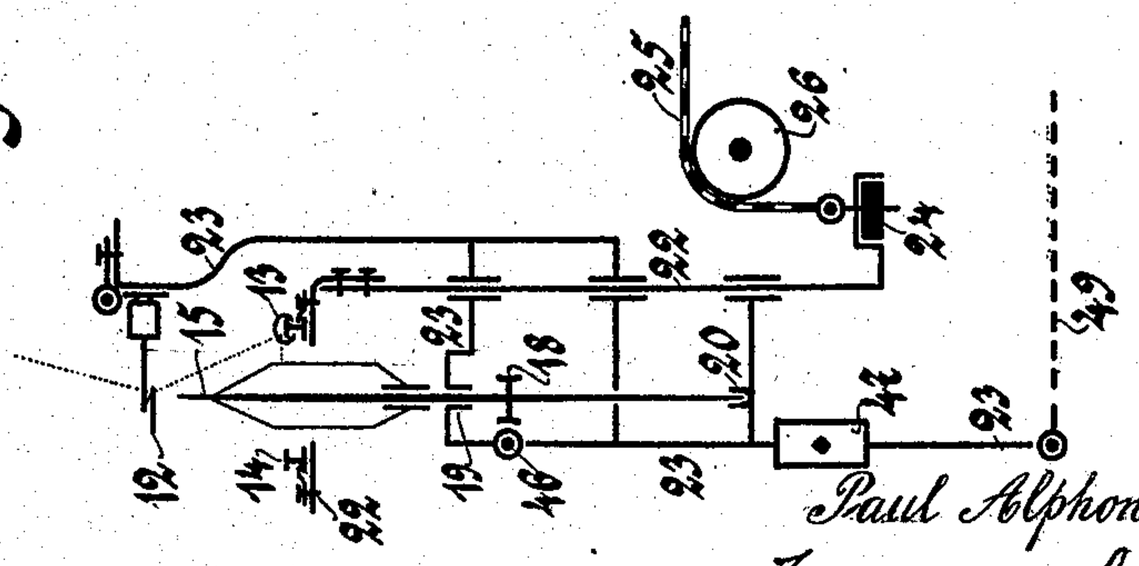

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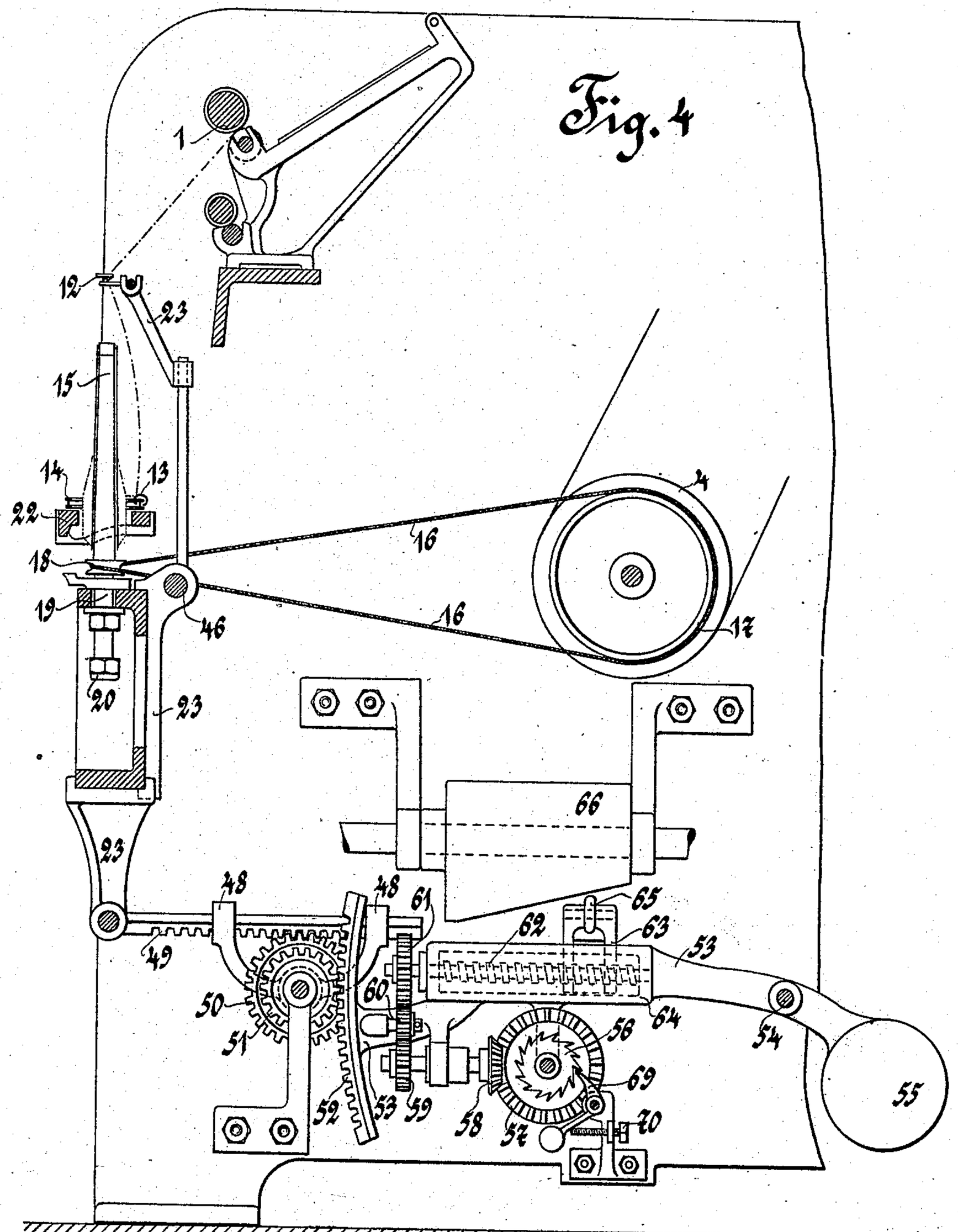
Fig. 4



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UNITED STATES PATENT OFFICE.

PAUL ALPHONSE MAYER, OF MÜLHAUSEN, GERMANY.

RING SPINNING AND TWISTING MACHINE.

No. 905,205. Specification of Letters Patent. Patented Dec. 1, 1908.

Application filed December 2, 1905. Serial No. 289,999.

To all whom it may concern:

Be it known that I, PAUL ALPHONSE MAYER, works manager, a subject of the Emperor of Germany, residing at Belforterstrasse 1, Mülhausen, Alsace, in the Empire of Germany, have invented new and useful Improvements in Ring Spinning and Twisting Machines, of which the following is a specification.

This invention relates to a ring spindle mounted on an oscillating spindle carrier.

In spinning or twisting on ring machines producing bobbins formed by conical layers, the twist of the yarn is greater when winding on the great diameter of the bobbin, and decreases proportionately when winding on the smaller diameters of the bobbin, because the retardation of the traveler or runner is reduced in winding on increasing diameters of the bobbin. The twist being proportionate to the resistance of the yarn, it is strongest on the great diameter of the layer, and it decreases proportionately to the decreased resistance in winding on the smaller diameters. Besides this variation in its resistances, the yarn is also subjected to varying tensions during the winding process. The tension on the yarn is increased while the winding is proceeding on a small diameter of the conical layer (where the twist and the resistance of the yarn is reduced) because the yarn passing from the runner to the bobbin is directed nearly horizontally, or in the direction of the radius of the bobbin. The tension decreases on the great diameters of the layer (while the twist and the resistance of the yarn increase) because the yarn passing from the runner to the bobbin is directed in a direction approximately tangential to the layer. Moreover the tension of the yarn increases or decreases according as the distance from the runner to the thread guide is smaller or greater, because the angle through which the thread is deflected by the runner decreases owing to the rise of the ring-rail for winding on the small diameters of the bobbin, and increases when the ring rail is sinking in order to wind the yarn on the greater diameter of the conical layer.

As the tension of the yarn increases, so also does the friction of the yarn in the thread guide, and this increasing resistance tends to prevent the twisting caused by the runner from extending through the thread guide to the yarn passing to it from the roller. Consequently that part of the yarn passing from the roller to the thread guide receiving while winding on the smaller diameters less twist, is so weakened that it is unable to resist any great strain, and breakages result.

The present invention has for its object to oppose to the varying tensions of the yarn (caused by the increasing and decreasing of the diameters of the layers, and by the varying length of the yarn between the thread guide and the runner due to the rise of the ring rail) a resistance which increases as the tension of the yarn decreases, and decreases as the tension of the yarn increases by varying the inclination of the spindles.

In my invention, the spindle carrier which supports the spindle, the ring rail and the thread-guide is not fixed as usual, but is pivoted on a horizontal axis situated at the level of the spindle whirl so that the tension of the strap actuating the spindle will not vary throughout the different inclinations of the spindle carrier. By this means the friction of the yarn in the thread guide is increased as the spindle carrier approaches the vertical position, and decreased as the spindle-carrier inclines towards the rollers. In the first case the prolongation of the axis of the spindle will pass through the point of grip of the rollers thus coinciding with the line of the yarn, and in the second case there will be an angle between the prolongation of the axis and the line of the yarn. This movement of the spindle carrier is so combined with the winding of the yarn on the conical layer of the bobbin, that the yarn passing through the guide is less deflected while the winding is on a small diameter, and most deflected while the winding is on the great diameter of the bobbin. By this inclination of the spindle carrier moreover, the twist passes when winding on the small diameter more freely through the thread guide, so that little resistance is opposed to the twisting up to the rollers. When winding on the great diameter the friction of the thread in the thread guide, and consequently the tension of the thread, are increased.

At the beginning of the formation of the bobbin there is very little difference between the diameters of the base and the top of the first layers and the tension of the yarn is greatest; therefore the spindle has to be inclined, so that the yarn passes quite freely through the guide. As the diameter of the

base or bottom of the cop or bobbin increases the spindle inclines in such a way that when winding on the great diameter of the base, the spindle will be least inclined. The spindle will return to its most inclined position when the yarn is winding on the point (top) of the layer and vice versa. This method of causing the spindle carrier to oscillate as above described, is specially necessary in spinning very soft weft or other delicate threads. On the other hand, to spin hard warp, this oscillation is not quite necessary and for such yarns the adjusting mechanism can be put out of operation and the spindle set in a fixed position, so as to allow a good running of the yarn.

In the forming of drag or tension spools with cylindrical winding, as illustrated in Fig. 3, a displacement of the spindle carrier takes place essentially only from layer or layer, so that the spindle at the commencement of the winding is most inclined, and comes continually nearer and nearer to the vertical up to the end of the winding.

The invention is illustrated in the accompanying drawings as follows:

Figure 1 shows a part of the apparatus. Fig. 2 shows the entire mechanism in elevation. Fig. 3 shows a bobbin or cop with the cylindrical winding. Fig. 4 is a sectional elevation of the ring spinning frame showing the principal parts of the invention.

The thread coming from the fluted rollers 1, 2, 3, driven from the driving pulley 4 by the wheels 5, 6, 7, 8, 9, 10, 11, passes through the thread guide 12, in the traveler 13, running on the ring 14 and goes to the spindle 15. The spindle 15 driven by the strap 16 actuated by the drum 17 and passing over the spindle wharve 18, is supported in the bearing 19 and the step 20 fixed in the movable frame or spindle carrier which supports also the thread guide 12. The ring rail carrier 22 slides in guides on the spindle carrier 23 to which is fixed the claw for holding the block 24 of the frame drawing chain 25. This chain passes over the guide roller 26 and is fastened upon the roller 27 connected with the roller 28. The chain 29 is fastened at one end upon the roller 28 and at the other upon the drum 30 supported by the lever 31 pivoted at 32. This lever supports also the ratchet wheel 33 and the worm 34 which engages with the wheel 35 fixed on the axle of the drum 30. The roller 36 supported upon this lever 31 is engaged by the cam 37 receiving its motion from the wheel 10, through the wheel 38, the worm 39, the wheel 40 and the gear wheels 41, 42.

When the cam 37 depresses the lever 31 the dog 43 adjusted by means of the set screw 44 moves the ratchet wheel 33 and by the wheels 34 and 35 the chain 29 is wound upon the drum 30 and draws up the ring rail spindle 22 at every layer of the bobbin.

For effecting the oscillation of the spindle-carrier 23 it is pivoted at 46, balanced by the counter-weight 47, and controlled by the rack bar 49 passing through the guide 48. The said rack bar is in connection with the double wheel 50, 51. The wheel 51 is actuated by the toothed segment 52 fixed on the lever 53 pivoted at 54 with counterweight 55, which supports the ratchet wheel 56, the gearing 57, 58, 59, 60, 61 and the worm 62. On this worm 62 is a matrix 63, prevented from revolving by means of the holder 64, which bears a follower 65, pressed by means of the counterweight 55 upon the lever 53 against the eccentric tapering roller 66. The part 66 is mounted on the shaft of the wheel 67 which is driven by the shaft of the cam 37 through the wheels 68, 67, so that both have the same speed of revolution.

According to the position of the follower 65 upon the worm 62 larger or smaller movements of the lever 53 and of the segment 52 will be caused, and the point of engagement of the part 52 with the wheel 51 will be so displaced that the rack 49 can impart to the spindle-carrier 23 not only the position indicated in Fig. 2 and that indicated by Fig. 1, but can also oscillate it to and fro according to the shape of the zone of the eccentric 66 which is in contact with the roller 65.

The object of the eccentric tapering roller 66 is, that during the spinning of the various tapering layers of the bottom of the bobbin, in proportion to the increase of the greater diameter of the layers, the motion is caused of the spindle-carrier from the inclined position (Fig. 2) towards the vertical position (Fig. 1) suitable for the largest diameter of the layer. On the first layer of the bobbin, the spindle carrier will be in the position shown in Fig. 2 and the follower 65 upon the little diameter of the eccentric tapering roller 66 at the left. On the descent of the ring rail 14 and the lever 53, the dog 69 adjustable by means of the set screw 70, engages in the ratchet wheel 56, whereby it, and also the wheels 57, 58, 59, 60, 61, and the worm 62 are revolved. The follower 65 is thereby moved to the right and a larger eccentricity of the part 66 then causes a further motion of the spindle carrier 23 for the second layer. For the following layers the same operation is repeated, so that the entire layers are spun with the variation of inclination of the spindles which best corresponds to their diameter.

When the base or bottom of the bobbin is finished, the operator disengages the dog 69, so that no further alteration of the follower 65 is effected. For each layer of the body the spindle carrier will consequently execute the full oscillation. While the top of the layer is being wound, the spindle carrier is in the position shown in Fig. 2, but while the large diameter of the layer is being

wound, then the spindle carrier will be in the position shown in Fig. 1.

If the yarn can be spun without alternate inclination of the spindles taking place, for instance in the spinning of hand twist yarns, then it suffices either instead of the tapering eccentric 66 to place a cylinder or to fix the lever 53, on the position giving the best results for spinning and to disengage the two wheels 68 and 67 whereon the tapering eccentric 66 is out of action. The engagements of the tooth crown 52, double wheel 50, 51 and rack 49 must then be correspondingly arranged for the requisite inclination of the spindle carrier. This adjustment of the spindle inclination makes unnecessary the interchange of the numbers on passing from one number to another differing only a little from it, whereby time and yarn are spared.

What I claim is:

1. In combination in a ring spinning and twisting machine, the spindle 15, a driving pulley on said spindle, means for imparting rotary motion to said pulley and spindle, the spindle-carrier 23, the pivot 46 forming the axis of rotation of said carrier in the plane of the driving pulley, the runner 13, the ring 14, the thread guide 12 on said frame, tension rolls adapted to deliver the yarn to said thread guide, and mechanism adapted to vary the inclination of the spindle-carrier 23, and supported parts proportionately to the winding of the yarn on the spindle.

2. In combination in a ring spinning and twisting machine, an oscillatable spindle carrier, a runner and thread guide on said carrier and movable with it, a prime mover, a train of gearing actuated from the main driving pulley, thread delivery rolls engaging with said gearing, a cam mechanism operated from the main driving pulley, a counter-weighted lever, mechanism on said lever adapted to impart to it motion from the cam, a rack arm on said lever, a wheel adapted to be operated by said rack arm, and a chain connecting said wheel to the spindle carrier, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

PAUL ALPHONSE MAYER.

Witnesses:

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