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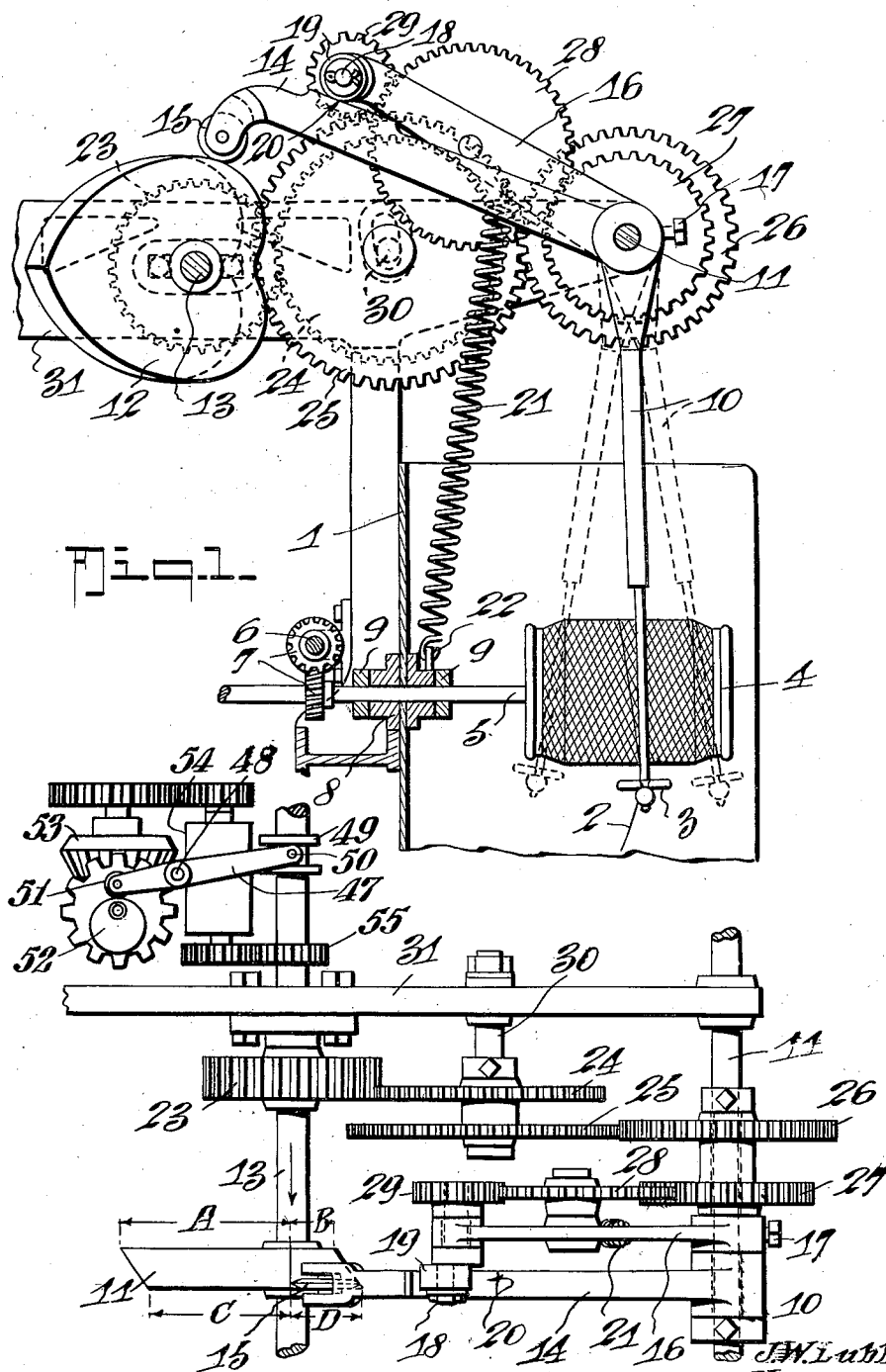
J. W. LUBBERHUIZEN ET AL

2,034,404

WINDING OF FILAMENTS, THREADS AND THE LIKE

Filed June 10, 1933

3 Sheets-Sheet 1



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3 Sheets-Sheet 3

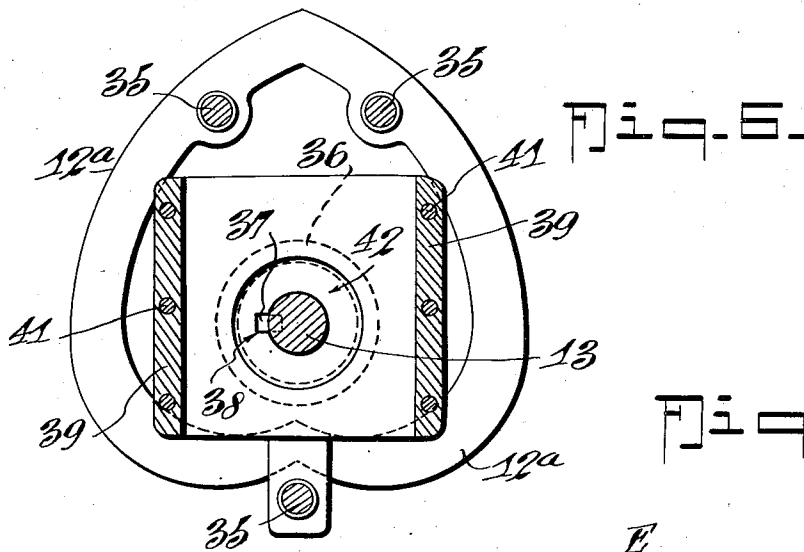
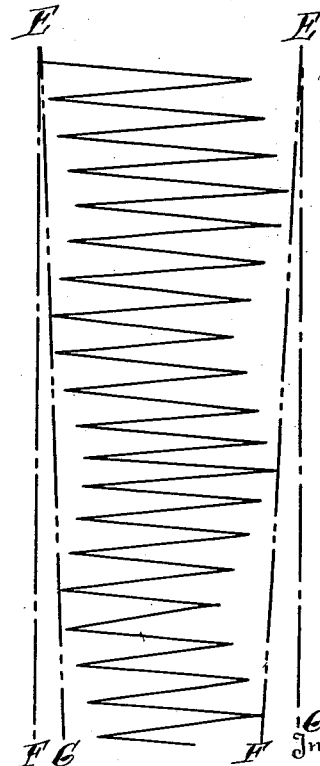
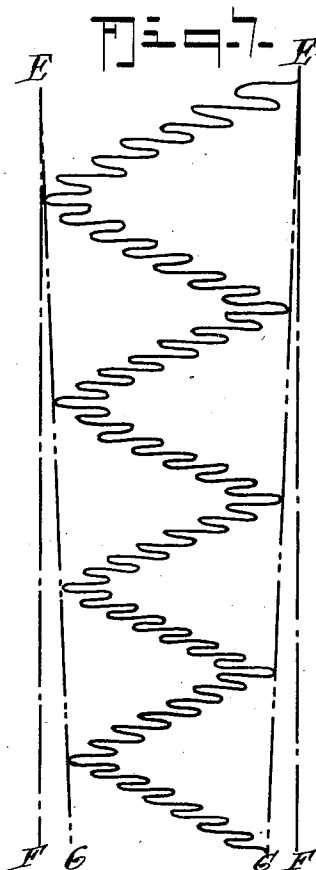


Fig. 8.



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WINDING OF FILAMENTS, THREADS,
AND THE LIKE

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This invention relates to the winding of threads or yarn, but primarily has for its object the production of a yarn body having an improved build up.

Another object of the present invention is to devise a mechanism whereby the method in which the filaments are wound on the take-up means facilitates the after-treatment of the yarn.

Further, another object of the present invention is to provide a means whereby the stroke of the thread guide is varied during every traverse motion of the thread guide and at the same time is decreased as the thickness of the wind increases.

These and other objects of the present invention will in part be pointed out and in part become obvious from a study of the following description and by references to the attached drawings, in which:

Figure 1 is a side elevation of one form of the device with such parts of a spinning machine being shown to illustrate the application of the invention;

Figure 2 is a detail plan of a portion of the device;

Figure 3 is a side elevation of a modification of the invention when the so-called wandering or pilgrim stroke is desired;

Figure 4 is a detail section of a modified form of mechanism for decreasing the length of the thread guide stroke;

Figure 5 is a front elevation of the parts illustrated in Figure 4;

Figure 6 is a vertical cross section on the line 6—6 of Figure 5;

Figure 7 is a graphical representation of the manner in which the thread is laid on the spool when the form of gearing illustrated in Figures 1 and 2 of the drawings is used; and

Figure 8 is a graphical representation of the manner in which the thread is laid on the spool when the gearing illustrated in Figure 3 is used.

In the production of artificial silk or the like, the thread-like material is extruded from a spinnerette immersed in a bath, and the thus newly-formed or green thread-like material passes then directly to a winding mechanism consisting essentially of a thread guide and a rotatable spool or bobbin, said elements having a transverse movement one with relation to the other so that the thread-like material or filaments are wound cross-wise into a number of superimposed series of convolutions first in one and then in the other direction.

One difficulty heretofore encountered in the

art is a tendency toward a lack of uniformity in physical characteristics of the filaments, which tendency appears to be caused by the tension created during drying by uneven shrinkage. It must be borne in mind that the freshly extruded filaments are quite plastic in character and are therefore easily affected by any strain which may be placed on them while in this state.

It is also known that closely wound yarn bodies on the spool are difficult of penetration by the after-treating solution to which they are subjected making it necessary that during the take-up of the filaments they are so wound as to allow as many interstices as possible to be formed in said yarn body in a manner pointed out in the present invention. By so doing the liquid used in washing or dyeing processes will penetrate the yarn body more easily than would otherwise be the case, thereby materially reducing the time necessary to complete such processes.

It has also been found that if the yarn body is bevelled through a constant alternative displacement of the stroke of the thread guide, overlapping at the ends and ridges throughout the rest of the yarn body are the result, which ridges cause variations in the denier of the filaments, dyeing differences, and open thread windings.

It is therefore the purpose of applicants' invention to overcome all of these disadvantages by devising a mechanism which will lay the filament windings on the spool with a combined oscillating or additional to and fro movement of the thread guide during each backward and forward transverse movement along the spinning spool and a gradual decrease of the length of the over-all stroke of the thread guide after each layer of yarn wound on said spool.

In the drawings in which like numerals of reference indicate like parts, 1 indicates the back board of a spinning machine, only so much of which is shown as is necessary to illustrate the application of the invention. The filaments 2 are extruded from the spinnerette (not shown) and carried through a thread guide 3 then over the take-up spool 4.

The spool 4 is mounted on a shaft 5 and rotated thereby, the shaft 5 being driven by a power shaft 6 through the medium of spiral gears 7—7. The shaft 5 has bearing in the back board 1 as shown at 8 and is prevented from endwise movement by collars 9.

The thread guide 3 is rigidly attached to a rocker arm 10 which is mounted on a rocker shaft 11 and oscillated thereby.

The rocker shaft 11 is oscillated through the

medium of a cam and lever arrangement. A heart shaped cam 12 is mounted on a rotating shaft 13 and operates a lever 14 having a roller 15 which rides on the cam 12. The lever 14 is pivotally mounted on the rocker shaft 11 and freely swingable thereon.

The lever 14 as it is reciprocated up and down by the cam 12 operates a second lever 16 which is fixedly mounted on the shaft 11 by a set screw 17. The lever 16 having at its outer end an eccentric shaft 18 and roller 19 adapted to rotate on the eccentric of the shaft 18. This roller 19 contacts with a raised slideway 20 integrally formed on the top of the lever 14 for a reason that will later become apparent. A spring 21 is attached to the under side of the lever 16, the purpose being to always insure positive contact between the two levers 14 and 16. The other end of the spring 21 is attached at 22 to the bearing 8. Mounted on the shaft 13 and rotating therewith is a gear 23 which meshes with an intermediate double gear 24 carried by the stub shaft 30 which is secured in the bearing bracket 31. The other gear portion 25 of the double gear 24 meshes with a second double gear 26 and 27 which is freely rotatable on the rocker shaft 11. The gear portion 25 meshes with an intermediate gear 28 mounted on the lever 16. The intermediate gear 28 driving a pinion 29 secured on the eccentric shaft 18 and thereby rotating said shaft 18.

It will be readily apparent from the foregoing description that as the shaft 13 rotates the cam 12, the rocker shaft 11 will be oscillated by reason of the levers 14 and 16 being reciprocated up and down, thereby oscillating the rocker arm 10 and imparting to the thread guide 3 a reciprocating traverse motion with relation to the take-up spool 4.

It will also be readily apparent that a number of additional oscillations are imparted to the thread guide 3 during one traverse across the spool 4 due to the speed of rotation of the eccentric shaft 18 being greater than the rotation of the cam 12. The result being a combination undulating traverse wind as illustrated in Figure 7 of the drawings, by reference to which, it will be noted that the filaments are undulatingly cross wound on the spool, the consequence being that additional interstices are placed in the yarn body which will improve the washing and treating thereof.

In order that the yarn body as it builds up will not overlap at the ends and result in variations of denier, the over-all length of the stroke of the thread guide is decreased after each layer of yarn is wound on the spool. This is done by angling the contacting surface of the cam 12 and shifting the shaft 13 as the wind increases in diameter.

The shaft 13 is shifted by means of a forked lever 47 which is connected to the shaft 13 by a grooved collar 48 rotating therewith and pins 50 which project in the grooved collar 48 and which are mounted in the forked lever.

A cam roller 51 is mounted on the other end of the lever 47 and contacts a cam 52. The cam 52 is rotated through the medium of bevel gears 53, a reduction gear train 54 which is driven from the main drive shaft 13 by a drive gear 55 mounted thereon.

As the drive shaft 13 rotates to drive the reciprocating cam 11, the cam 52 is slowly rotated and rocks the lever 47 which moves the shaft 13 in an endwise direction as shown by the arrow.

By reference to Figure 2 of the drawings, it will be clearly apparent how this is brought about. The position of the cam 12 with relation to the

roller 15 as shown in Figure 2 is the position of the parts at the end of the wind or is that position which gives the shortest traverse stroke to the thread guide 3.

The letter A indicating the distance, from the center of rotation to the operating surface of the cam is seen to be longer than distance C. The distance B allows the lever 14 to return closer to the center of rotation than the distance D will allow. It is therefore easily seen how by moving the shaft 13 in the proper endwise direction as the yarn builds up, that the traverse length of the stroke of the thread guide will be gradually decreased.

This is graphically shown in Figure 7 of the drawings where the lines E—F represent the greatest length of stroke and the lines E—G indicate the gradual decrease in length of the stroke.

This mechanism therefore will give a yarn body with bevelled edges (which do not overlap) and a yarn body that will be more easily penetrated by treating liquids due to the combined decreasing oscillatory stroke of the traverse motion.

In Figure 3 is shown a modified arrangement in which the gear ratio has been changed to make the speed of rotation of the eccentric shaft 18 slower than the rotation of the cam 12, the result being a different type of stroke which is not oscillatory but which gives a gradual displacement of stroke, first in one direction and then in the other.

In this form the intermediate gear 28 has been eliminated and a larger gear 32 substituted for the pinion 29. The gear 32 is sufficiently large in diameter to mesh with the gear 27, the rest of the gear train 23, 24, 25, 26 and 27 retaining the same proportions and positions in which they were shown in Figures 1 and 2.

By substituting this larger gear 32 for the intermediate gear 28 and the pinion 29, it will be observed that the speed of rotation of the eccentric shaft 18 will be slower than the speed of rotation of the cam 12 resulting in the type of wind such as illustrated in Figure 8 of the drawings by reference to which it will be observed that the stroke wanders in first one direction and then in the other direction. The decreased length of the wind is indicated by the lines E—F and E—G which is brought about in the same manner as described in the first form.

In Figures 4, 5 and 6 is illustrated a modified form of that portion of the invention which decreases the length of the stroke. In this form the heart shaped cam 12a is not slidable in an endwise direction and the operating surface is not angled but is in parallel alignment with the axis of the shaft 13. In this form the decrease in stroke length is obtained by changing the center of rotation of the cam 12a.

The cam 12a is supported on a slidable member 33 by nuts 34 and bolts 35, the bolts 35 being shouldered to hold the cam 12a in spaced relation to the slide 33. The slide 33 has rollers 44—44 which ride on the inclined faces of key members 45—45 which are rigidly positioned on the shaft 13.

The shaft 13 is endwise slidable in a bearing member 36, said bearing member however, rotating with the shaft 13 by reason of a key and slot means. The key being indicated by 37 and the slot by 38.

The bearing member 36 at one end is adapted to guide the slide member by reason of extending shoulders 39—39 and a cover plate 40 which

is bolted to the shoulders 39 at 41. The bearing member 36 is recessed at 42 to allow the cam keys 45-45 to be drawn inwardly with the shaft 13 as it is slid endwise for changing the center of rotation of the cam 12a.

From the foregoing description it will easily be seen how by sliding the shaft 13 to the left in Figure 4 of the drawings the center of the cam 12a will be changed to decrease the length of the stroke. Any suitable means for shifting the shaft 13 as the yarn body builds up on the spool, may be employed.

Having described the invention as required by the patent statutes and taken in connection with the accompanying drawings, it is thought the complete construction, operation and advantages of the invention will be clear to those skilled in the art to which it belongs, what is claimed is:

1. In a machine of the class described, a collecting spool, means to distribute thread thereon in a plurality of superimposed layers, means for oscillating said thread distributing means, said last mentioned means comprising, a drive shaft, a cam on said shaft, a lever oscillated by said cam, said lever oscillating a second lever, said second lever being securely mounted on a rocker shaft, said thread distributing means being securely mounted on said rocker shaft and oscillated thereby, means for producing additional movement of the second lever during the oscillation thereof and means for varying the length of stroke of said thread distributing means.

2. In a machine of the class described, a collecting spool, means to distribute thread thereon in a plurality of superimposed layers, means for oscillating said thread distributing means, said last mentioned means comprising a drive shaft, a cam on said shaft, a lever oscillated by said cam, said lever oscillating a second lever, said second lever being securely mounted on a rocker shaft, said thread distributing means being securely mounted on said rocker shaft and oscillated thereby, said second lever having means thereon for producing additional movement during the oscillation thereof, and means for varying the length of stroke of said thread distributing means.

3. In a machine of the class described, a collecting spool, means to distribute thread thereon in a plurality of superimposed layers, means for oscillating said thread distributing means, said last mentioned means comprising a drive shaft, a cam on said shaft, a lever oscillated by said cam, said lever oscillating a second lever, said second lever being securely mounted on a rocker shaft, said thread distributing means being securely mounted on said rocker shaft and oscillated thereby, said second lever having means thereon for producing additional movement during the oscillation thereof, said last mentioned means comprising, an eccentric shaft mounted on said second lever, means for rotating said eccentric shaft, a roller mounted on said eccentric, said roller contacting with said cam operated lever, and means for varying the length of oscillation of said cam operated lever.

4. In a machine of the class described, a collecting spool, means to distribute thread thereon in a plurality of superimposed layers, means for oscillating said thread distributing means, said last mentioned means comprising a drive shaft, a cam on said shaft, a lever oscillated by said cam, said lever oscillating a second lever, said second lever being securely mounted on a rocker shaft, said thread distributing means being

securely mounted on said rocker shaft and oscillated thereby, said second lever having means thereon for producing additional movement during the oscillation thereof, said last mentioned means comprising, an eccentric shaft rotatably mounted on said second lever, means for rotating said eccentric shaft, said last mentioned means comprising, a gear on said drive shaft and intermediate gears rotated by said driving gear, a pinion on said eccentric shaft rotated by said intermediate gears, a roller eccentrically mounted on said eccentric shaft, said roller contacting with said cam operated lever, and means for varying the length of oscillation of said last mentioned lever.

5. In a machine of the class described, a collecting spool, means to distribute thread thereon in a plurality of super-imposed layers, means for oscillating said thread distributing means, means for producing additional movement of the thread distributing means comprising an oscillating lever, a second lever oscillated thereby, and means to vary the relationship of said levers, said second lever oscillating said thread distributing means, and means for varying the length of stroke of said thread distributing means.

6. A traverse varying device for the production of yarn bodies having tapered ends comprising a drive shaft, a cam on said shaft, a lever reciprocated by said cam, a second lever reciprocated by said first mentioned lever and mounted on a shaft, said shaft being rocked by said second lever, a thread distributing means securely mounted on said rocked shaft and reciprocated thereby, and means for producing additional movement of said second lever during the oscillation thereof.

7. A traverse varying device for the production of yarn bodies having tapered ends comprising a drive shaft, a cam on said shaft, a lever reciprocated by said cam, a second lever reciprocated by said first mentioned lever and mounted on a shaft, said shaft being rocked by said second lever, a thread distributing means securely mounted on said rocked shaft and reciprocated thereby, and means mounted on said second lever for producing additional movement of said second lever during the reciprocation thereof.

8. A traverse varying device for the production of yarn bodies having tapered ends comprising a drive shaft, a cam on said shaft, a lever reciprocated by said cam, a second lever reciprocated by said first mentioned lever and mounted on a shaft, said shaft being rocked by said second lever, a thread distributing means securely mounted on said rocked shaft and reciprocated thereby, and means mounted on said second lever for producing additional movement during the reciprocation thereof comprising an eccentric means mounted on said second lever, and means to operate said eccentric means whereby said second lever moves toward and away from said first mentioned lever during the reciprocation thereof.

9. A traverse varying device for the production of yarn bodies having tapered ends comprising a drive shaft, a cam on said shaft, a lever reciprocated by said cam, a second lever reciprocated by said first mentioned lever and mounted on a shaft, said shaft being rocked by said second lever, a thread distributing means securely mounted on said rocked shaft and reciprocated thereby, and means mounted on said second lever for producing additional movement during the reciprocation thereof comprising an eccentric

shaft mounted on said second lever, means for rotating said eccentric shaft, a roller mounted on said eccentric, said roller contacting with said cam operated lever.

- 5 10. A traverse varying device for the production of yarn bodies having tapered ends comprising a drive shaft, a cam on said shaft, a lever reciprocated by said cam, a second lever reciprocated by said first mentioned lever and
10 mounted on a shaft, said shaft being rocked by said second lever, a thread distributing means securely mounted on said rocked shaft and reciprocated thereby, and means mounted on said second lever for producing additional movement
15 during the reciprocation thereof comprising an eccentric shaft mounted on said second lever,

means for rotating said eccentric shaft comprising a gear on said drive shaft and intermediate gearing driven by said driving gear, a pinion on said eccentric shaft rotated by said intermediate gearing, a roller mounted on said eccentric shaft, said roller contacting with said cam operated lever. 5

11. A traverse varying device for the production of yarn bodies having tapered ends comprising an oscillating lever, a second lever oscillated
10 thereby, and means to move said second lever toward and away from said first mentioned lever during the oscillation thereof, said second lever acting to reciprocate a thread distributing means.

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