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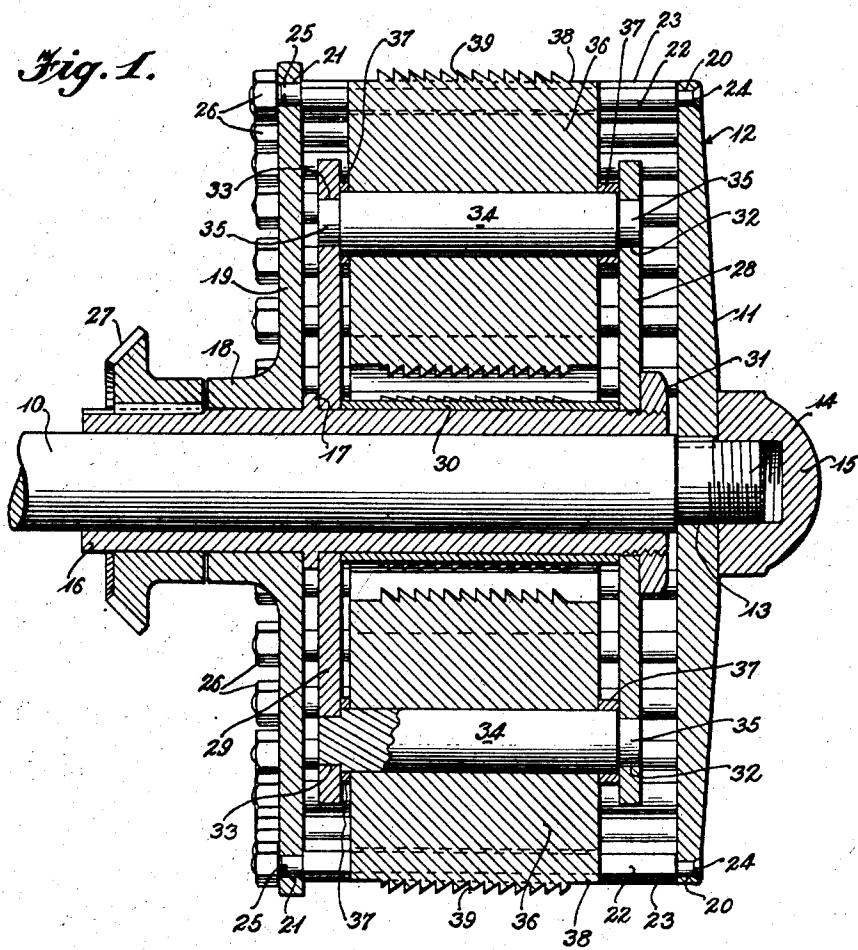
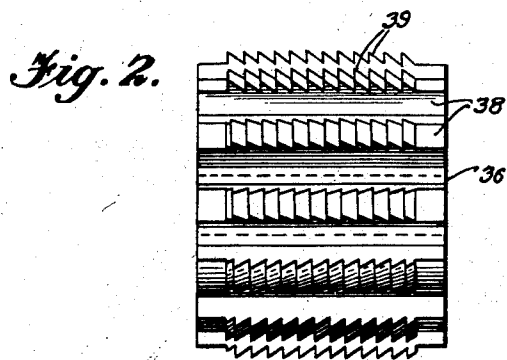
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2,424,489

THREAD ADVANCING REEL

Filed June 30, 1945

6 Sheets-Sheet 1



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THREAD ADVANCING REEL

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6 Sheets-Sheet 2

Fig. 3.

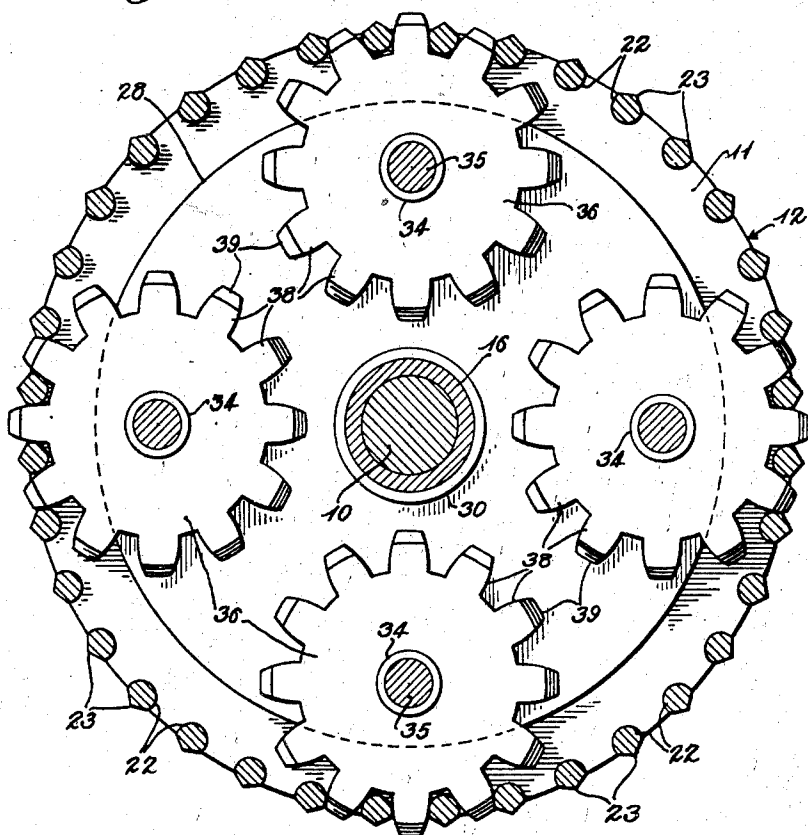
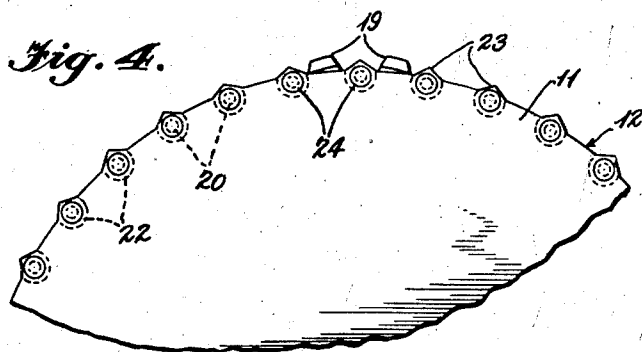


Fig. 4.



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THREAD ADVANCING REEL

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Fig. 5.

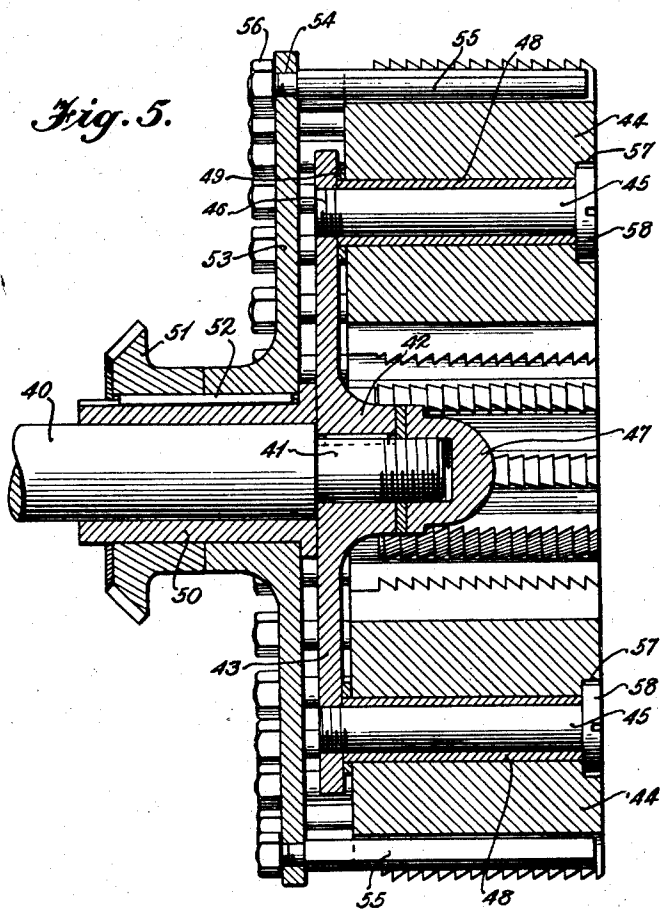
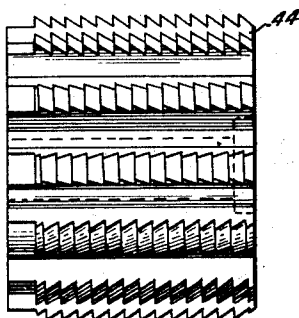


Fig. 6.



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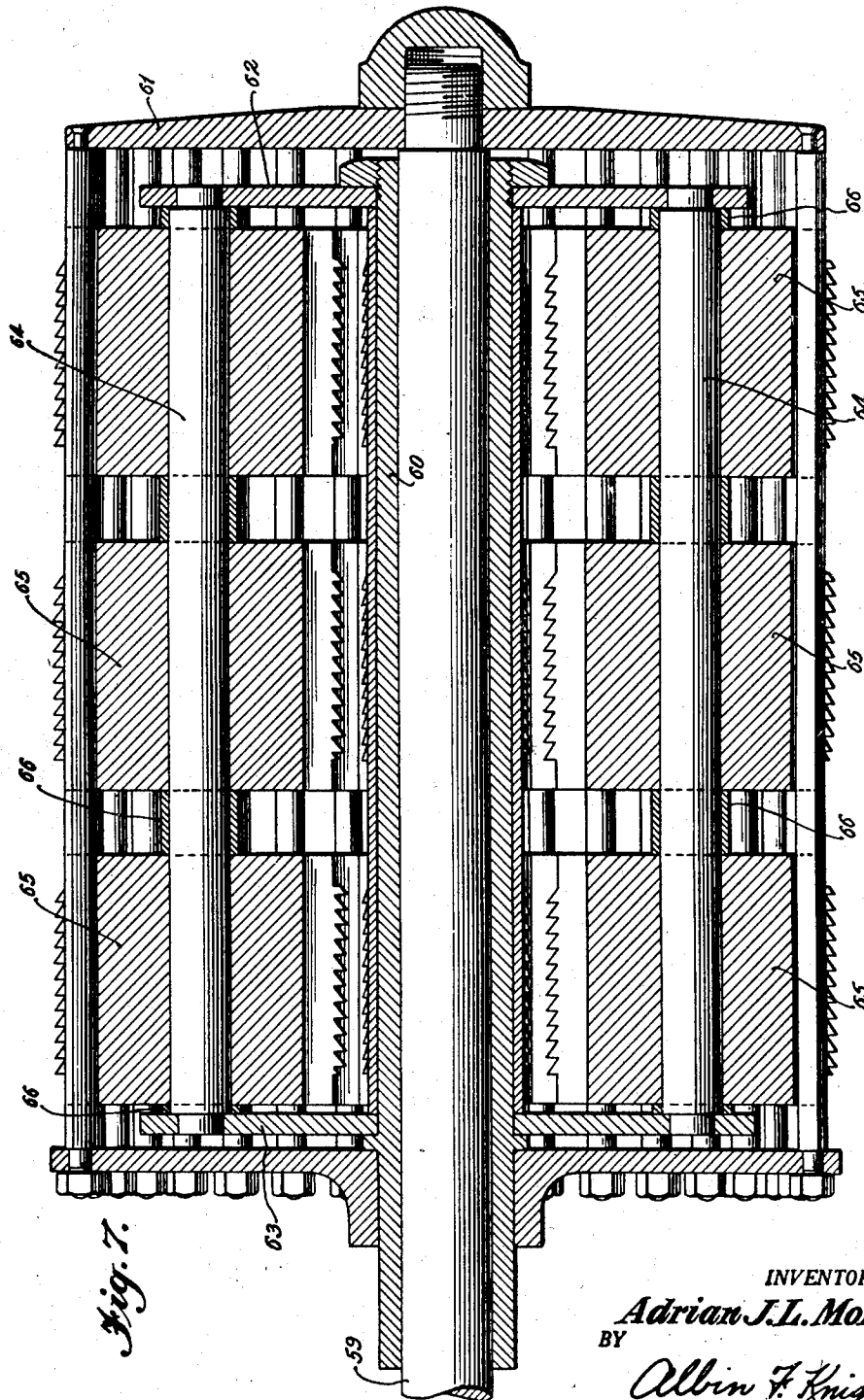
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THREAD ADVANCING REEL

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6 Sheets-Sheet 4



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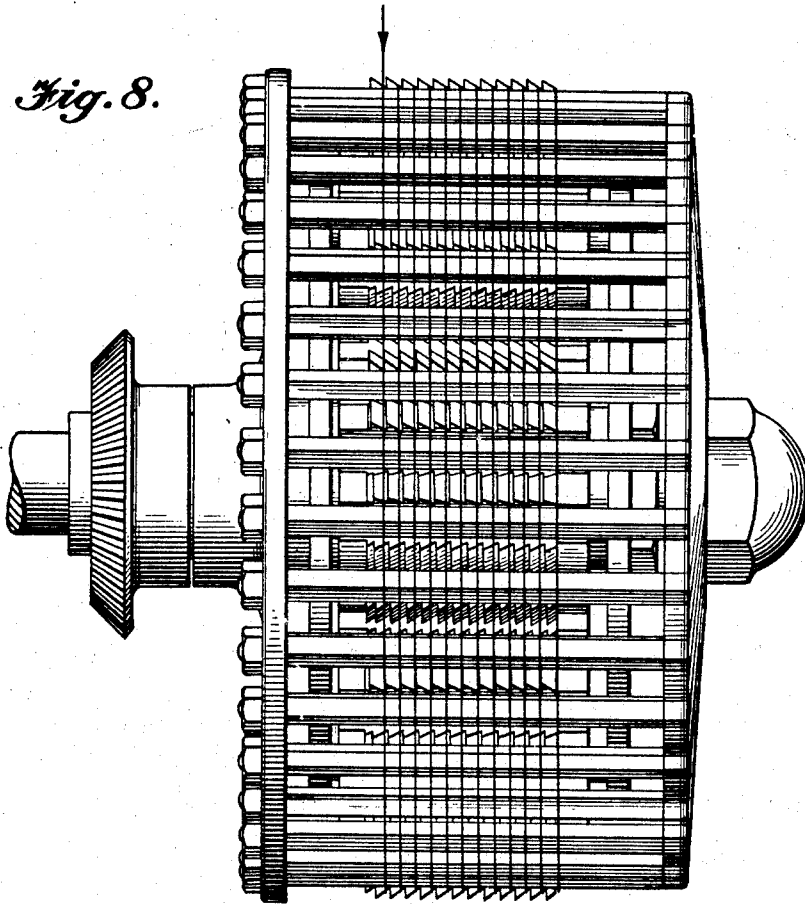
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Fig. 8.



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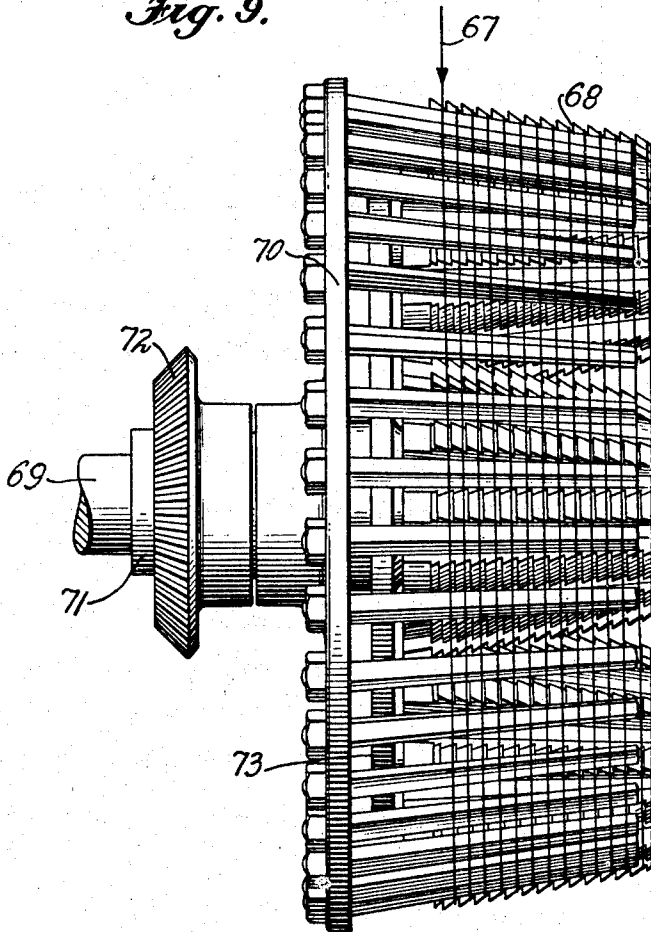
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Fig. 9.



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THREAD ADVANCING REEL

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Application June 30, 1945, Serial No. 602,465

14 Claims. (Cl. 28—71.6)

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The present invention relates to the handling of strandular materials and more particularly to a method and apparatus for processing freshly spun synthetic threads such as rayon, nylon, Vinyon, casein and the like.

In one specific application, the invention will be described in connection with the manufacture of viscose rayon as this type of process is more generally used than the other processes.

During recent years the quality of viscose rayon has improved greatly as a result of technological advances and refinements in the technique of handling and aftertreating freshly formed thread. One of the important advances has been the substitution of rotatable thread-guiding surfaces for the old type friction thread guide which was maintained stationary. These rotating surfaces have a distinct advantage over the stationary guide in that the stretch on the thread can be predetermined and maintained as desired by controlling the peripheral speed of the thread-guiding surface.

At first the thread-guiding surface was provided on a freely rotatable roller or a driven roller commonly called a godet. These godets have been, and are being, used commercially in the viscose plants producing rayon according to the discontinuous method wherein the acid thread is initially collected in a centrifugal bucket or on a bobbin prior to aftertreatment.

Another process which has been more recently developed commercially is the continuous process which provides for the treatment of the viscose thread prior to its initial collection in package form. In order to properly effect the various processing steps, a suitable thread-storage, thread-advancing device had to be devised. This took several forms but all involving the same principle, namely, the use of angle-axis rollers. Two rollers, the axes of which were offset and spaced apart, or a reel having interdigitating elements, were employed. In both of these cases, however, the devices were long enough to support the thread in a multiplicity of helices so that the thread could be given one or more treatments thereon and the helices were caused to move laterally of the devices by the offsetting of the axes, i. e., the helices moved in the direction of the convergence of the axes.

Although there were some drawbacks to the

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continuous process, the utility thereof was recognized in the trade as the product has, in some respects, more uniform chemical and physical properties.

As an outgrowth of the continuous process involving the use of thread-storage, thread-advancing devices, it was determined that these same devices could be adopted or substituted for the usual godets and thereby effect the necessary stretching of the thread while giving it some of the treatments prior to collection in the bucket or on the bobbin. Such a process might be termed a "semi-continuous" one.

In the two-bath process for the production of high tenacity thread for use as reinforcing elements in the manufacture of rubber articles such as cord tires and the like, the use of these thread-storage, thread-advancing devices has particular advantages either in lieu of godets or in addition thereto. The freshly formed thread is given sufficient time to reach a slow rate of regeneration on these devices prior to the time it is passed through the second hot bath. This gives the final product more even properties and a higher fatigue life.

As can be expected during the evolution of an industry, it passes through various constructive stages before it reaches a highly efficient state. Whereas, the continuous process is an excellent system as a whole, the thread-storage, thread-advancing devices are mechanically complicated and therefore are expensive to manufacture, install, and maintain. Wear and tear on the parts are especially evident in these systems because of the nature of chemicals that have to be used. The operation of the devices and replacement of the parts are difficult and accordingly, the desire and need for a simplified thread-storage, thread-advancing device which is at least as efficient as those presently known, are obvious.

It is therefore the object of the present invention to provide a novel thread-storage, thread-advancing device that can be employed in any type of system where the handling of strandular materials is involved.

The invention further contemplates a process in which thread is advanced through a treating or storage zone in the form of a multiplicity of helices which are guided laterally during their advancement.

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Another object of this invention is the provision of a cage member which rotates a series of laterally spaced helices about a single axis and coacts with a complementary means at the periphery of the cage to physically guide the thread in the form of a multiplicity of helices laterally of the cage member.

The invention has, as an additional object, the provision of a continuous spinning system in which one or more thread-storage, thread-advancing devices are employed for processing freshly formed viscose rayon threads prior to their collection in the form of a package.

Other objects and advantages will be apparent from the following detailed description when considered in connection with the accompanying drawings wherein:

Figure 1 is a longitudinal sectional view through a reel constructed in accordance with this invention;

Figure 2 is an elevational view of one of the spur gears illustrating the interrupted saw-toothed thread formed on the crowns of the gear teeth;

Figure 3 is a transverse sectional view through the reel illustrated in Figure 1;

Figure 4 is a fragmentary elevational view of the outer end of the reel shown in Figure 1;

Figure 5 is a longitudinal sectional view of a modified form of reel constructed in accordance with this invention;

Figure 6 is an elevational view of one of the spur gears utilized in the modified construction illustrated in Figure 5 with the bore formed therein being shown in dotted lines;

Figure 7 is a further modified form of reel constructed in accordance with the present invention, the reel being provided with a lateral series of spur gears for permitting a plurality of zones of treatment of strandular material on one reel;

Figure 8 is a diagrammatic view common to each of the forms of reels referred to, illustrating the position of the strandular material as it is advanced longitudinally of a reel when the relative motion of the parts thereof is such as to maintain a spacing of the convolutions of strandular material the full distance between the threads of the gears; and

Figure 9 is a diagrammatic view of a modified form of Figure 5, wherein the bars of the cage member converge and the spur gears are tapered so that the strandular material is permitted to contract thereon.

In referring to the drawings in detail, numeral 10 designates a driving shaft having keyed thereto, for rotation therewith, a circular front plate 11 of an outer cage designated generally as 12. Plate 11 is provided with a central opening 13 for receiving the reduced portion 14 of shaft 10. Crown nut 15 is threaded upon portion 14 for retaining the outer cage in position. A tubular shaft 16 is mounted upon shaft 10 for relative rotary motion with respect thereto. Shaft 16 is formed with a flange 17, which bears against hub 18 of the rear circular plate 19 of cage 12. Circular plates 11 and 19 are provided with openings 20 and 21 adjacent the respective peripheries thereof. Bars 22 having ridged outer surfaces 23, extend between plates 11 and 19, the front portions of each bar being reduced as at 24 and riveted into place within openings 20. Each of the bars 22 have reduced threaded portions 25, extending through openings 21 in plate 19, and nuts 26 are threaded thereon. The outer cage 12 is thus formed as a rigid construction, in which

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the plates thereof are securely held in spaced position by means of the bars 22, and the driving of shaft 10 will cause the rotation of the cage and relative rotation of the cage with respect to tubular shaft 16 when shaft 16 is maintained stationary or is driven at a speed different from or in a direction counter to shaft 10. A gear 27 is keyed to shaft 16 for effecting the rotation thereof by a suitable source of power (not shown).

Inner circular plates 28 and 29, provided with central openings, are fitted over and keyed to tubular shaft 16, plate 29 being pressed against flange 17 of tubular shaft 16 by means of a spacer sleeve 30 against the edge of which plate 28 is pressed by means of a nut 31 threaded upon the end of the tubular shaft 16. Plates 28 and 29 are formed with a series of openings 32 and 33. Axles 34 having reduced ends 35 are secured in corresponding openings 32 and 33 of plates 28 and 29 and spur gears 36 are mounted for rotation upon said axles. Spacers 37 are provided for maintaining spur gears 36 in the same plane with respect to each other. Axles 34 are so positioned inwardly of bars 22 that the teeth 38 of spur gears 36 when meshed with the bars will extend between the bars to such extent that the saw-toothed screw-thread sections 39 cut on the crowns of the teeth will project beyond the circumference of the cage as formed by the bars 22 with the bases of the threads just within the cage circumference.

Thread sections 39 are so cut upon the crowns of the teeth 38 of each of the spur gears that they jointly present on each gear an interrupted screw-thread as illustrated in Figure 2. While other types of screw-threads may be utilized the saw-toothed thread has been found to give very satisfactory results, in that, substantially the entire threaded surface of each gear is made up of faces sloping toward the delivery end of the reel. The dimensions of the saw-toothed screw-thread may vary depending on the number and size of the spur gears, e. g., where four spur gears are employed, the saw-toothed screw-thread may vary from $\frac{3}{16}$ " to $\frac{1}{8}$ " in height and $\frac{1}{8}$ " to $\frac{1}{4}$ " in width.

As will appear from Figure 3, four spur gears 36 may be employed in the nature of planets meshing with the cage 12 as a ring gear. While it has been found that the use of four spur gears is highly satisfactory, the number of spur gears may be varied so long as a sufficient number of spur gears are utilized to effect the desired advancement of the strandular material in helical form longitudinally of the reel.

In the operation of the reel as thus described continuous strandular material, such as freshly spun rayon yarn passed from a coagulating bath, is delivered to a position on the surface of the reel immediately adjacent the rearmost thread convolution as illustrated in Figure 8. As the outer cage 12 is continued to be rotated and tubular shaft 16 with plates 28 and 29 and axles 34 are either maintained stationary or rotated relative to cage 12, the tendency to wind the continuous thread upon itself on the bars 22 of the cage is prevented by the lateral guiding of the strandular material, i. e., longitudinally of the reel toward the end plate 11. If, as shown in Figure 3, the cage is rotated in a clockwise direction each tooth of a given spur gear meshing within the space between succeeding bars will present a section of saw-toothed thread sloping toward the front plate 11 and as each following thread section moves outwardly from between

the bars the sloping surface of its teeth will engage the strandular material and gently move it toward the delivery end of the reel. Since the thread sections on the teeth of each spur gear 36 forms an interrupted screw-thread around the gear, each succeeding tooth of the gear will present a thread section slightly advanced beyond the section which effected the movement of the preceding portion of strandular material. Each of the spur gears as shown are formed with twelve teeth and therefore when the relative positions of advancement between the portions of the strandular material first engaged by the gear and the portions engaged by the twelfth tooth will be one screw-thread apart. The movement of each portion of the strandular material by the screw-thread section is from the position where it is engaged by the sloping thread surface to a position immediately overlying the base of the thread. The particular spur gear 36 underlying the point of feed of the thread to the reel will depend upon whether the tubular shaft 16 is being held stationary, rotated at a different speed but in the same direction of the cage, or whether it is being rotated in a counter direction. However, since the gears are arranged with the interrupted thread thereon one-fourth turn in advance of the thread on the next succeeding gear in the sequence the apexes of the screw-thread of the succeeding gear will be so located that the projection of the thread sections of the following gear between the bars will cause the engagement of the thread by the teeth at a point near the apex thereof. Therefore as the thread sections move outwardly the strandular material is again moved longitudinally of the reel a distance equal to that between the point of its engagement with the slope of the thread and a point immediately above the base of the slope. As the rotary movement of the reel is continuous and the strandular material is advanced by the projection of the respective thread sections of the gears from between the bars 22, it will be apparent that a complete revolution of the reel will result in the movement of the strandular material from the position where it initially engaged the reel and that this longitudinal displacement of the strandular material will result in the maintenance of a helix of the material on the reel by the continuous feed thereof to an end of the helix during continuous delivery of the same from the opposite end of the helix. For any given pitch of the saw-toothed thread, the space between each convolution is controlled and determined by the relative speeds of the cage and spur gears, i. e., as the difference in relative speeds increases, the spacing increases. The strandular material delivered from the reel may be directed to a point of collection or it may be subjected to treatment upon a similar reel or reels, or upon any one of the well known treating devices. This is particularly important when the reels are being utilized in the production of viscose rayon.

Figures 5 and 6 illustrate a reel which operates on the same principle as the reel shown in Figures 1-4, inclusive. However, the drive shaft 40 of this modified form is reduced at 41 and receives a hub 42 of a single disc 43 to which a series of spur gears 44 are attached by a stub axle 45 the end of which is screwed into disc 43 as indicated at 46. Disc 43 is keyed to the shaft and secured into position by a crown nut 47. A sleeve 48 is mounted on each axle for properly spacing the end thereof to accommodate the respective spur gears 44 and spacers 49 are

employed to properly align the spur gears on the stub axles.

In the modification shown in Figure 5 a tubular shaft 50 is mounted for rotation upon shaft 40. A bevel gear 51 adapted for connection to a source of power (not shown) is keyed with key 52 to shaft 50 and abuts against the hub of a circular disc 53 provided with a series of openings 54 adjacent the periphery thereof. A series of spaced bars 55 are anchored within the openings 54 and are secured therein by nuts 56. In case there is a tendency for the yarn leaving the reel to become entangled in the spur gears 44, particularly during the threading-up stage, bars 55 may be extended and bent toward the center of the reel to act as guards. As an alternative, a circular disc-like shield may be fastened at its periphery to the outer ends of bars 55. Each of the spur gears 44 is identical in formation with the spur gears 36 described in connection with Figures 1-4, inclusive, except for the counterbore 57 at the outer end of the center bore thereof which enlargement is adapted to receive the head 58 of the stub axle 45.

The modified form of reel illustrated in Figure 5 operates in the same manner as the reel illustrated in Figures 1-4, inclusive, with the exception that the outer member carrying the bars 55 is driven by the tubular shaft while the inner member carrying the spur gears 44 is driven by the circular shaft. It is clear, therefore, that in order for the reels of the two forms to operate identically the shafts 40 and 50 of the form shown in Figure 5 are driven in a direction opposite to the corresponding shafts of the form shown in Figures 1-4, inclusive.

The modification shown in Figure 7 is similar to the form of reel illustrated in Figures 1-4, inclusive, in that the outer cage is driven by shaft 59 and the inner member is driven by tubular shaft 60. However, in the form illustrated in Figure 7 strandular material may be formed into three separate helices longitudinally along the cage 61 so that various treatments of the strandular material may be effected on the same reel. In this modified form front and rear discs 62 and 63 are mounted in spaced relation upon tubular shaft 60 and they have secured therein axles 64 upon which are mounted for free rotation spur gears 65. The spur gears are maintained in proper alignment by means of spacers 66. Spur gears 65 are identical in construction with spur gears 36 in the form illustrated in Figures 1-4, inclusive. The operation of the reel illustrated in Figure 7 is the same as the operation of the reel of Figures 1-4, inclusive, with the exception that a godet (not shown) may be utilized to transfer the strandular material as it is discharged at the end of the first helix to the point of feed of the strandular material to the second helix and another godet (not shown) may be utilized to effect the transfer of the strandular material from the end of the second helix to the point of feed of the third helix. The number of helices employed may be varied and the reel shown in the modification of Figure 7 may be utilized in conjunction with the reels shown in the other forms when additional treatments of the strandular material are to be effected.

In the various forms of reels heretofore disclosed, the bars of the outer cage members define a cylinder and the spur gears are also of a cylindrical configuration. Such constructions effect no stretching or let-off on the reels per se, although any desirable stretching or contraction may be accomplished between the reels by driving

the reels at different peripheral speeds or by introducing godets therebetween.

The invention further comprehends modifying the reels by mounting the bars of the cage members so that they converge and if the degree of convergence makes it necessary, then the spur gears can be tapered to a corresponding extent. Depending on the direction of the convergence, i. e., whether the bars diverge or converge from the adit to the exit end of the reel, the yarn will be stretched or permitted to contract.

A reel of the type shown in Figure 9 has particular utility in the drying of rayon and offers advantages over prior drying reels which have never been entirely satisfactory because when utilizing the angle-axis principle on conical reels, the yarn as it dried had a tendency to ride back on itself instead of advancing laterally of the reel. In the reel as shown, the yarn 67 is physically guided laterally by the saw-tooth screw-thread sections 68 and accordingly, will be advanced thereon toward the smaller end to effect any desired amount of contraction during drying. The driving shaft 69 drives the outer cage 70, and tubular shaft 71 is mounted on shaft 69 for relative rotation therewith. A gear 72 is keyed to tubular shaft 71 for effecting rotation thereof, which in turn drives spur gears 73.

As stated above, the present invention has particular utility in the treatment of synthetic yarns, such as viscose in the wet state, although the principle here involved may be adapted to the processing of dry yarns. It is to be understood that various modifications may be made without departing from the spirit of the invention, as the scope thereof is to be limited only to the extent of the appended claims.

What is claimed is:

1. A device adapted for use in the handling of strandular material, comprising a rotatably mounted outer cage for supporting helically arranged strandular material, a second member provided with at least one rotatably mounted spur gear arranged within the outer cage, said spur gear having sections of saw-tooth screw-threads on the crowns of the teeth to thereby form an interrupted screw-thread, the teeth of the spur gear being of a height to protrude through the outer cage member when fully meshed therewith.

2. A thread-storage, thread-advancing device comprising a cage member consisting of a series of fixed bars spaced in a circular manner, a shaft mounted concentrically of said member adapted to rotate the same, at least one spur gear having a screw-thread on the periphery thereof and mounted within the area defined by the cage member on a shaft parallel to the axis of the cage member, the teeth of said gear meshing with the bars of the cage member upon relative rotation therewith, said teeth extending beyond the periphery defined by the bars whereby convolutions of yarn are advanced progressively laterally by means of the screw-thread.

3. A thread-storage, thread-advancing device comprising a cage member consisting of two disc members at each end thereof connected by a series of bars spaced around the periphery of the disc members a shaft mounted concentrically of said cage member adapted to rotate the same, at least one spur gear having a screw-thread on the periphery of the teeth and mounted within the area defined by the cage member on a shaft parallel to the axis of the cage member, the teeth of said gear meshing with the bars of the cage

member upon relative rotation therewith, said teeth extending beyond the periphery defined by the bars whereby convolutions of yarn are advanced progressively laterally by means of the screw-thread.

4. A thread-storage, thread-advancing device comprising a rotatably mounted outer cage member consisting of a series of fixed bars spaced in a circular manner, a second member provided with several rotatably mounted spur gears arranged within the outer cage, said spur gears having saw-tooth screw-threads on the crowns of the teeth to thereby form an interrupted screw-thread, the teeth of said spur gears meshing with the bars of the cage member upon relative rotation therewith, said teeth extending beyond the periphery defined by the bars whereby convolutions of yarn are advanced progressively laterally of the cage member by means of the screw-thread.

5. A thread-storage, thread-advancing device comprising a rotatably mounted outer cage member formed of a disc having a plurality of circularly arranged, spaced bars anchored around the periphery thereof, a second member provided with several rotatably mounted spur gears arranged within the outer cage, said spur gears having saw-tooth screw-threads on the crowns of the teeth to thereby form an interrupted screw-thread, the teeth of said spur gears meshing with the bars of the cage member upon relative rotation therewith, said teeth extending beyond the periphery defined by the bars whereby convolutions of yarn are advanced progressively laterally of the cage member by means of the screw-thread.

6. A device adapted for use in the handling of freshly formed rayon yarn comprising, a member for supporting yarn in helical form about the periphery thereof, said member having a series of annularly arranged longitudinally extending spaced narrow bars stationary with respect to one another, means for rotatably supporting the member, and means within the member mounted to project outwardly between the spaced bars when the member is rotated, said means being provided with a plurality of faces sloping in the same direction, whereby yarn supported on the member will be contacted by the faces and will be moved transversely as the faces move outwardly from between the bars.

7. A device adapted for use in the handling of freshly formed rayon yarn comprising, an outer member formed with a circular plate to which longitudinally spaced bars are attached in annular formation adjacent the periphery thereof, means for rotatably supporting said outer member, a spur gear rotatably mounted within the outer member with the teeth thereof meshing between the spaced bars, the teeth on the gear having transverse saw tooth thread sections, said thread sections on the gear teeth when fully meshed between respective pairs of bars extending beyond the outer surfaces of the bars, whereby movement of the outer member relative to the gear will cause yarn encircling the outer member to move longitudinally thereof.

8. A thread-storage, thread-advancing device comprising a rotatably mounted outer cage member formed of a disc having a plurality of circularly arranged, spaced bars anchored around the periphery thereof, a second member provided with rotatably mounted spur gears arranged within the outer cage, a shaft mounted concentric to the cage member for supporting the second member and rotating the same relative to the cage, a tubular shaft mounted on said shaft for

rotating said cage, said spur gears having saw-tooth screw-threads on the crowns of the teeth to thereby form an interrupted screw-thread, the teeth of said spur gears meshing with the bars of the cage member upon relative rotation therewith, said teeth extending beyond the periphery defined by the bars whereby convolutions of yarn are advanced progressively laterally of the cage member by means of the screw-thread.

9. A conical thread-storage, thread-advancing device comprising a rotatably mounted outer cage member consisting of a series of fixed bars spaced in a circular manner, said bars converging toward one end to define a conical cage, a second member provided with several rotatably mounted tapered spur gears arranged within the outer cage, said spur gears having saw-tooth, screw threads on the crowns of the teeth to thereby form an interrupted screw-thread on the spur gears tapering in the same direction as the convergence of the bars, said teeth extending beyond the periphery defined by the bars whereby convolutions of yarn are advanced progressively laterally of the cage member by means of the screw-thread and depending on the lateral direction of the yarn, the length of the yarn is altered.

10. A device for use in the handling of freshly formed rayon yarns comprising, a drive shaft, a tubular shaft mounted thereon, an outer member formed with a plate keyed to one of the shafts, a plurality of circularly arranged spaced bars having their ends anchored in the plate, a second member arranged within the outer member and keyed for rotation with the other shaft, said second member being formed with a disc having a stub axle extending therefrom, and a thread advancing gear mounted on the axle, said gear having teeth meshing with the spaced bars of the outer member, the teeth on the gear having transverse saw tooth thread sections, said sections of threads on each of the gear teeth when fully meshed between respective pairs of bars extending beyond the outer surfaces thereof, whereby relative rotation of the drive shaft and the tubular shaft will cause yarn encircling the outer member to move longitudinally thereof.

11. A cantilever device adapted for use in the handling of freshly formed rayon yarns, comprising a drive shaft, a tubular shaft mounted thereon, an outer member formed with a circular plate provided with an aperture to fit over one of the shafts, means for securing the plate in fixed position relative to said shaft, a plurality of circularly arranged spaced bars having their ends anchored in the plate, a second member arranged within the outer member and keyed for rotation with the other shaft, said second member being formed with a disc having axles extending therefrom at points adjacent its periphery and a thread advancing member mounted on each of the axles, each of said members being formed with teeth meshing with the spaced bars of the outer member, the teeth on each member having transverse saw tooth thread sections sloping in the direction of the unsupported end of the device, and complementing one another to form an interrupted screw thread, said sections of threads on each of the teeth when fully meshed between respective pairs of bars extending beyond the outer surfaces thereof, whereby relative rotation of the drive shaft and tubular shaft will cause yarn encircling the outer member to move longitudinally thereof.

12. A device adapted for use in the handling

of freshly formed rayon yarns comprising, a drive shaft, a tubular shaft mounted thereon, an outer member formed with a circular plate provided with an aperture to fit over one of the shafts, means for securing the plate in fixed position relative to said shaft, a plurality of circularly arranged spaced bars having their ends anchored in the plate, a second member arranged within the outer member and keyed for rotation with the other shaft, said second member being formed with a disc having apertures adjacent its periphery, axles secured within the openings in the discs, and a spur gear mounted on each of the axles, each being formed with teeth meshing with the spaced bars of the outer member, the teeth on each gear having transverse saw-tooth thread sections which complement one another to form an interrupted screw-thread, said spaced bars each having a ridged outer surface and the sections of threads on each of the teeth when fully meshed between respective pairs of bars extending beyond the ridged surfaces thereof, whereby relative rotation of the drive shaft and the tubular shaft will cause yarn encircling the outer member to move longitudinally thereof.

13. A thread-storage, thread-advancing reel adapted for use in the handling of freshly formed rayon yarns comprising, a drive shaft having an end portion of reduced diameter, a tubular shaft mounted thereon, an outer cage member formed with a circular front plate provided with an aperture to fit over the reduced portion of the drive shaft, means for securing the front plate in fixed position upon the shaft, a rear plate spaced from the front plate and having a bearing surface encircling the tubular shaft, a plurality of circularly arranged spaced bars having their respective ends anchored in the front plate, said bars being provided with reduced portions extending through apertures in the rear plate, means for securing the bars within the apertures in the rear plate, a second member arranged within the outer cage and keyed for rotation with the tubular shaft, said second member being formed of front and rear discs each having apertures arranged adjacent its respective circumference, axles provided with reduced end portions positioned within the openings in said discs, and a thread-advancing member mounted on each of the last mentioned shafts, said members being formed with teeth meshing with the spaced bars of the outer cage, the teeth on each member having transverse saw-tooth thread sections sloping in the direction of the front plate and complementing one another to form an interrupted screw-thread, said spaced bars of the outer cage each having a ridged outer surface, and the sections of threads on each of the teeth when fully meshed between the respective pairs of bars extending beyond the ridged surfaces thereof, whereby relative rotation of the drive shaft and the tubular shaft will cause yarn circling the outer cage to move longitudinally thereof.

14. A device adapted for use in the handling of freshly formed rayon yarn comprising, a member for supporting yarn in helical form about the periphery thereof formed with a series of annularly arranged longitudinally extending spaced bars having yarn contacting surfaces, means for rotatably supporting the member, and means within the member mounted to project outwardly between the spaced bars when

the member is rotated, said means being provided with a plurality of yarn contact faces sloping in the same direction, whereby yarn supported on the member will be contacted by the faces and will be moved transversely as the faces move outwardly from between the bars, said contact faces having a total yarn engaging area at least equivalent to the yarn contacting surfaces of the bars.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
2,289,390	Torrence et al.	July 14, 1942
2,277,753	Furness	Mar. 31, 1942
2,165,259	Helm	July 11, 1939
2,255,017	Torrence et al.	Sept. 2, 1941
2,246,468	Kuebusch	June 17, 1941
1,682,453	Willhelm	Aug. 28, 1928
2,203,793	Lovett	June 11, 1940
2,287,517	Ewing	June 23, 1942
2,378,211	Furness	June 12, 1945
2,384,963	Pollak	Sept. 18, 1945
1,847,161	Alden	Mar. 1, 1932
2,369,481	Modighani	Feb. 13, 1945