Nov. 17, 1936. W. F. KNEBUSCH ET AL 2,060,809

TRANSFER DEVICE

Original Filed April 23, 1934

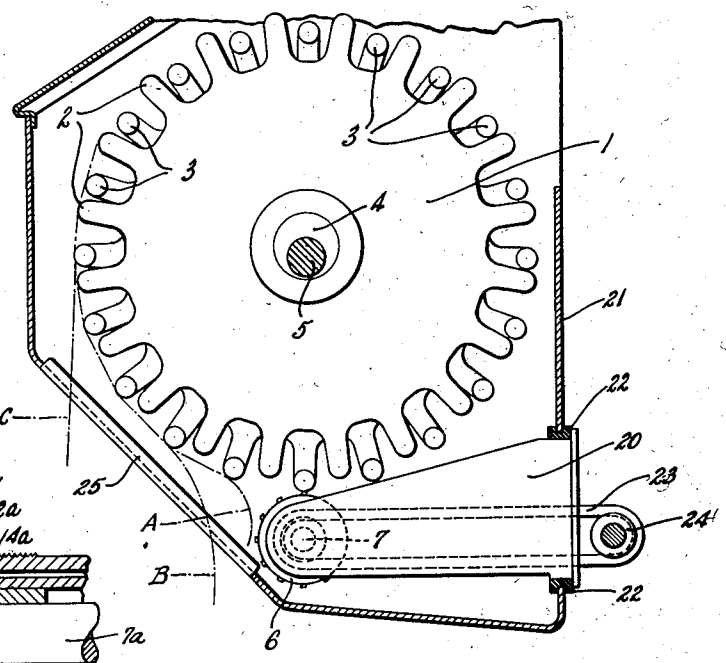


FIG.-1

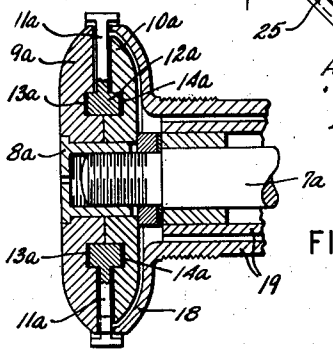


FIG.-4

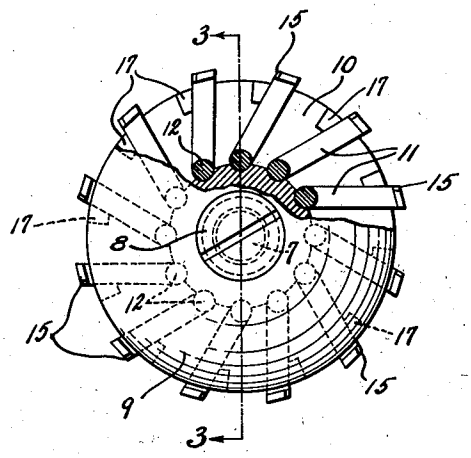


FIG.-2

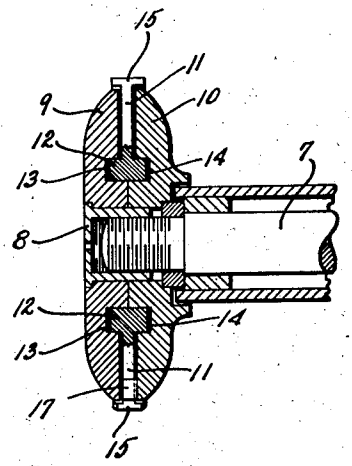


FIG.-3

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TRANSFER DEVICE

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Renewed August 9, 1935

14 Claims. (Cl. 18—8)

This invention relates to a transfer mechanism for removing thread or the like from a rotating surface. More particularly, the invention relates to a transfer wheel contacting with a rotating surface on which thread or the like is being wound and adapted to sever such thread and transfer the thread or the like end so formed to another rotating surface. Specifically, the invention concerns a transfer wheel embodying a plurality of pivotally disposed thread-engaging elements.

In the continuous spinning of artificial silk, a number of reels each having the faculty of advancing a thread helically along its length are superposed or otherwise aligned so that a thread which has completed its travel on one reel may be transferred to the next succeeding reel, and so on, until the treatment of the thread has been completed. Such a machine is described in co-pending application Ser. No. 651,404, filed January 12, 1933. The present mechanism is intended to be used therewith or in any other location where it is desired to transfer a traveling thread from one surface to another without interrupting the running of the thread. The purpose of causing the thread to travel over a number of reels is to provide distinct or separate locations for the various treatments to which an artificial silk or rayon yarn may be subjected, which, in the viscose process, include washing, desulphurizing, souring, drying, etc. One of these operations may be performed on each reel while the thread is in effect being stored on the reel for the time which it takes to complete its travel thereon.

The reels used in these continuous spinning machines are adapted to cause a thread to travel along the surface of the reel in approximately helical form. The reel herein shown consists of two cages, made up of laterally extending intermeshing bars, mounted for rotation about axes both offset and canted or askew with respect to each other, as described in application Ser. No. 652,089, filed January 16, 1933. The offset relation of the cage members causes the thread turns to be alternately picked up and carried, during rotation, by each set of bars and the canted relation causes each set of bars to receive the turns of thread at a point a little forward of the position previously occupied by the turns. In this way, the thread is advanced axially along the reel until it has come to the end and must be transferred to another similar reel to be subjected to the next treatment.

In view of the fact that as many as nine unit reels, i. e., reels each carrying one thread, may be required for the treatment of each thread end and that there may be thousands of such thread ends running in a plant, it is desirable that some automatic means be provided to accomplish the operation of starting a thread running through the machine by transferring the thread from reel to reel and from the final reel to a take-up device or packaging device. This transfer is rendered difficult by the fact that the thread is wet from the various baths to which it is subjected and tends to cling to the bars of the reels on account of surface tension. Furthermore, the liquid which is present and which is showered onto the reels and thread tends to wash the leading end of the thread under following threads. A condition wherein the leading end is bound under following turns of thread may also result from the irregular initial application of the thread to the first reel. Consequently, the transfer mechanism used must be capable of creating a new free leading end by severance of the thread back of the true leading end.

It is, accordingly, an object of the invention to provide means for automatically forming a new leading end on a thread-like article being helically wound on a rotating cylindrical surface and for automatically removing such leading end from the surface. Another object of the invention is to provide an apparatus for automatically transferring a helically winding thread from one rotating surface to another. A further object of the invention is to provide a transfer mechanism having improved characteristics for severing and transferring a winding thread. Other objects of the invention will in part be obvious and will in part appear hereinafter.

The invention is adapted for use in connection with any process of making artificial silk or rayon, such as the cuprammonium, cellulose nitrate, cellulose acetate or viscose processes, but it is particularly valuable in connection with the viscose process and will be more particularly described in relation thereto, although no limitation is thereby implied. In the drawing, which illustrates a preferred embodiment,

Figure 3 is a section taken along the line 3—3 of Figure 2; and Figure 4 is a section through a modified form of the transfer device.

Referring to the drawing, spinning reel 1 consists of a cage member carrying a plurality of bars 2 intermeshing with bars 3 of another cage member, bars 3 rotating about the shaft 5 and bars 2 rotating about the hub 4 offset from the shaft 5. The two axes of rotation of the cage members are thus offset and are also canted or askew with respect to each other, as previously explained. A thread undergoing treatment travels along the reel 1 due to this offset and canted relation of the two sets of bars until it reaches a zone at or near the end of the reel. A transfer device 6 is located at this point in contact with the reel bars and effects a transfer by severing the thread, which thereupon billows out and occupies the successive positions, A, B and C, the position C representing the thread running off reel 1 and onto the next succeeding reel situated therebe-

low. Thereafter, the transfer mechanism will not contact with the thread since the latter will be pulled off the first reel and onto the second reel before it has reached the zone in which the transfer mechanism operates. However, should the thread be broken between the two reels for any reason, it will wind over the first reel until it has again reached the transfer mechanism and is again severed and transferred.

The construction of the mechanism forming the subject matter of the present invention is particularly illustrated in Figs. 2 and 3 of the drawing and consists of an axle preferably taking the form of a spindle 7 suitably mounted for rotation and threaded into a cap 8 which carries an outer shroud 9 and an inner shroud 10 mating therewith. The shrouds are circular in shape and are spaced apart toward their peripheries to provide for the reception and movement of elements 11. These elements, which take the form of blades are preferably of the so-called "sling hammer" type and are provided with axially extending cylindrical portions 12 at their inner ends which fit into mating recesses 13 and 14 in the respective shrouds, the recesses forming slots for the reception of these retaining ends of the blades.

The blades themselves are provided with severing heads 15 extending parallel to the axis of the shaft 7 which heads are preferably formed by coining or by bending the shank of the blade, these heads being the portions which contact with the thread and sever it. Due to the mounting of the blades in the cylindrical recesses 13 and 14 and the corresponding cylindrical shape of the retaining ends 12, the blade is free to move or swing about the axis of the hub so provided, and such swinging movement may take place when the transfer wheel as a whole is rotating about the shaft 7. The purpose of this swinging motion is to provide a more or less yielding contact of the transfer wheel with the winding reels in order to avoid excessive wear of the contacting parts.

As may be seen in Fig. 2, the blades 11 are mounted so as to be inclined somewhat to a radius of the wheel, the blades being prevented from assuming a radial position by stops 17 mounted near the periphery of one of the shrouds. When the transfer wheel is placed in operation and contacts with the surface of reel 1, i. e., with the bars 2 or 3, the blades will be pushed back by the resulting friction in a direction opposite to the direction of rotation of the wheel and this will enable the wheel to move past the reel with a minimum of friction while still providing adequate contact for severance of a thread, the effect being to lessen the diameter of the transfer wheel at the point of contact of the two rotating surfaces. The stops 17 are provided in order that the blades will always lean to the same side of a radius passing through the hub of a given blade, the inclination of the blades being in the opposite direction to the direction of rotation, in order that the frictional force may operate to press the blades inwardly and thus lessen the apparent diameter.

The inclination of the blades, thus maintained by the stops 17, brings about an augmented movement of the blades toward the center of the wheel, upon contact with the reel bars, since the vertical vector of the blade motion increases as the angle of the blades with the radius increases. At the same time, the blades tend to be swung toward the radial position of maximum diameter, due to the centrifugal force developed by rotation, the mounting of the blades so as to be free to rotate about the axes of their hubs permitting the blades to respond to this force. Here, again, the inclination of the blades works to advantage, the centrifugal force which tends to hold the blades against the stops being greater as the blade departs from the radial position; this force being of zero magnitude at such radial position. In this way, adequate contact is assured in order that a thread may be severed while preventing rigid contact of the transfer mechanism with the winding reel which would result in undue wear of one or both of these mechanisms.

In Fig. 4 of the drawing there has been illustrated a modified form of the device in which there is secured to a shaft 7*a* by means of cap 8*a*, shrouds 9*a* and 10*a*, rotatable therewith. The blades 11*a* are mounted in mating recesses 13*a* and 14*a* in the shrouds which form slots for the reception of the cylindrical portions 12*a* of the blades, in the same manner in which the blades are secured in the modification previously described. However, the inner shroud 10*a* is enclosed by a stationary cup-shaped extension 18 of the shaft housing 19 so that the rotating part is not exposed at this side of the blades. The purpose of such construction is to avoid a condition in which loose thread ends cut off by the transfer mechanism are wrapped around the base of the shroud and tend to work into the bearings, eventually stopping rotation if not removed. With the inner shroud protected by the stationary extension 18, this condition cannot occur.

In operation, the transfer mechanism is mounted in a bracket or housing 20 which is inserted in the housing 21 surrounding the reel 1 and which serves to prevent escape of the bath which is being applied to the thread on the reel. This bracket is resiliently mounted in the housing 21 by means of a rubber gasket 22 and adjustment of the transfer mechanism with relation to the reel surface may be made by appropriate means, the flexibility of the gasket permitting such adjustment. The bracket 20 is hollow and receives a belt 23 driven by a pulley 24 and driving the shaft 7 of the transfer mechanism. In this way, all parts within the bracket are protected from the corrosive atmosphere which may prevail within the housing 21. The transfer mechanism is rotated at a fairly rapid rate of speed in contact with reel 1 which is also rotating. The rotation of the two members is in the same direction in order that their contacting surfaces may move past each other in opposite directions. The cutting or severing heads 15 of the blades 11 sever the thread when it reaches the zone of contact and the windage set up by the rotation of the transfer wheel blows the severed thread away from the reel as indicated by the successive positions A, B and C. The thread finally passes through an opening 25 in the housing 21 and through a corresponding opening in the housing of the succeeding reel to contact with such reel.

It will be apparent from the foregoing description that the contact between the bars 2 and 3 and the cutting heads 15 is comparatively gentle due to the tendency of the blades 11 to yield as the blades move past the reel bars, but, nevertheless, positive enough to insure severance of the thread due to the effect of centrifugal force in tending to swing the blades to a radial position of maximum diameter. Thus, the described

construction renders it possible to leave the transfer wheels running constantly, if desired, and therefore ready to effect a transfer of a broken thread without attention from the operator, since the friction and consequent wear between the rotating surfaces has been reduced to a minimum. Such wear as might be caused by the contact of two rigid members placed in such contact as is necessary to effect severance and transfer of a thread would not allow of operating the transfer mechanism continuously in this manner since the resulting wear would not only lessen the diameter of the transfer wheels and necessitate frequent adjustment of the bracket **20** to bring the mechanism again into effective contact with the rail and early replacement of worn out mechanism, but would also wear a groove in the reel bars which would interfere with the proper treatment and transfer of the thread.

Of course, it is also possible to operate the transfer mechanisms intermittently and to shut these down after a thread end has been started running over all the reels in a series and, in such case, the wear will not be so great and the life of the transfer mechanism will be prolonged. However, when the transfer mechanisms are thus shut down, they will not automatically transfer a thread which may have become broken after a machine is set in operation and, to this extent, the full value of the invention will not be realized. Consequently, it is preferred to operate the transfer wheels continuously as described.

It is intended that the patent shall cover, by suitable expression in the appended claims, whatever features of patentable novelty reside in the invention.

What we claim is:

1. A thread transfer mechanism comprising an axle, shrouds mounted on said axle, axially extending slots in said shrouds, blades swingably mounted in said slots and extending beyond the periphery of said shrouds, and thread-severing heads on said blades.

2. A thread transfer mechanism comprising an axle, shrouds mounted on said axle, slots in said shrouds, blades swingably mounted in said slots and extending between said shrouds beyond the periphery thereof, and thread-severing heads on said blades.

3. A thread transfer mechanism comprising a spindle, a pair of shrouds in opposed relation mounted to rotate with said spindle, registering recesses in the opposed faces of said shrouds, blades swingably mounted in the slots formed by said registering recesses and extending beyond the periphery of said shrouds, and thread-severing heads on said blades.

4. A thread transfer mechanism comprising a spindle, spaced disk-like members mounted to rotate with said spindle, registering recesses in the opposed faces of said members, blades mounted between said members and extending beyond the periphery thereof, hubs on said blades swingably fitting in the slots formed by said registering recesses, and thread-severing heads on said blades.

5. A thread transfer mechanism comprising a spindle, spaced disk-like members mounted to rotate with said spindle, registering recesses in the opposed faces of said members, blades swingably mounted in the slots formed by said recesses and extending beyond the periphery of said members, stops between said members limiting the swing of said blades, and thread-severing heads on said blades.

6. A transfer mechanism comprising a member mounted for rotation, elements swingably mounted on said member and rotatable therewith, and severing means on the outer ends of said elements.

7. A transfer mechanism comprising a member mounted for rotation, elements swingably mounted on said member and rotatable therewith, severing means on the outer ends of said elements, and stops on said member limiting the swing of said elements.

8. A transfer mechanism comprising a member mounted for rotation, elements swingably mounted on said member extending non-radially therefrom and rotatable therewith, and severing means on the outer ends of said elements.

9. A transfer mechanism comprising a member mounted for rotation, elements swingably mounted on said member inclined against the direction of rotation of said member and rotatable therewith, and stops on said member adapted to limit movement of said elements toward a radial position.

10. A transfer mechanism comprising a plurality of elements swingably mounted in spaced relation around an axis of rotation and inclined against the direction of rotation, and means for limiting movement of said elements toward a radial position.

11. A transfer mechanism comprising a plurality of elements spaced around an axis of rotation, said elements extending outwardly from and being rotatable about said axis of rotation; means engaging the inner ends of said elements in such manner that each element is free to rotate independently about its inner end; and means adapted to limit such independent rotation of said elements.

12. A thread transfer mechanism comprising an axle, a series of thread-engaging elements disposed in regular arrangement about said axle for individual free pivotal movement with respect thereto, and means for supporting said series of thread-engaging elements in said regular arrangement about said axle.

13. A thread transfer mechanism comprising an axle, a series of thread-engaging elements disposed in regular arrangement about said axle for individual free pivotal movement with respect thereto, means restricting the amount of individual free pivotal movement of such elements, and means for supporting said series of thread-engaging elements in said regular arrangement about said axle.

14. A thread transfer mechanism comprising means providing an axis of rotation, a series of thread-engaging elements disposed in regular arrangement about said axis of rotation for individual free pivotal movement with respect thereto, and means for supporting said series of thread-engaging elements in said regular arrangement about said axis of rotation.

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