Dec. 5, 1939. L. E. LOVETT 2,181,902

TRANSFER MECHANISM

Filed June 6, 1936

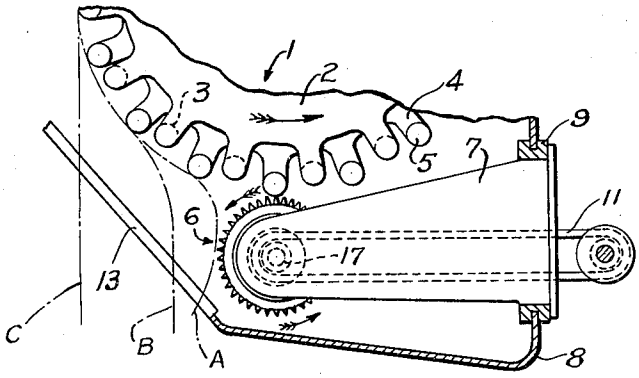


Fig. 1

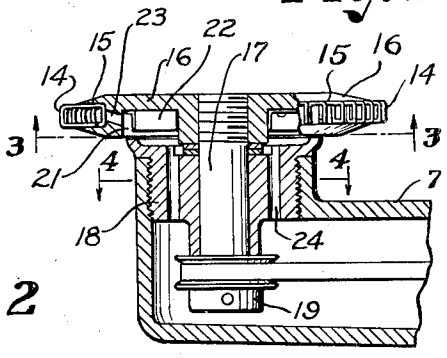


Fig. 2

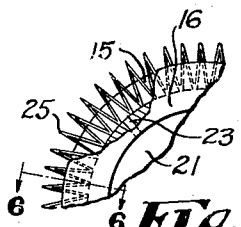


Fig. 5

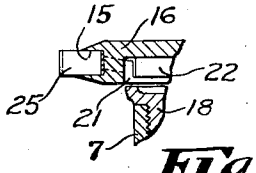


Fig. 6

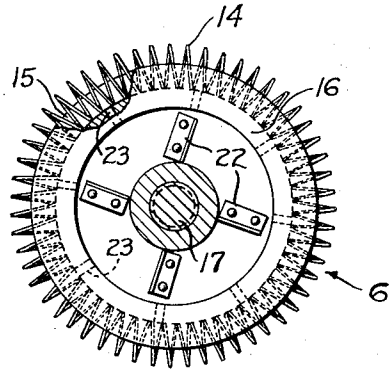


Fig. 3

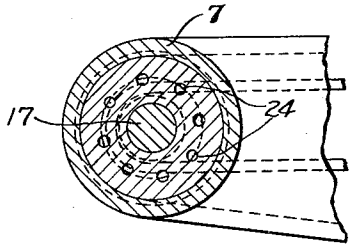


Fig. 4

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TRANSFER MECHANISM

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12 Claims. (Cl. 18—8)

This invention relates to a transfer mechanism for removing a thread from a rotating surface on which it is being wound. More particularly, the invention relates to a transfer wheel adapted to contact with a rotating surface on which a wet thread is being wound to sever such thread and to transfer the thread end so formed to another surface which may also be rotating. The invention provides, among other things, a member having elements or groups of elements spaced around its periphery adapted to sever a thread which is winding on a rotating cylindrical surface. The device is particularly useful in connection with a reel which operates to advance a thread in helical turns along its length, the transfer device acting to sever the thread and remove the free end so formed, so that the thread can be transferred to another similar reel where the winding operation is repeated.

The invention is especially useful in connection with the continuous spinning of artificial silk, in which all of the treatments necessary to finish an artificial silk thread coming from a spin bath are performed on the thread in succession on a number of reels arranged in regular order. Thus in the viscose process of making artificial silk, the thread may be washed, desulphurized, bleached, etc., each operation being performed while the thread is passing over a separate reel. The method is continuous in that the thread automatically winds in approximately helical form along a given reel, runs from this reel onto the next reel, travels along the second reel in the same manner, and so on until the finished thread is taken up on a packaging device. Such a machine is described at some length in copending application Ser. No. 679,606, filed July 10, 1933, now Patent No. 2,067,881, and the present mechanism may be used therewith or wherever it is desired to transfer a traveling thread from one surface to another without interrupting the running of the thread.

While the transfer mechanism can be used in connection with various forms of reels for winding thread, its operation will be described in connection with the form of reel set forth in application Ser. No. 652,089, filed January 16, 1933, wherein is disclosed a reel consisting of two cage members made up of laterally extending intermeshing bars, the cage members being mounted for rotation about axes both offset and canted or askew with respect to each other. As the bars of the respective cage members move in and out due to this offset relation of their axes, the turns of thread are alternately picked up and dropped by each set of bars, the turns, due to the canted relation of the axes, being dropped onto the bars slightly forward of the position which they last occupied. This results in travel of the thread along the reel until it has come to the end thereof and is ready to be transferred to another similar reel.

Automatic means to effect this transfer from reel to reel are desirable in order that each thread end may be caused to wind over the several reels provided for the application of the solutions required for the various treatments to which the thread is subjected. Such a transfer can to advantage be employed when the machine is first set in operation, which is done by applying the thread from a spin bath to the first reel, causing it to wind over the first reel, transferring it to the second reel, completing the travel on this reel, and again transferring it, until the finished thread is run off onto the final packaging device. Breakage of a thread during operation of the machine also necessitates transfer. Manual transfer is possible and is sometimes employed, but automatic transfer is preferred, especially since the number of transfers is very large where thread is being spun in commercial amounts.

Removal of the thread from the reel is made difficult by the fact that the thread is wet by the various baths to which it is subjected and tends to cling to the bars of the reel. Also, the liquid is showered onto the reels and tends to wash following turns of thread over the leading end. Where the true leading end is thus bound under following turns, it is desirable to employ a transfer mechanism which is capable of creating a new free leading end by severance of the thread back of the true end. The thread-engaging elements which are presented to the reel must necessarily bear thereagainst with sufficient rigidity to cut the thread when contact is made therewith but at the same time this rigidity must be neither so great that the transfer mechanisms will become worn out quickly and require replacement nor so great that a groove will be worn in the winding reel resulting in abrasion and breaking of the still soft, wet thread during operation of the machine. For this reason, a mechanism is required which is on the whole moderately flexible, so that it yields somewhat upon contact with the reel but yet may be urged against the thread with sufficient firmness to sever such thread.

It is accordingly an object of the invention to provide means for automatically forming a new leading end on a thread-like article being wound

on a rotating surface and 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 on the whole a moderate flexibility, either inherent in or capable of being imparted to the thread-engaging elements or groups of elements for severing and transferring a winding thread. Other objects of the invention will in part be obvious and will in part appear more in detail hereinafter.

The invention is adapted for use in connection with any process of making artificial filaments, as, for example, artificial silk thread, such as the cuprammonium, cellulose acetate, cellulose nitrate and viscose processes; but it is especially valuable in connection with the viscose process and will be more particularly described in relation thereto, although no limitation is thereby implied. In fact, the apparatus will be found useful wherever it is necessary to transfer a thread from a rotating surface to another surface, particularly if the thread to be transferred is wet and tends to cling to the surface from which it is to be removed.

In the drawing, which illustrates two related embodiments of the invention, Figure 1 is a fragmentary elevation of a transfer mechanism constructed in accordance with the invention mounted in operative relation to a thread processing reel. Figure 2 is a sectional plan view of one of said embodiments, parts being shown in elevation. Figure 3 is a sectional elevation from the line 3—3 of Figure 2, a portion being broken away. Figure 4 is a sectional elevation from the line 4—4 of Figure 2. Figure 5 is a fragmentary elevation, corresponding generally to a portion of Figure 3, of a second embodiment of the invention. Figure 6 is a section on line 6—6 of Figure 5.

Referring first to Figure 1 of the drawing, reel 1 consists of a cage member 2, carrying longitudinally extending bars 3, and a cage member 4, carrying interdigitating bars 5, the two sets of bars moving in and out radially with respect to each other due to a lateral offsetting of their respective axes of rotation. As the turns of thread reach the end of the reel, they encounter transfer wheel 6, illustrated as of the type shown in Figures 1 and 2, mounted on bracket 7. This bracket is mounted in the reel housing 8 by means of a rubber gasket 9 and may be adjustable in relation to the reel. A belt 11 drives the transfer wheel from a suitable source of power (not shown). The transfer wheel 6 is rotated in the same angular direction as the reel 1 in order that the thread-engaging elements 12 may move in the opposite direction to the bars 3 and 5 at the point of contact to effect detachment of the severed end from the reel. The thread end then drops through the opening 13 in the reel housing 8 to contact with the surface of another reel therebelow or otherwise disposed in proximity to reel 1.

As shown in Figures 2 and 3, the thread-engaging portion of the transfer mechanism 6 is made up of coiled wire or like strip material 14. While any tortuous formation of the wire 14 may be employed which will present portions thereof in close relation to each other, as here shown the wire is so bent upon itself as to form a helix having in cross-section a generally rectangular shape, in consequence of which the individual loops or turns of the helix cannot turn relatively to each other and the thread-engaging portions will be maintained in the desired relation to the reel. Because of this formation, the wire 14 presents an undulating appearance.

To dispose the thread-engaging portion thereof in circumferential relation, the wire 14 is mounted in a groove 15 in the outer periphery of the disc-shaped carrier member 16. By placing the helix in the groove under some degree of tension, it will retain itself in place, although separate retaining means may be employed. This groove is preferably rectangular in cross-section in order that the helix will be closely received. Carrier member 16 is secured, as by the screw-threads shown, to a shaft 17, which is rotatably supported in bearing block 18. This bearing block 18 is here shown to be separable from the bracket 7 and fastened thereto by a screw-threaded connection. A pulley 19 affixed to the shaft 17 on the side of the bearing block 18 opposite from the carrier member 16, receives the driving belt 11.

To deliver a current of air radially outwardly from the transfer mechanism 6, a side face of the carrier member 16 may be formed with a recess 21 and within this recess may be secured vanes 22 inclined to impel air radially outwardly. This air passes through ports 23, which establish a communication between the recess 21 and groove 15, directly to the thread engaging portions of the helix. It may be desirable to form the recess 21 in the side of the carrier member which faces the bearing block 18, and to form passageways 24 through this bearing block. In this manner air may be drawn through the interior of bracket 7 for delivery by vanes 22 through ports 23. If desired, air may be forcibly supplied to the interior of bracket 7 to assure an adequate supply through ports 23.

In the embodiment of the invention illustrated in Figures 5 and 6, the strip element, instead of being a wire, comprises a band or ribbon 25. This ribbon is reversely bent in undulating or wave-like formation, so that outwardly disposed portions present a series of adjacent thread-engaging elements. Preferably, the band or ribbon 25 should be of the same width as rectangular groove 15, so that when it is bent or looped in the desired manner it will fit the groove. As shown, the band or ribbon 25 is provided with narrow cutting edges, arising from the fact that the material of the band or ribbon 25 is bent sharply back upon itself; if desired, the cutting edges may be somewhat rounded, presenting a generally sinuate surface.

In use, the thread-engaging means, whether formed out of a wire or a band or ribbon, will, upon contact with the thread being advanced along reel 1, sever the thread so as to form a new thread end. Upon contact with the reel, the thread-engaging means may yield, due to the nature of the strip material employed, and only a slight shock will occur upon the reel in severing the thread. The newly formed thread end will be removed from the reel for transfer to the next reel, by the combined action of the thread-engaging means and the current of air. This current of air assists in billowing the thread outwardly through the successive stages generally indicated by broken lines A, B, C. Thus automatic transfer of the thread from one to another of a series of reels may be readily effected, as and when required.

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 is claimed is:

1. A rotatable thread transfer mechanism comprising a helix of rectangular cross-sectional shape, corresponding portions thereof providing a series of thread-engaging means.

2. A rotatable thread transfer mechanism comprising ribbon material of wave-like form presenting a series of thread-engaging portions.

3. A rotatable thread transfer mechanism comprising a disc-shaped carrier member having therein an outer peripheral groove which is rectangular in cross-section and, disposed in said groove, a tortuously formed strip element of rectangular cross-sectional shape having portions projecting from said groove to provide a series of thread-engaging means.

4. A rotatable thread transfer mechanism comprising a rotatable carrier member, means carried thereby for engaging a thread to be transferred, and vanes carried by said member for delivering air outwardly of the mechanism for assisting the thread transfer.

5. A rotatable thread transfer mechanism comprising a rotatable carrier member having a peripheral enlargement, said enlargement having radial openings therethrough for the passage of air; means carried by said peripheral enlargement for engaging with a thread to be transferred; and vanes carried by said rotatable carrier member inwardly of said enlargement for impelling air through said openings toward said thread-engaging means.

6. In thread processing apparatus including a rotatable thread-storage, thread-advancing device, rotary means for transferring thread from said device comprising a continuous element of tortuous formation presenting a series of circumferentially arranged thread-engaging means disposed to contact with the thread-bearing surfaces of said thread-storage, thread-advancing device during rotation of said transfer means.

7. In thread processing apparatus including a rotatable thread-storage, thread-advancing device, rotary means for transferring thread from said device comprising an element of tortuously formed strip material presenting a plurality of circumferentially arranged thread-engaging edges interconnected by yieldable recessed portions disposed therebetween, said thread-engaging edges being disposed to contact with the thread-bearing surfaces of said thread-storage, thread-advancing device during rotation of said transfer means.

8. Thread processing apparatus according to claim 7 in which said thread-engaging edges and said yieldable recessed portions disposed therebetween are portions of a continuous wire.

9. Thread processing apparatus according to claim 7 in which said thread-engaging edges and said yieldable recessed portions disposed therebetween are portions of a continuous ribbon.

10. In thread processing apparatus including a rotatable thread-storage, thread-advancing device, rotary means for removing thread from said device comprising a wire of helical formation of which adjacent turns provide a series of circumferentially arranged thread-engaging elements, said thread-engaging elements being disposed to contact with the thread-bearing surfaces of said thread-storage, thread-advancing device during rotation of said transfer means.

11. In thread processing apparatus including a rotatable thread-storage, thread-advancing device, rotary means for removing thread from said device comprising a continuous ribbon having obversely and reversely presented transverse folds providing a series of circumferentially arranged thread-engaging elements, said thread-engaging elements being disposed to contact with the thread-bearing surfaces of said thread-storage, thread-advancing device during rotation of said transfer means.

12. In thread processing apparatus including a rotatable thread-storage, thread-advancing device, rotary means for removing thread from said device comprising a carrier having a peripheral groove and, carried by and retained in said groove, a plurality of looped elements, said elements being disposed to contact with the thread-bearing surfaces of said thread-storage, thread-advancing device during rotation of said transfer means.

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