

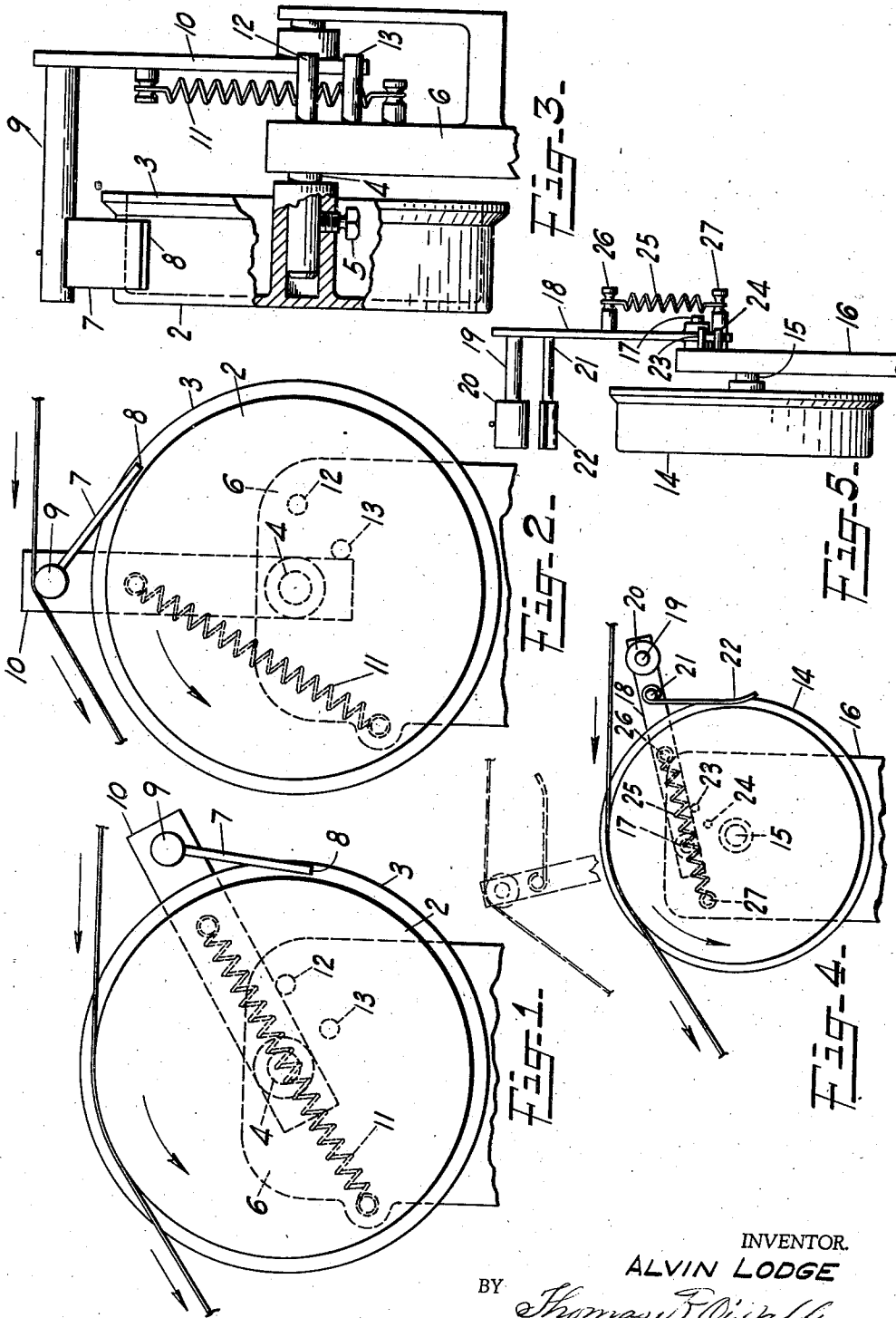
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FILAMENTARY GUIDING MECHANISM

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FILAMENTARY GUIDING MECHANISM

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This invention concerns rotary guides for changing the direction of travel of continuous filamentary bundles, such as tows, yarns, ropes and the like, particularly of non-metallic, natural or artificial textile materials, though it is applicable also to strands of non-textile character. In proceeding about the guide, filaments which may have weak or broken portions, especially if damp, tend to split away from the bundle and wrap around the rotating guide. Once this happens, the tendency for additional filaments to break and become wrapped about the guide is greatly increased and the point is sometimes reached where the entire bundle is broken. This tendency of the filaments to split and to wrap and become tangled about the guide is a serious disadvantage of a guide which is free to rotate. On the other hand, non-rotating guides, such as fixed guide posts, though they offer a greater amount of friction and consequent wear to the traveling bundle, are nevertheless substantially free of any tendency to gather split filaments upon themselves.

It is an object of this invention to provide a novel rotary guide with means for preventing any excessive accumulation of split filaments from becoming wrapped thereabout. A further object is to provide such a guide with a device responsive to the wrapping on the guide for displacing the filamentary bundle from the guide so that the wrapping may be removed therefrom and the guide restored to service without interfering with or interrupting the continuous traveling motion of the bundle. It is a further object to provide an auxiliary guide, which may be of the stationary or the rotary type, and means for bringing it into operation in place of the main rotary guide before splitting and wrapping about the main guide becomes excessive. Further objects and advantages of the invention will be apparent from the drawing and the description thereof hereinafter.

In the drawing, illustrative of the invention, Figure 1 is a side elevation of a rotary guide in normal operation,

Figure 2 is a side elevation of the rotary guide of Figure 1 when out of operation,

Figure 3 is an end elevation, partially in section, of the device shown in the position of Figure 2,

Figure 4 is a side elevation showing a different modification of the invention, and

Figure 5 is an end elevation corresponding to that of Figure 3 showing the modification of Figure 4.

As shown in Figures 1 to 3 of the drawing, a guide 2 in the form of a cylindrical drum which may be provided with a flange 3 at one or both edges of the drum periphery, is mounted upon shaft 4, such as by a set screw 5, which in turn is mounted rotatably within a suitable bearing or support 6. This guide may be employed to impart a change in direction to the filamentary bundle or it may serve simply as an intermediate support for a long running filamentary bundle extending between two other guides or filament handling members where no change of direction is contemplated. As shown, the guide is rotated in the direction of the arrow in Figure 1 by virtue of the traction exerted upon it by the filamentary bundle.

A member 7 is provided and is arranged so that its trailing end 8 just clears the face of the guide 2 and is adapted to permit the passage of a restricted quantity of filaments split from the bundle and wrapped upon the rotating guide 2. The proximity of the trailing end 8 to the periphery of guide 2 may be selected to limit to any desired extent the amount of wrapping upon the guide that can occur before the friction exerted by the wrapping against member 8 causes its displacement from its normal position in Figure 1 in the manner more particularly hereinafter described. The member 7 is supported by means of a rod 9 upon a pivotal arm 10 whose pivotal axis coincides with the axis of rotation of the guide 2. A spring 11, secured at one end to the support 6 and at the other to arm 10, is arranged for snap action to throw the arm 10 when displaced to its dead center, in either of opposite directions against the stop 12 (position in Figure 1) or against another stop 13 (position in Figures 2 and 3), these stops being secured in support 6. Figure 1 shows the normal rest position of arm 10 which is at a relatively small displacement from dead center. The arm 10 rapidly responds to any accumulation of the filamentary wrapping on the guide 2 by which it is displaced from the rest position of Figure 1 through its dead center and thereupon into the position of Figure 2 as a result of the snap action of the spring 12. As shown in Figure 2, in this second position, the filamentary bundle is lifted entirely from the rotatable guide 2 and is solely guided by the rod 9 upon the arm 10. The rod 9 then assumes the function of a stationary guide. The filaments previously split from the bundle and wrapped upon the rotating guide 2 can then be removed without interfering with the traveling filamentary

bundle, after which the rotary guide 2 can again be thrown into operation by returning the arm 10 and guide 9 to the rest position of Figure 1.

It is apparent that the disposition of the guide in a vertical plane as shown in Figures 1 and 2 is not critical. For example, the guide 2 may be arranged just as well in a horizontal plane in which event Figures 1 and 2 would be considered plan views. In addition, the guide 2 may be in an inclined plane and where it is in an inclined plane or vertical plane, it is not essential that the arm 10 supporting the rod 9 and member 7 be so arranged that it comes into a vertical position as shown in Figure 2 when the rod 9 is brought into operative position in place of the rotating guide 2. It is clear that the action of the spring 12 is sufficient to perform the functions of retaining the rod 9 in an inoperative position and to bring it into the operative position by snap-action regardless of the effect or influence of gravity thereupon. While the rotary guide 2 has been described as an idler, the invention is applicable as well to a driven guide.

The building or wrapping of the filamentary material upon the rotary guide gradually increases the pressure exerted upon the end 8 of member 7 until either the frictional force itself is sufficient to swing the arm 10 past the dead center of the snap-acting spring or the filaments in the exterior windings of the wrapping become caught against the back face of the member 7. In the claims, the expression, "frictional engagement" is intended to be generic to both of these effects.

Figures 4 and 5 show a modification in which the auxiliary guide is of the rotary type and in which it is thrown into operative position by the radial displacement action of the wrappings instead of by frictional effects as in the embodiment of Figures 1 to 3. With reference to Figures 4 and 5, 14 represents the main rotary guide supported for free rotation on shaft 15 mounted on a support 16 which carries a stub shaft 17 eccentrically offset from shaft 15 upon which the arm 18 is pivotally mounted. This arm carries an outwardly projecting shaft 19 upon which the guide member 20 is rotatably mounted. Arm 18 also carries an outwardly projecting arm 21 for supporting the lifting member 22 in definite relationship with respect to the arm 18. Stops 23 and 24 are fixed in support 16 to limit the clockwise and counterclockwise motions respectively (as viewed in Figure 4) of arm 18. A snap-action spring 25 is secured at one end to arm 18 at 26 and at the other end to a pin 27 in support 16. As shown, the inoperative position of the auxiliary guide 20 (full-line position of Figure 4) as determined by stop 23 is such that end 26 of spring 25 is just slightly offset from its dead center. The lifting member 22 may be arranged to make any desired clearance with respect to the periphery of guide 14, say $\frac{1}{4}$ to $\frac{1}{2}$ inch, so that when the windings begin to build up in excess of this amount arm 18 is forced by the increased depth of the wrappings against the lifting member 22 in a counterclockwise direction until the dead center of the end 26 of the spring is exceeded whereupon the spring snaps the arm 18 against stop 24 thereby throwing the auxiliary guide 20 into operative position with respect to the filamentary bundle instead of the main guide.

If desired, an auxiliary guide of the rotary type may be provided on an extension of the arm 10 of the embodiment of Figures 1 to 3. Also rotary guide 20 of the embodiment of Figures 4 and 5

may be replaced with a stationary guide or it may be omitted and the arm 21 may be arranged to serve as a stationary guide in a manner similar to member 9 of Figures 1 to 3.

While preferred embodiments of the invention have been disclosed, the description is intended to be illustrative only, and it is to be understood that changes and variations may be made without departing from the spirit or scope of the invention as defined by the appended claims.

I claim:

1. In combination, a rotatable guide for a continuous filamentary bundle and means associated with the guide for displacing the bundle from operative relation with the guide upon the wrapping about the guide of a predetermined amount of any filamentary material split from the bundle.

2. In combination, a rotatable guide for a traveling continuous filamentary bundle and means associated with the guide responsive to a predetermined amount of wrapping upon the rotatable guide of any filamentary material split from the bundle for displacing the bundle from operative relation with the guide whereby the wrapping may be removed from the guide without interfering with the travel of the bundle.

3. In combination, a rotatable guide for a continuous filamentary bundle, an auxiliary guide normally retained in inoperative relation to the bundle, and means responsive to a predetermined amount of wrapping upon the rotatable guide of any filamentary material split from the bundle for bringing the auxiliary guide instead of the rotatable guide into operative relationship with the bundle.

4. In combination, a rotatable guide for a continuous filamentary bundle, a non-rotatable guide normally retained in inoperative relation to the bundle, and means responsive to a predetermined amount of wrapping upon the rotatable guide of any filamentary material split from the bundle for bringing the non-rotatable guide instead of the rotatable guide into operative relationship with the bundle.

5. In combination, a rotatable guide for a continuous filamentary bundle, an auxiliary guide associated with the rotatable guide and normally retained in inoperative relation to the bundle, and means responsive to a predetermined amount of wrapping upon the rotatable guide of any filamentary material split from the bundle for bringing the auxiliary guide instead of the rotatable guide into operative relationship with the bundle whereby the wrapping may be removed from the rotatable guide without interfering with the travel of the bundle.

6. In combination, a rotatable guide for a continuous filamentary bundle, a non-rotatable guide associated with the rotatable guide and normally retained in inoperative relation to the bundle, and means responsive to a predetermined amount of wrapping upon the rotatable guide of any filamentary material split from the bundle for bringing the non-rotatable guide instead of the rotatable guide into operative relationship with the bundle whereby the wrapping may be removed from the rotatable guide without interfering with the travel of the bundle.

7. In combination, a rotatable guide for a continuous filamentary bundle, an auxiliary guide normally retained in inoperative relation to the bundle, means associated with the auxiliary guide arranged for frictional engagement with a predetermined amount of filamentary material split from the bundle and wrapped upon the rotatable

guide said means being arranged to replace the rotatable guide with the auxiliary guide upon the wrapping of a predetermined amount.

8. In combination, a rotatable guide for a continuous filamentary bundle, a non-rotatable guide normally retained in inoperative relation to the bundle, means associated with the non-rotatable guide arranged for frictional engagement with a predetermined amount of filamentary material split from the bundle and wrapped upon the rotatable guide said means being arranged to replace the rotatable guide with the non-rotatable guide upon the wrapping of a predetermined amount.

9. In combination, a rotatable guide for a continuous filamentary bundle, an auxiliary rotatable guide normally retained in inoperative relation to the bundle, means associated with the auxiliary guide arranged for frictional engagement with a predetermined amount of filamentary material split from the bundle and wrapped upon the rotatable guide said means being arranged to replace the rotatable guide with the auxiliary guide upon the wrapping of a predetermined amount.

10. In combination, a rotatable guide for a continuous filamentary bundle, a rod secured upon a support, and a member secured upon the rod arranged to bear against any filamentary material building upon the surface of the rotatable guide.

11. In combination, a rotatable guide for a continuous filamentary bundle, an auxiliary guide secured upon a support mounted pivotally upon substantially the same axis as the rotatable guide, a member secured upon the support for the auxiliary guide and arranged to bear against any filamentary material wrapped on the surface of the rotatable guide, a spring secured to the support arranged to normally retain the auxiliary guide in inoperative position and to be displaced through a dead-center by the frictional engagement of the wrapped filamentary material against the member to throw the auxiliary guide instead of the rotatable guide into operative relation with the bundle.

12. In combination, a rotatable guide for a continuous filamentary bundle, a non-rotatable guide secured upon a support mounted pivotally upon substantially the same axis as the rotatable guide, a member secured upon the non-rotatable guide and arranged to bear against any filamentary material wrapped on the surface of the rotatable guide, a spring secured to the support arranged to normally retain the non-rotatable guide in inoperative position and to be displaced through a dead-center by the frictional engagement of the wrapped filamentary material against the member to throw the non-rotatable guide instead of the rotatable guide into operative relation with the bundle.

13. In combination, a rotatable guide for a continuous filamentary bundle, an auxiliary guide secured upon a support mounted pivotally upon a shaft eccentrically offset from the axis of the rotatable guide, a member secured upon the sup-

port for the auxiliary guide and arranged to bear against any filamentary material wrapped on the surface of the rotatable guide, a spring secured to the support arranged to normally retain the auxiliary guide in inoperative position and to be displaced through a dead-center by the radial displacement of the member by an increase in the depth of the wrapped filamentary material to throw the auxiliary guide instead of the rotatable guide into operative relation with the bundle.

14. In combination, a rotatable guide for a continuous filamentary bundle, an auxiliary guide secured upon a support mounted pivotally upon substantially the same axis as the rotatable guide, a member secured upon the support for the auxiliary guide and arranged to bear against any filamentary material wrapped on the surface of the rotatable guide, stop members arranged to cooperate with the support to limit the pivotal motion of the support in both directions, a snap-acting spring secured to the support arranged to normally retain the auxiliary guide in inoperative position but, upon displacement thereof by the frictional engagement of the wrapped filamentary material against the member through a dead center, to throw the auxiliary guide instead of the rotatable guide into operative relation with the bundle.

15. In combination, a rotatable guide for a continuous filamentary bundle, a non-rotatable guide secured upon a support mounted pivotally upon substantially the same axis as the rotatable guide, a member secured upon the non-rotatable guide and arranged to bear against any filamentary material wrapped on the surface of the rotatable guide, stop members arranged to cooperate with the support to limit the pivotal motion of the support in both directions, a snap-acting spring secured to the support arranged to normally retain the non-rotatable guide in inoperative position but, upon displacement thereof by the frictional engagement of the wrapped filamentary material against the member through a dead center to throw the non-rotatable guide instead of the rotatable guide into operative relation with the bundle.

16. In combination, a rotatable guide for a continuous filamentary bundle, an auxiliary guide secured upon a support mounted pivotally upon a shaft eccentrically offset from the axis of the rotatable guide, a member secured upon the support for the auxiliary guide and arranged to bear against any filamentary material wrapped on the surface of the rotatable guide, stop members arranged to cooperate with the support to limit the pivotal motion of the support in both directions, a snap-acting spring secured to the support arranged to normally retain the auxiliary guide in inoperative position but, upon displacement thereof by the radial displacement of the member by an increase in the depth of the wrapped filamentary material to throw the auxiliary guide instead of the rotatable guide into operative relation with the bundle.

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