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THREAD-GUIDING AND TENSIONING MEANS

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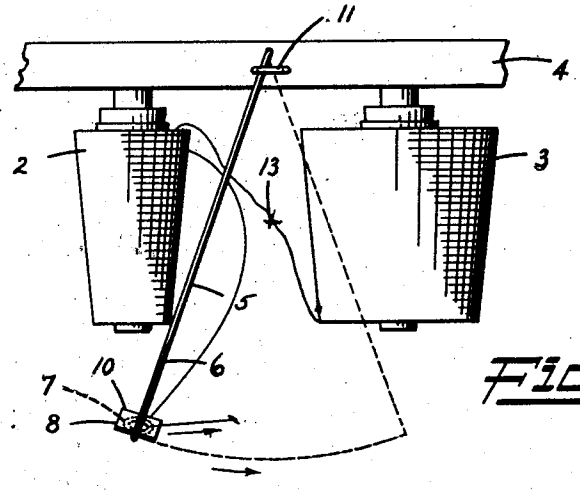


Fig. 1

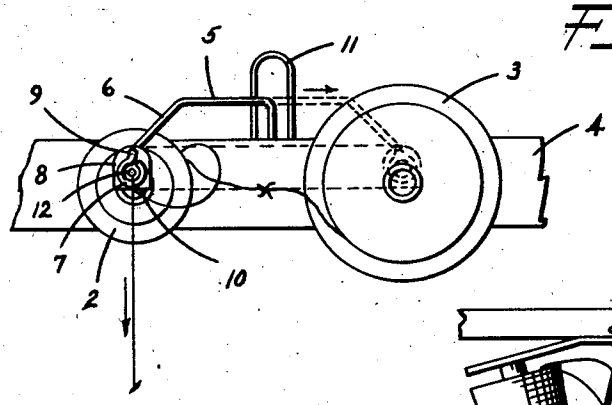


Fig. 3

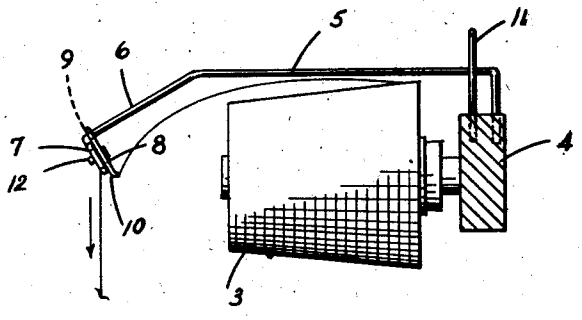


Fig. 4

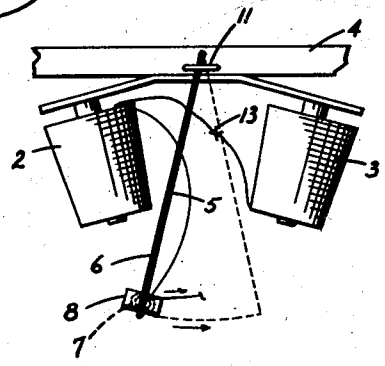


Fig. 2

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THREAD-GUIDING AND TENSIONING MEANS

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This invention relates to apparatus for facilitating unwinding of filamentary material from a plurality of supply packages thereof by the transfer method.

Devices for unwinding filamentary material by the transfer method usually include a fixed guide for each pair of supply packages which necessitates mounting the packages on a support with their axes converging and intersecting through a common point in the guide. Such arrangements are not always satisfactory and, depending on the size of the packages, may be uneconomical of the space available for mounting the packages. Thus, when the supply packages are fairly large, the packages are crowded together and are not readily accessible for replacement, tying of broken strands, etc. Movable guides, on the other hand, have not been considered suitable for use in unwinding filamentary material by the transfer method because a tensioning means common to a pair of packages cannot be associated satisfactorily with movable guides of the type heretofore available, and a separate tensioning means is necessary for each package.

The primary object of the present invention is to provide a swingable guide common to a pair of supply packages of filamentary material supported with their axes in a common plane, whether horizontally, or vertically, and whether supported with their axes parallel or diverging in either direction. A further object is to provide associated guiding and tensioning means common to such packages.

Broadly, the apparatus of the present invention comprises means for supporting a plurality of wound packages of filamentary material with their axes in a common plane, or facing generally toward a common plane, and a swingable guide disposed in the plane of the axes of the packages, so that the filamentary material pulls the guide into unwinding position substantially axially of the package from which it is being drawn. In its more specific embodiment, the invention further contemplates the provision of a tensioning means associated with the swingable guide and carried with the guide into unwinding position with each of the supply packages in sequence by the filamentary material unwinding therefrom.

In the drawing which illustrates one type of apparatus embodying the principles of the invention,

Figure 1 is a top plan view of an unwinding machine provided with associated guiding and

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tensioning means, in which the packages are mounted with their axes parallel;

Figure 2 is a top plan view of a machine similar to that shown in Figure 1, but with the supply packages arranged with their axes converging;

Figure 3 is a front elevation of the apparatus shown in Figures 1 and 2; and

Figure 4 is an enlarged side elevation of part of the apparatus shown in Figures 1, 2, and 3.

Referring to the drawings, a pair of cones 2 and 3, or other packages (such as cakes, bobbins, balls, tubes, etc.) of filamentary material are mounted with their axes in a common plane on a stationary support 4. A rod or arm 5 extends longitudinally of the packages, being mounted on support 4 symmetrically above the packages. At its forward end, arm 5 is bent downwardly slightly from the vertical to provide a sloped portion 6. In the specific embodiment of the invention illustrated, the thread guide is constituted by a loop or eye 7 which depends from sloped portion 8 of arm 5 and slopes inwardly toward the unsupported ends of the supply packages. A plate 8 is suspended on arm 5, back of loop 7, through a hole 9 located at the top thereof so that the major portion of the weight of the plate falls below the arm and bears against loop 7. Hole 9 is slightly greater in diameter than the cross-section of arm 5, to permit some freedom of movement of the plate on the arm, and preferably loop 7 is open at the top or near the top to provide a threading gap for facilitating lacing up. Plate 8 may be of any shape and as shown is generally rectangular except that the bottom portion thereof is turned back, as shown at an angle of 45°, to provide a surface 10 over which the filamentary material travels before passing through the loop, as shown more clearly in Figure 4, and all edges of plate 8 are smoothly rounded to prevent undue wear on the filamentary material. Arm 5 is so mounted on support 4 that loop 7 and plate 8 are disposed in the plane common to the axes of cones 2 and 3, in advance of the unsupported ends of the cones. Arm 5 is mounted on support 4 for swinging movement transversely of cones 2 and 3. The arm may be mounted in any suitable manner. As shown, the end thereof opposite loop 7 is bent downwardly to provide a vertical portion adapted to be fitted into the support. Movement of rod 5 transversely of cones 2 and 3 is restrained by a wicket 11 mounted on support 4 in front of the mounted end of arm 5.

In the operation of the device, the trailing end

or "tail" of the filamentary material on the inside of cone 2 is fastened, as by tying, splicing, cementing, or soldering, as at 13, to the leading end of the material on the outside of cone 3. Loop 7 and plate 8 are axially aligned with cone 2. The leading end of the material on the outside of cone 2 is drawn over surface 10 of plate 8, passed between plate 8 and loop 7 through the threading-up gap in the loop, over the surface defining the loop, and is thence directed to a take-up means.

Plate 8 bearing against loop 7 maintains the filamentary material being drawn through the loop under tension. Plate 8 has some freedom of movement on rod 5 and is therefore responsive to changes in tension in the unwinding material, so that in general the material is maintained under a substantially constant tension and its tendency to excessive ballooning, which tendency increases as the diameter of the package decreases, is controlled. The tension exerted on the filamentary material may be varied by varying the pressure of plate 8 against loop 7, as by varying the thickness of the plate, or by weighting the plate, for example by means of a stud 12 which projects through the plate and rides generally below the center of the loop. Stud 12 also serves to position the plate in general alignment with the loop and prevents the plate from swinging too far to either side of the loop. The tension exerted on the filamentary material may also be varied by varying the extent to which loop 7 slopes inwardly toward the supply packages. When cone 2 is completely unwound, the leading end of cone 3 begins to unwind. The pull exerted by the material unwinding from cone 3 causes arm 5 to swing in the direction of cone 3, loop 7 and plate 8 are automatically aligned in unwinding position substantially axially of cone 3, and the unwinding operation continues without interruption. The operator replaces cone 2 with a fresh cone, and ties up the leading end thereof with the trailing end of cone 3. In due course, when the material on cone 3 is exhausted, arm 5 is swung toward the replacement for cone 2 and loop 7 and plate 8 are axially aligned therewith in unwinding position, the unwinding material being forwarded continuously to a common take-up means, such as a warping machine, beaming machine, or to any other point where it is prepared for further processing.

It will be readily apparent that the apparatus illustrated represents only one embodiment of the principles of this invention and that the guide may have a form other than a loop or eye, the feature of the invention being that the guide, whatever its specific structure, is swingable in the plane common to the axes of the supply packages. Although as shown, the supply packages are mounted with their axes horizontal, they may be mounted with their axes vertical and in either parallel relationship or diverging in either direction. When the device illustrated is employed with supply packages arranged with their axes vertical, plate 8 may be fastened in any suitable manner to arm 5 to ensure that the plate bears against eye 7. Other types of guiding and/or tensioning means may be employed, as for example a disk-type device comprising two juxtaposed disks between which the thread passes may be suitably secured to arm 5.

A swingable guide, which is the essence of the present invention, has the advantage that it is pulled into automatic alignment in unwinding position substantially axially of each of the supply packages in sequence, by the thread unwinding from the package, and hence the packages may be supported with their axes in any common plane, whether horizontal or vertical, and whether in parallel, converging or diverging relation, and, further, a tensioning means common to the supply packages may be effectively associated with the guide. When the packages are large, it will be found advantageous to support them with their axes parallel, which arrangement is conservative of space, packages so mounted being readily accessible for replacement, etc., without interrupting the unwinding operation, regardless of the size of the package. A swingable guide, or a swingable guide carrying a tension means, in accordance with the invention may be used in facilitating unwinding of textile filamentary material, such as thread, yarns or other strands, and is also useful in unwinding filamentary material in general, including ropes, cables, and wires not adapted to textile use. The term "filamentary material" as used herein is intended to include such material of both textile and non-textile utility.

While a preferred embodiment of the invention has been disclosed, it will be understood that the description is intended to be illustrative merely, and that modifications may be made without departing from the spirit and scope of the invention as defined by the appended claims.

We claim:

1. Apparatus for facilitating unwinding of filamentary material from a plurality of wound packages thereof in sequence, comprising means for supporting the packages with their axes facing generally toward a common plane, and a freely swingable guide so arranged and constructed that the filamentary material pulls the guide into unwinding position with the package from which it is being drawn, and means for limiting the swinging movement of the guide to a path the extremes of which coincide generally with the axes of packages served by the guide while permitting free swing of the guide from unwinding position generally axially of one of said packages to unwinding position generally axially of another of the packages in response to completion of the unwinding from the first mentioned package.

2. Apparatus for facilitating unwinding of filamentary material from a plurality of wound packages thereof in sequence, comprising means for supporting the packages with their axes in a common plane, and a freely swingable guide so arranged and constructed that the filamentary material pulls the guide into unwinding position with the package from which it is being drawn, and means for limiting the swinging movement of the guide to a path the extremes of which coincide generally with the axes of packages served by the guide while permitting free swing of the guide from unwinding position generally axially of one of said packages to unwinding position generally axially of another of the packages in response to completion of the unwinding from the first mentioned package.

3. Apparatus for facilitating unwinding of filamentary material from a plurality of wound packages thereof in sequence, comprising means for supporting the packages with their axes in a common plane, and a freely swingable guide so arranged and constructed that the filamentary material pulls the guide into unwinding position substantially axially of the package from which it is being drawn, and means for limiting the swinging movement of the guide to a path the

extremes of which coincide generally with the axes of packages served by the guide while permitting free swing of the guide from unwinding position generally axially of one of said packages to unwinding position generally axially of another of the packages in response to completion of the unwinding from the first mentioned package.

4. Apparatus for facilitating unwinding of filamentary material from a plurality of wound packages thereof in sequence, comprising means for supporting the packages with their axes facing generally toward a common plane, and a freely swingable guide so arranged and constructed that the filamentary material pulls the guide into unwinding position with the package from which it is being drawn, and means for limiting the swinging movement of the guide to a path the extremes of which coincide generally with the axes of packages served by the guide while permitting free swing of the guide from unwinding position generally axially of one of said packages to unwinding position generally axially of another of the packages in response to completion of the unwinding from the first mentioned package.

5. Apparatus for facilitating unwinding of filamentary material from a plurality of wound packages thereof in sequence, comprising means for supporting the packages with their axes in a common plane, and a freely swingable guide so arranged and constructed that the filamentary material pulls the guide into unwinding position with the package from which it is being drawn, and means for limiting the swinging movement of the guide to a path the extremes of which coincide generally with the axes of packages served by the guide while permitting free swing of the guide from unwinding position generally axially of one of said packages to unwinding position generally axially of another of the packages in response to completion of the unwinding from the first mentioned package.

6. Apparatus for facilitating unwinding of filamentary material from a plurality of wound packages thereof in sequence, comprising means for supporting the packages with their axes in a common plane, a thread guide, and an arm carrying said guide, said guide and arm being pivotally mounted with respect to the packages, and said guide being freely swingable in the plane of the axes of the packages, and means for limiting the swinging movement of the guide to a path the extremes of which coincide generally with the axes of packages served by the guide while permitting free swing of the guide from unwinding position generally axially of one of said packages to unwinding position generally axially of another of the packages in response to completion of the unwinding from the first mentioned package.

7. In apparatus for facilitating unwinding of filamentary material from a plurality of wound packages thereof in sequence including means for supporting the packages with their axes in a common plane, the combination of a guide carrying a tension means, which guide is swingable and carries the tension means with it, said guide and tension means being swingable in the plane of the axes of the packages.

8. Apparatus for facilitating unwinding of filamentary material from a plurality of wound packages thereof in sequence, comprising means for supporting the packages with their axes facing generally toward a common plane, a swingable guide, and a tension means associated with said guide, said guide and tension means being so constructed and arranged that the filamentary material pulls them into unwinding position with the package from which it is being drawn.

9. Apparatus for facilitating unwinding of filamentary material from a plurality of wound packages thereof in sequence, comprising means for supporting the packages with their axes in a common plane, a guide for the filamentary material, and means for supporting the guide in the plane of the axes of the packages, said last-named supporting means being freely swingable relatively of the plurality of packages so that the filamentary material pulls the guide into unwinding position substantially axially of the package from which it is being drawn, and means for limiting the swinging movement of the supporting means to a path the extremes of which coincide generally with the axes of packages served by the guide while permitting free swing of the supporting means to carry the guide from unwinding position generally axially of one of said packages to unwinding position generally axially of another of the packages in response to completion of the unwinding from the first mentioned package.

10. Apparatus for facilitating unwinding of filamentary material from a plurality of wound packages thereof in sequence, comprising means for supporting the packages with their axes in a common plane, a guide for the filamentary material, means for supporting the guide in the plane of the axes of the packages, said last-named supporting means being freely swingable relatively of the plurality of packages so that the filamentary material pulls the guide into unwinding position substantially axially of the package from which it is being drawn, and means for limiting the swinging movement of said supporting means to a path the extremes of which coincide generally with the axes of packages served by the guide while permitting free swing of the supporting means to carry the guide from unwinding position generally axially of one of said packages to unwinding position generally axially of another of the packages in response to completion of the unwinding from the first mentioned package.

11. Apparatus for facilitating unwinding of filamentary material from a plurality of wound packages thereof in sequence, comprising means for supporting the packages with their axes in a common plane, associated guiding and tensioning means for the filamentary material, means for supporting the latter in the plane of the axes of the packages, said last-named supporting means being swingable relatively of the plurality of packages so that the filamentary material pulls the guiding and tensioning means into unwinding position substantially axially of the package from which it is being drawn.

12. Apparatus for facilitating unwinding of filamentary materials from a plurality of wound packages thereof in sequence, comprising means for supporting the packages with their axes in a common plane, associated guiding and tensioning means for the filamentary material, means for supporting the latter in the plane of the axes of the packages, said last-named supporting means being swingable relatively of the plurality of packages so that the filamentary material pulls the guiding and tensioning means into unwinding position substantially axially of the package from which it is being drawn, and means

for limiting the swinging movement of said supporting means relatively of said packages.

13. Apparatus for facilitating unwinding of filamentary material from a plurality of wound packages thereof in sequence, comprising means for supporting the packages with their axes in a common plane, an arm extending longitudinally of the packages, a loop carried by the arm and sloping inwardly toward the packages, and a plate carried by the arm in close proximity to said loop, said arm being positioned to support the loop and plate in the plane of the axes of the packages, and swingable relatively of the packages so that the filamentary material pulls the loop and plate into unwinding position substantially axially of the package from which it is being drawn.

14. Apparatus for facilitating unwinding of filamentary material from a plurality of wound packages thereof in sequence, comprising means for supporting the packages with their axes in a common plane, an arm extending longitudinally of the packages, a loop carried by the arm and sloping inwardly toward the packages, and a plate carried by the arm in close proximity to said loop, said arm being positioned to support the loop and plate in the plane of the axes of the packages, and swingable relatively of the packages so that the filamentary material pulls the loop and plate into unwinding position substantially axially of the package from which it is being drawn, and means for limiting the swinging movement of the arm relatively of the packages.

15. Apparatus for facilitating unwinding of filamentary material from a plurality of wound packages thereof in sequence, comprising means for supporting the packages with their axes in a common plane, an arm extending longitudinally of the packages, a loop carried by the arm and sloping inwardly toward said packages, a plate carried by the arm and having a major portion of its weight bearing against the loop, said arm being positioned to support the loop and plate constituting guiding and tensioning means for the filamentary material in the plane of the axes of the packages and swingable in said plane so that the filamentary material pulls the loop and plate into unwinding position substantially axially of the package from which it is being drawn.

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