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APPARATUS FOR WINDING YARN

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2 Sheets-Sheet 2

*Fig. 3*

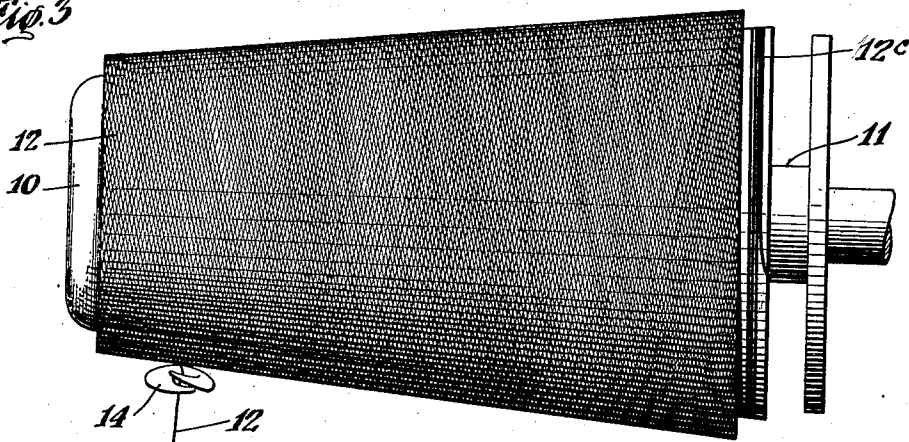


*Fig. 4*

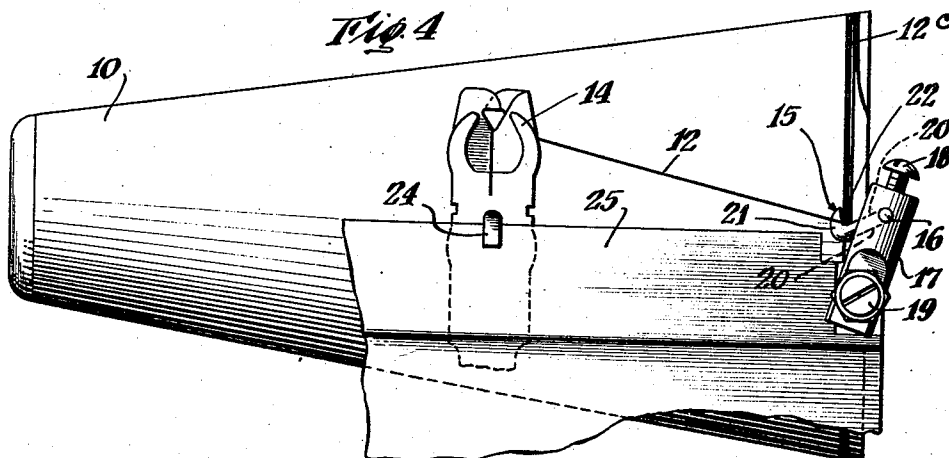
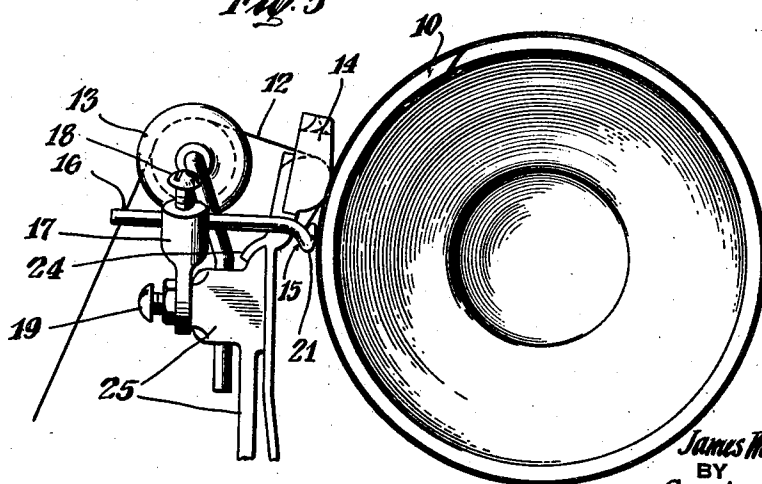


*Fig. 5*



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## UNITED STATES PATENT OFFICE

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## APPARATUS FOR WINDING YARN

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1 Claim. (Cl. 242—43)

This invention relates to a method and apparatus for winding yarn or thread, and more particularly to a method and apparatus for forming what is commonly known in the art in question as a "tail-end" for a yarn package.

I shall describe the invention more particularly with reference to the manufacture of rayon yarn, since that is the commercial application which I have made of it, but the invention may also be applied to the winding of other kinds of yarn under proper circumstances. Although my description relates primarily to the formation or winding of yarn cone packages, the invention may also be applied, under proper conditions, to the winding of cops, tubes, bobbins or other yarn packages in which the hereinafter described tail-end is desired.

Preparatory to weaving, warps are often formed from yarn cones or other packages in a magazine creel. In the following description I shall refer to yarn cone packages by way of illustration. A large number of cones of yarn, sometimes several hundred, are placed in the warper creel. To avoid stopping the warper when a cone is used up, there is a magazine adjacent to each cone in use, containing a full cone. The end of the yarn in the fresh cone must be tied to the tail-end of the yarn which is being unwound. Accordingly, each cone is wound with a tail-end of yarn for this purpose. The tail-end may be suitably of the order of about a yard in length, or longer if desired.

Although the making of such tail-ends has long been common practice, it has, hitherto, had to be done either by hand or by a complicated mechanical device, involving a number of moving parts, and which is expensive and easily gets out of order.

In the case of hand operation, the operator, in beginning to wind each yarn cone, attaches the end of the yarn to be wound to the inside of the cone support (for example, a conical supporting tube of paper, papier-mâché or cardboard) upon which the yarn is to be wound, by means of a sticker placed inside the base of the support. Then, placing the cone support on the mandrel of the winding machine (which may also have a spindle upon which the mandrel is mounted), and while turning the support by hand or by the machine, the operator manually guides the thread (yarn) so that several turns of yarn will be made around the base of the support, on that part of the support which projects below the portion to be occupied by the finished package of yarn. When enough turns have been made to

furnish the desired tail-end, the thread is placed in the traverse guide of the winding machine, which is then started and winds the yarn cone or other package in the usual manner.

An example of the complicated mechanical devices of the prior art, heretofore suggested for this purpose, is found in Beckman Patent No. 1,966,159, granted July 10, 1934. A somewhat similar device, for winding a "bunch" by means of a winding machine, is shown in the Quill Patent No. 1,809,217, granted June 9, 1931. These and similar devices have, according to my observation, been found to suffer from various disadvantages—among others, those of being both complicated and expensive, involving a number of moving parts, and of getting easily out of order or adjustment. These and other disadvantages are overcome by my invention.

The principal object of the present invention is to provide a simple and efficient device for the automatic formation of the desired tail-end in a cone or other desired yarn package, without the necessity for any manual operation, other than threading, and without any additional moving parts at all. The device, in the form of a guide (and which, for convenience, I describe as a "tail-end guide"), may be attached to a standard winding machine, such as is ordinarily used for winding cones or other packages of rayon, or other yarn, and is non-breakable, automatic in operation, and involves no additional moving parts at all, during its operation. When once properly attached to the machine, it does not require further adjustment, and has the additional great advantages of being very inexpensive to manufacture and to install.

Other objects of the invention will appear from the following description.

I shall now describe, by way of illustration, the principle of my machine, and the best mode in which I have contemplated applying that principle, constituting what is at present the preferred form of my invention, and being the best form of the apparatus and process now known to me, in greater detail, in connection with the accompanying drawings, in which:

Figure 1 is a side elevation of a portion of one unit of a cone winding machine of well known type, showing my invention applied thereto, and with the tail-end being wound on the yarn cone support;

Figure 2 is a plan view of the same portion of the winding machine; with my invention applied thereto, showing the yarn after it has been automatically released from the tail-end guide, and

is winding on the yarn cone support in the normal manner to form a cone package of yarn;

Figure 3 is a fragmentary view of the machine, showing the yarn cone package partly wound, and illustrating the tail-end of yarn at the base thereof;

Figure 4 is a side elevation, partially broken away, of a portion of one unit of a winding machine with my invention applied thereto, and showing a somewhat different means of mounting and supporting the tail-end guide; and

Figure 5 is an end view, partially broken away, of a portion of the machine as shown in Figure 4, as seen from the right-hand end of Figure 4, and showing the mounting of the tail-end guide as illustrated in Figure 4.

Referring now to the drawings in greater detail, 10 represents a paper, papier-mâché or other yarn cone support of the usual type, for supporting a wound package or cone of yarn. It is placed upon the mandrel 11 of the winding machine, which may, in turn, be mounted upon a spindle in a usual manner. The yarn strand 12 is led from the yarn cake, skein or the like (not shown, but located below the portion 26 of the machine illustrated in Figure 1) from which the cone package is to be wound (in the case of rayon manufacture, preferably from the washed, purified and dried rayon yarn cake when that process is used), over the usual yarn ball 13, thence through the traversing guide 14, all in the usual manner, and to the yarn support 10. According to my invention there is, however, interposed, between the traversing guide 14 and the yarn support 10, the "tail-end guide" 15 which I have invented and which, together with the process of employing the same, constitutes the present invention and the subject-matter of this application for Letters Patent.

In the drawings as so far described, it is to be understood that only a small portion of the winding machine is shown, and only one of a battery of winding units. A commercial machine may have a dozen or more winding units of this kind, all operating simultaneously, and a yarn package is wound on each unit of the machine. In such machines, as at present commercially manufactured, the spindles and mandrels are usually (but not necessarily) arranged in horizontal position, as shown in the drawings. The yarn cone supports, when mounted on their mandrels, may either project outwardly from the machine, in a horizontal plane, or may be arranged lengthwise of the machine, but also in a horizontal plane. In either mounting, the axis of rotation of the yarn support ordinarily lies in a horizontal plane, and the traverse guide reciprocates substantially horizontally. The operator faces the side of the package, in the case of the end-to-end mounting, and the small ends of the cones (in the case of a cone package) when the winding supports project from the machine side-by-side. By way of illustration, I shall, accordingly, describe the application of my invention to a commercial machine employing horizontal spindles, although the application of the invention is not necessarily confined thereto.

The tail-end guide generically designated by the reference character 15, comprises, in the preferred form or embodiment which I have shown by way of illustration, a base portion 16 mounted slidably upon a bracket 17 by means of a set-screw 18. The bracket itself, with attached guide, is mounted upon the carriage 26, upon which the ball 13 and traversing guide 14 are also

mounted. This carriage 26 (not shown in detail) is a usual part of such a standard winding machine, and moves bodily away from the yarn support as the yarn package grows in radius, all in the well-understood manner. The traversing guide 14 is provided with a latch or support 24, sliding transversely on the support 25 (Figures 4 and 5), and all mounted upon the carriage 26, all in the usual manner in such machines.

In initially installing the tail-end guide 15, its distance from the yarn cone support 10 may be correctly adjusted in the manner shown, to accomplish the result explained below. The bracket 17 may also be pivoted, as shown at 19, so that the position of the guide may be properly adjusted, thus giving, in effect, a universal mounting for initial adjustment of the tail-end guide. When once properly installed upon the winding machine, no further adjustment is, ordinarily, required.

At the outer end of the base portion 16 of the guide 15, it is bent to form the guide portion 20, which terminates in a hook 21, over which the yarn may be threaded or hooked when the winding operation is begun. The shape of the under surface of the hook-portion of the guide is, preferably, of about the form shown, with an underface 22 of such form that the yarn may readily slip out of the guide in the manner now to be described.

The principle and operation of the device illustrated in the drawings is as follows:

The end of the yarn 12, from the cake or other package which is to be rewound into a cone package on the cone support 10, is attached with a sticker to the inside of the cone support 10, and the support is placed on the usual mandrel 11, with its axis in a horizontal plane. The yarn is then threaded over the yarn ball 13, and through the traversing guide 14, also in the usual manner. The thread 12 is then hooked over the hook 21. All this is done, of course, while the machine is at rest, and the operator must be careful to see that this threading up of the machine is done at such a period of its cycle of operation that, when the machine is started, the traversing guide 14 will first move in a direction away from the base or larger end of the cone support; that is, away from the tail-end guide 15. The machine is so constructed, in ordinary practice, in the embodiment here selected for illustration, that the mandrel 11, with the cone support 10 carried thereby, makes approximately five revolutions (in the direction indicated by the arrows) for each movement of the traversing guide 14 from end to end of its stroke and return. Hence, the machine being threaded up when the traversing guide 14 will travel away from the tail-end guide 15, when the machine is put in motion, there will be wound around the base of the cone support a tail-end of yarn, 12c consisting of not less than about 2½ nor more than about 5 turns of yarn, before the traversing guide 14 reaches its innermost position,—that is, its position nearest the tail-end guide 15. Now, the relation and co-operation of the various parts of the apparatus is such, substantially as shown, that the first time the traversing guide 14 reaches the end of its stroke near the tail-end guide, it passes above and almost, but not quite, over (see Figures 1 and 4), the tail-end guide 15. This operation serves, automatically, to unhook the yarn 12 from the hook 21, the underface 22 of the hook having a configuration designed and intended to produce that

result, whereupon the yarn is thereafter traversed in the usual manner, by the guide 14, and is wound and built up into the usual yarn package or "cone", on the "cone support" 10.

5 In the preferred operation, the traversing guide 14 never reaches a position directly over the tail-end guide 15. If it did, the yarn package would cover up the tail-end 12c first wound on the support, an undesired result. Preferably, at  
10 the end of its stroke adjacent the tail-end guide 15, the traversing guide 14 reaches a position about an eighth or three-sixteenths of an inch away from the point at which the tail-end 12c is wound onto the yarn support. Hence the  
15 yarn package does not overlap the tail-end; see Figure 3. The release of the yarn from the tail-end guide is accomplished by reason of the fact that, in operation, the tail-end guide 15 is, in the preferred form of the apparatus, positioned  
20 lower than the traversing guide 14, and as low as, or preferably lower than, the yarn ball 13, see particularly Figures 1 and 5, and also Figure 4.

Accordingly, the desired "tail-end" 12c of yarn  
25 is automatically wound around the base of the yarn cone support, after which the yarn is automatically disengaged from the tail-end guide solely by the motion of the traversing guide, due to the position and arrangement of the parts  
30 as described, and the usual package is thereafter wound, without overlapping or covering up the tail-end previously wound on the base of the support. The winding of the tail-end is thus entirely automatic, yet no extra moving parts  
35 are required for its formation, the fixed tail-end guide 15 being merely applied to an existing winding machine of one of the well-known types. There is nothing to break or get out of order or adjustment, and the device is simple and inexpensive to make and install.

40 In Figure 1 the traversing guide 14, having been started to the left, or away from the base of the cone, when the winding of the tail-end began, is shown after it has travelled to the end of its stroke and is moving to the right, toward the  
45 base of the cone, as indicated by the arrow. When it reaches the right-hand end of its stroke, the yarn 12 will be unhooked from the guide 15. At this stage of the winding, the tail-end is still being wound, and the traverse winding of the  
50 yarn has not yet begun. Although the thread itself is being traversed by the guide 14, the

guide 15 prevents traverse winding of the yarn on the cone support.

In Figure 2, the traversing guide 14 has passed the right-hand end of its stroke and has again started to the left, away from the base of the cone, as indicated by the arrow. The yarn 12 has become unhooked from the tail-end guide 15, and is beginning its traverse winding on the cone support 10, in the normal manner. The yarn is shown by the solid line where it is visible, and is indicated by the dash line, at 12a, where it passes back of the cone support and cannot be seen. The dashed and dotted line 12b in Figure 2 indicates the former position of the yarn (as in Figure 1), before it became unhooked from the guide 15.

In Figure 3 the normal traverse winding of the yarn 12 has progressed to a considerable extent, and the cone package is nearly finished. The tail-end 12c is plainly shown at the right, wound around the base of the cone support, but not covered up by the wound package.

In Figure 4 the tail-end is still being wound, as in Figure 1, and the yarn has not yet been released from the tail-end guide.

In Figure 5 the tail-end is also being wound. The method and apparatus herein specifically illustrated and described are the best embodiments of my invention now known to me, but it is to be understood that the invention is not necessarily or specifically limited thereto, but may be carried out in other ways, without departure from its spirit, within the scope of the following claim.

#### I claim:

35 A tail-end guide adapted for attachment to a yarn cone winding machine of standard type, said guide comprising, in combination, a mounting bracket provided, adjacent one end, with adjustable means for attachment of the bracket to the winding machine, a yarn guiding member  
40 adjustably secured near the opposite end of said mounting bracket and including a portion adapted to extend toward the base of the yarn cone support, and a yarn guiding hook near the outer end of said guiding member and arranged at an angle adapted to engage and retain a yarn strand threaded over said hook, and thereafter to release the yarn strand by appropriate motion of the traversing guide of the winding machine.

JAMES WASHINGTON BRUCKER.