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# Traversing Mechanism without the Use of Cam

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## Abstract

**Filter winder winds yarns or rovings on cylindrical perforated packages. Commercial filter winders use grooved cam traverse. The author developed a prototype filter winder to wind 30 inches long packages with a traversing mechanism without the use of cam [1, 2] in which combined action of three yarn traversing guides mounted on an endless loop of chain traverse yarn. Continued efforts of the author has resulted into further improved version of yarn traversing guides which is described in this paper. During traversing, yarn remains in ceramic guide eye carried in each yarn traversing guide; which is distinguishing feature of this development over earlier ones.**

**Key words:** Filter winder, yarn traversing guides, release rod, yarn transfer

## I. Introduction

A filter winder winds textile material in forms like yarns or rovings; on perforated cylindrical packages. Textile material wound on these packages, serve as a filter media. These filter packages may be with exceptionally longer lengths such as 30 inches, 40 inches or even 72 inches. Commercial filter winders use grooved cam traverse for traversing yarn. Grooved cam traverse system has limitations with regard to achieving high traverse speeds. Traversing system with counter rotating blades, used on commercial winding systems, replaces the grooved cam traverse and allows winding of cylindrical packages at high speeds. However, this traverse system is applicable only up to limited traverse lengths. Patent literature describes several methods of yarn traversing without the use of grooved cam traverse, based on mechanical principles [3 - 10]. However, these systems also, are basically intended for shorter traverse lengths.

Filter winders have to cover a wide range of traverse lengths, as long as 72 inches. The author of this paper developed a prototype filter winder to wind 30 inches filter with a traversing mechanism without the use of grooved cam traverse in which three guides mounted on an endless chain traverse yarn to and fro would traverse yarn across the length of the package [1, 2]. Yarn traversing guides used in both these developments consists of two parallel arms in which yarn remains during traversing. A yarn guide cum release rod, extending across the package length, also plays an important role in yarn traversing. Subsequent continued efforts of the author on improving design of yarn traversing guides resulted in development of new yarn traversing guide design which is described in this paper. During traversing, yarn remains in a ceramic guide, a component of yarn traversing guide, which is the situation similar to what it prevails in grooved yarn traversing system. Filter packages were wound on this filter winder using polypropylene yarns.

## II. Chain loop with yarn traversing guides

Figure 1 shows chain loop with three yarn traversing guides located at equal interval of links. As shown in figure 1 (a), a loop of chain passing over five sprockets carries three yarn traversing guides. Two segments of this chain loop are horizontal, closely spaced and parallel to each other. These chain segments move in mutually opposite direction. A yarn traversing guide traverses yarn when it is over this chain segment. As shown in figure 1 (a), yarn traversing guide 1, lying in lower parallel segment of chain is traversing yarn from left to right. At right extreme of traverse yarn traversing guide 1 meets guide 2 moving from right to left on upper chain segment [figure 1 (b)]. Here, yarn is relieved from yarn traversing guide 1 and is picked up by guide 2. Now yarn is traversed from right to left by yarn traversing guide 2 as shown in figure 1(c). Referring to figure 1 (d), at left extreme of yarn traverse, yarn traversing guide meets yarn guide 3 moving from left to right on lower chain segment where yarn is transferred from guide 2 to 3 and its traverse direction is reversed. In this way yarn keeps on traversing by its transfer from on yarn traversing guide to the other at traverse extremes. Chain is stabilized in traversing zone by providing projections over it at back side at regular intervals that follows grooves of a stationary bracket. Length of chain is six times the length of traverse.

As shown in figure 2, 'c' and 'd' are yarn traversing guides on lower and upper chain segments respectively. Each yarn traversing guide carries a ceramic yarn guide ('g' in figure 2). One side of ceramic yarn guide of each yarn traversing guide has an arm projecting little beyond ceramic yarn guide and on the other side a slanting portion. '$c_1$' and '$d_1$' are arms of yarn traversing guides 'C' and 'D' respectively that project little beyond their respective ceramic guides. '$c_2$' and '$d_2$' are slanting portions of yarn traversing guides 'c' and 'd' respectively which project beyond their respective ceramic guides.

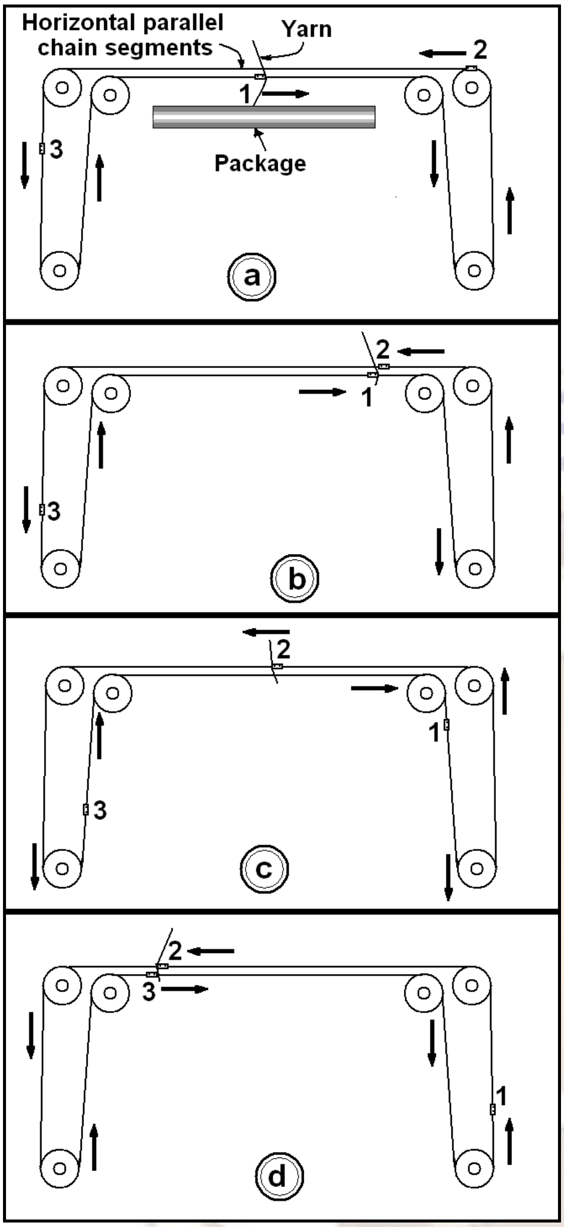


Figure 1
Traversing with yarn traversing guide

When a yarn traversing guide traverses yarn, slant portion lies ahead of yarn whereas arm projecting beyond yarn ceramic guide lies behind. It is seen in figure 2 that slanting portion ‘$c_2$’ of yarn traversing guide ‘c’ lies ahead of ceramic yarn guide whereas arm ‘$c_1$’ lies behind. Yarn ‘a’ coming from supply package passes around guide rod ‘b’, through ceramic yarn guide ‘g’ and is ultimately wound on package ‘f’. During traversing, yarn remains in ceramic yarn guide. Yarn traversing guide ‘c’ is moving towards right extreme where it would relieve the yarn which is to be received by yarn traversing guide ‘d’.

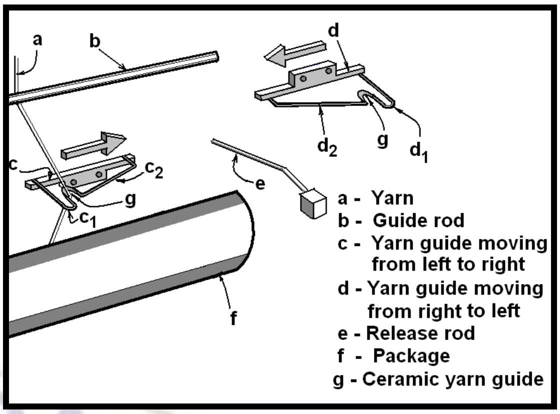


Figure 2
Yarn traversing guide

Figure 3 shows photograph of a yarn traversing guide traversing yarn. Projections at the back side of the chain passing through slot in a slotted bracket are also seen. Yarn guide is reaching towards traverse extreme.

## III. Yarn transfer from one yarn traversing guide to the other at traverse extreme

Figure 4 shows yarn transfer from one guide to the other at the traverse extreme. Yarn is to be relieved from yarn traversing guide ‘c’. Just before it is relieved from yarn traversing guide ‘c’, it should be received by yarn traversing guide ‘d’.

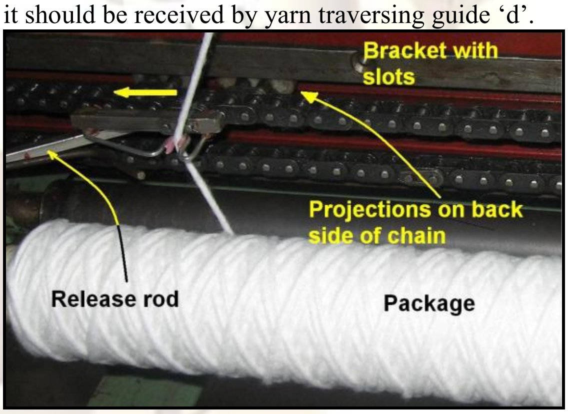


Figure 3
Yarn traversing guide reaching traverse extreme

At both traverse extremes, release rod is provided to relieve yarn from yarn traversing guide that is traversing yarn. Yarn traversing guide located on bottom chain segment passes beneath release rod whereas that on top chain segment passes above it. Yarn traversing guide ‘c’ is passing below release rod ‘e’. When yarn traversing guide ‘c’ reaches closer to traverse extreme, yarn comes first under influence of slanting portion ‘$d_2$’ of yarn traversing guide ‘d’ moving from right to left; which starts moving yarn out of yarn traversing guide ‘c’. Release rod ‘e’ is slanting at an angle to the direction of package axis. Therefore, release rod also tends to push the yarn being traversed by yarn traversing guide out of yarn comes in contact with release rod.

But just before yarn is relieved from yarn traversing guide 'c', slanting portion '$d_2$' of yarn traversing guide 'd' gets over and ceramic guide portion starts. Therefore, just before yarn is relieved from yarn traversing guide 'c', it comes under control of yarn traversing guide 'd'. In this way, yarn is transferred from one yarn traversing guide to the other at traverse extremes and yarn keeps on traversing.

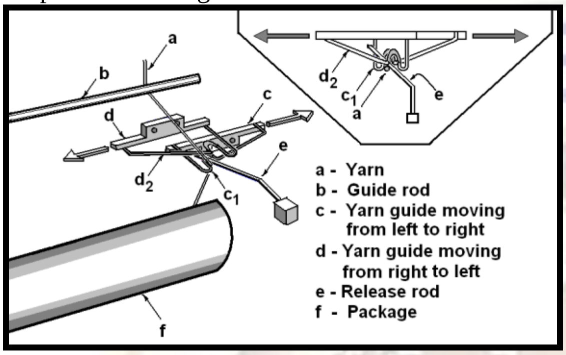


Figure 4
Yarn transfer

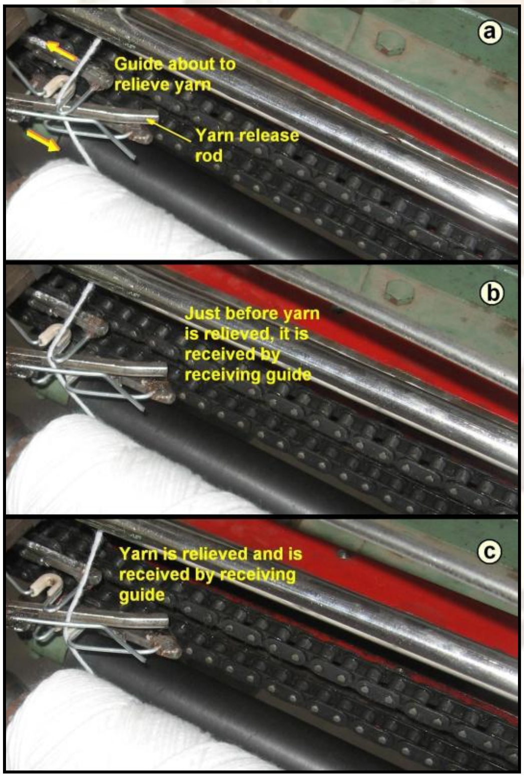


Figure 5
Photographic view of yarn transfer

Figure 5 shows sequence of yarn transfer from one traversing guide to the other through a series of three photographs.

## IV. Crossing ratio adjustment

Crossing ratio is an important parameter that determines performance of the filter. Four change gears are provided on the machine to adjust desired crossing ratio.

## V. Material wound

0.4 and 0.6 hank polypropylene yarns were wound with different crossing ratios. Yarn lay on the packages was satisfactory. Overall view of the filter winder is seen in photograph of figure 6.

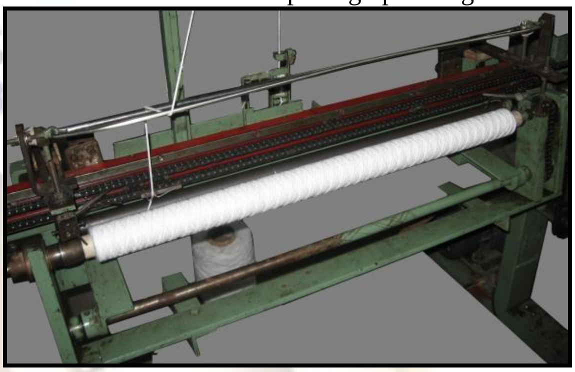

Figure 6
Machine view

## VI. Conclusion

The described traversing mechanism of filter winder is a significant improvement over earlier developments [1, 2]. Earlier traversing mechanism [1] require mechanical movement of a small arm at each yarn transfer which increases mechanical wear and tear of yarn traversing guide. Other yarn traversing mechanism [2] also necessitates little movement of an arm. In both these earlier developments [1, 2], during traversing; yarn remains in two arms of yarn traversing guide and is also guided by a yarn guide cum release rod.

In the present development, yarn guide cum release rod extending across the length of the machine; is eliminated. It requires only release rod on either sides. During yarn traversing, yarn remains in the ceramic guide eye of the yarn traversing guide, which is a situation closer to grooved cam traversing that offers better control in yarn laying. As yarn remains in ceramic guide eye during yarn traversing, it is also advantageous in winding highly abrasive material like glass which is also used in such filter packages. Yarn transfer from one traversing to the other at traverse extremes takes place without need of mechanical movement/ deflection of any element of yarn traversing guide. Yarn transfer takes place by virtue of suitable geometry of yarn traversing guides in combination with release rod. This traversing mechanism can be adopted for any length of the package.

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