MEANS FOR MECHANICALLY TYING KNOTS

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FIG. 1

FIG. 2

INVENTOR.
ALBERT DIELS

BY

AGENT
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Albert Diels, Brussels-Uccle, Belgium

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The present invention relates to a method of and means for mechanically forming and tying knots and loops.

It is known to loop and tie cords and like elongated flexible elements with the aid of mechanical parts actuated by complicated lever transmission systems.

It is the principal object of this invention to provide a simple method and means for mechanically forming and tying knots.

According to the invention, the cord to be tied into a knot is attached to a flexible hollow guide element, which may be a piece of flexible helically wound spring. The flexible guide element with the attached cord is guidedly moved through a conduit which has the shape of the loop or knot to be formed, including the intersecting portions where one portion of the cord passes over or under another portion of the cord.

The cord is pushed through the conduit by means of the guide element and is held in position at the outer end of the guide element while the guide element is retracted. The conduit has slots means facing centrally or toward the location of the knot to be formed.

Once the hollow guide element is removed from the conduit, the cord is pulled out of the conduit through its lateral open or slot means by pulling on its two ends, the knot being formed centrally of the conduit around an article to be tied.

The conduit may be suitably formed for all types of simple, double and multiple knots to make any desired knot.

Throughout the specification and claims, the term "cord" is applied to any flexible filament, thread, strand, string, band, bow and the like which may be looped and tied into knots.

The invention will be more fully set forth in the following detailed description of a now preferred mechanical knotting means illustrated in the accompanying drawing, wherein:

Fig. 1 is a plan view of one embodiment of the invention, comprising a tubular conduit; and

Fig. 2 is a perspective view of certain conduit portions, showing one detail.

The conduit for hollow, flexible cord guide element is designated by reference numeral 1. Conduit is provided with longitudinal slots 4 through which the cord is adapted to slide to form knot 7 around object 6, a double knot being shown in Fig. 1. The interior windings of the conduit are provided with transverse notches 5 to permit the cord from the corresponding outer windings to pass therethrough toward the center when the knot is formed. As shown in Fig. 1, three such notches are necessary in case of a double knot. The exact location of these notches is completely optional as long as they are provided on any interior winding surrounded by an exterior winding.

The principle of forming knots according to the present invention is applicable to all cases where continuous cords are to be formed into knots to be tied around an object. The method and means of the invention have been found particularly useful in the food industry for tying the ends of sausages, for instance. It has also found application in the textile and other industries.

From a practical point of view, it will be preferred to pre-tension the cord on cones which are arranged centrally of the guide conduit. Furthermore, the knot will preferably be tied with the retraction of the hollow guide element so that the hollow guide element with the cord is always in the end position at the beginning of the tying step whereby an idle stroke for insertion of the guide element is saved and the efficiency of the operation is correspondingly increased.

While the invention has been specifically described and illustrated in connection with certain preferred embodiments thereof, it will be obvious to those skilled in the art that modifications may occur to the skilled in the art after they have benefited from the present teaching without departing from the spirit and scope of the invention as defined in the appended claims.

1. A device for forming and tying a knot around an object with one continuous length of cord, comprising a tortuous and convolute tube for receiving the cord and having the configuration of the desired knot, the tube being longitudinally slotted to permit the cord to be laterally pulled inwardly from the tube around the object placed centrally in respect of the tube convolutions, the tube comprising a first interior convolution, an outer convolution and a second interior convolution, the interior convolutions crossing alternately over and under each other at three points whereby the first interior convolution forms a portion surrounding a portion of the second interior convolution between two crossing points and the second interior convolution forms a portion surrounding a portion of the first interior convolution between two crossing points, the interior convolutions having cord inlet and cord outlet end portions respectively, the outer convolution surrounding said inner convolutions, and one of said end portions surrounded by the outer convolution as well as the two portions of the first and second interior convolutions respectively surrounded by the respective second and first convolution portions being transversely notched to permit the cord to be laterally pulled inwardly from the surrounding convolutions through the surrounded convolutions.

2. A device for forming and tying a knot around an object with one continuous length of cord, comprising a tortuous and convolute tube for receiving the cord and having the configuration of the desired knot, the tube being longitudinally slotted to permit the cord to be laterally pulled inwardly from the tube around the object placed centrally in respect of the tube convolutions, the tube comprising two convolutions crossing alternately over and under each other at five points whereby there are formed between two each adjacent crossing points four interior convolution portions surrounded by four exterior convolution portions, each interior convolution portion being transversely notched to permit the cord to be laterally pulled inwardly from the surrounding exterior portion through the surrounded interior portion.

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