Dec. 2, 1941. E. J. ABBOTT 2,264,784

KNOT TIER

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Fig. 1

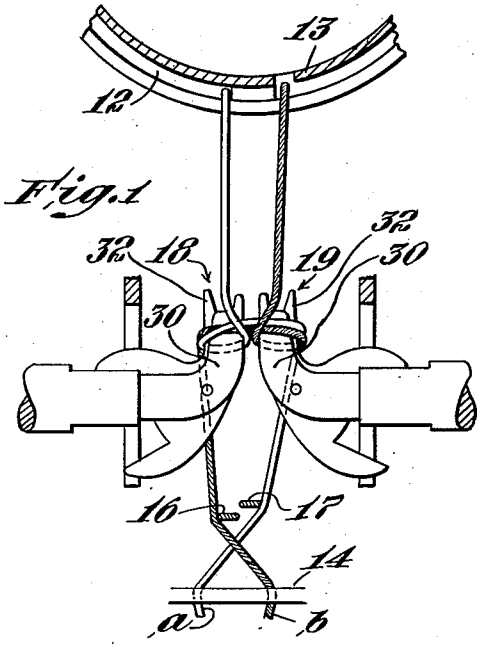


Fig. 2

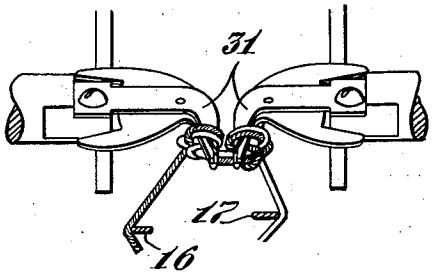


Fig. 4

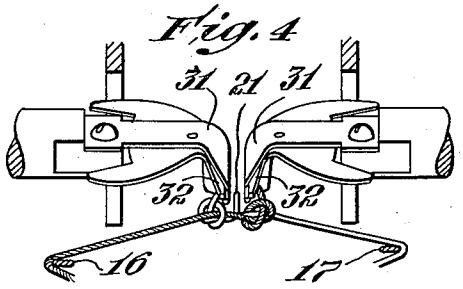




Fig. 5



Fig. 3

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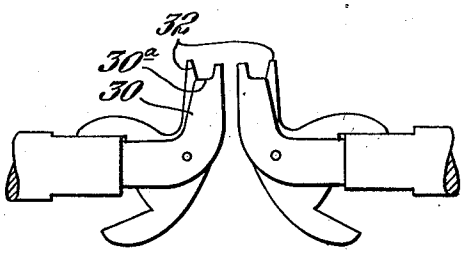


Fig. 6

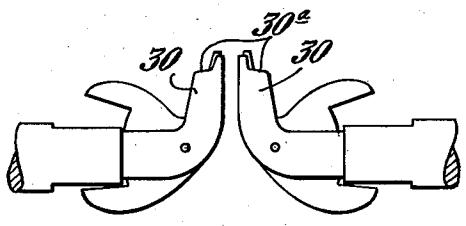


Fig. 7

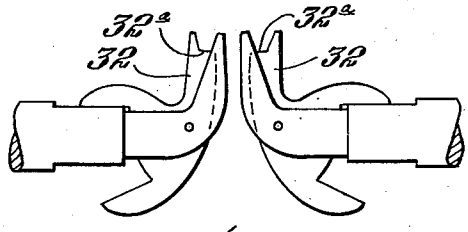


Fig. 8

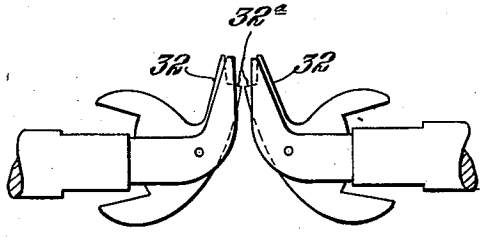


Fig. 9

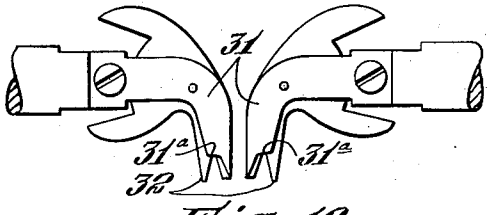


Fig. 10

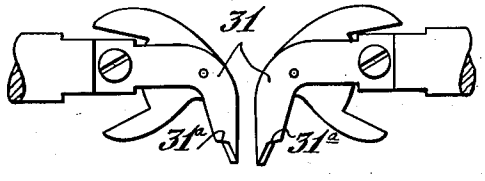


Fig. 11

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Patented Dec. 2, 1941

2,264,784

UNITED STATES PATENT OFFICE

2,264,784

KNOT TIER

Edward J. Abbott, Wilton, N. H., assignor to Abbott Machine Company, Wilton, N. H., a corporation of New Hampshire

Application August 2, 1940, Serial No. 350,022

6 Claims. (Cl. 289—2)

This invention relates to knot tiers, particularly knot tiers for automatic textile machines such as winders, as for example the knot tier disclosed in the United States Letters Patent to Edward J. Abbott, No. 2,146,713 dated February 14, 1939. In the mechanism of that patent the two threads, one from the winding package and one from a supply bobbin, are automatically positioned and held under tension for knotting by two rotary bills, each of which in its rotation picks up one of the threads between its fixed and movable blades, cuts the thread and holds the cut end while the formed knot is pulled off over the two ends held by the bills. The present invention aims to provide an automatic knot tier having two rotary bills and in which the length of each tail of the knot can be accurately predetermined. By means of the invention it can be assured that both tails of the knot will have the same length if desired, and also that each tail can have any particular length desired.

Although not limited to such use, the invention is shown as applied to a knotter of the type described in said Letters Patent No. 2,146,713 and in Letters Patent No. 1,965,023 to Edward J. Abbott and Joseph E. Ring dated July 3, 1934, in which the rotation of the bills forms a knot in the first thread about a single thickness of the second thread and forms a knot in the second thread about a single thickness of the first thread.

Other objects of invention and features of advantage and utility will be apparent from this specification and its drawings in which the invention is explained by way of example.

In the drawings:

Fig. 1 is a diagrammatic plan view of the two rotary bills and portions of the thread-positioning and tensioning mechanism of a knotter constructed generally according to United States Letters Patent No. 2,146,713, and showing the threads crossed, looped by the bills and the tail-forming portions of the threads about to be caught by the bills;

Fig. 2 is a similar view showing the bills after they have turned 135° from the position of Fig. 1 and cut the tails;

Fig. 3 is a diagram corresponding to Fig. 2 showing on a larger scale the loop formations around the bills in the position of Fig. 2;

Fig. 4 is a view similar to Fig. 2 showing the bills after they have turned 45° from Fig. 2 and showing the stripper and the yarn-positioning fingers acting to tighten and remove the knot from the bills;

Fig. 5 shows a finished knot;

Figs. 6 and 7 are side elevations of pairs of bills of the knotter of the preceding figures, showing the blades as open and closed, respectively;

Figs. 8 and 9 are similar views of another form of bill; and

Figs. 10 and 11 are similar views of a third form of bill.

Referring to Fig. 1 the yarn *a* is the yarn of a new supply bobbin carried in a rotary magazine which surrounds the knotted and the tail portion of this yarn *a* is held by suction in a slot 12 of a suction conduit in the center of the magazine. The yarn *b* is the yarn of the winding package, of which the end has been found by an end-finding mechanism and conveyed to the knotter by a slotted suction tube 13 of which the slot terminates in the slot 12. Suitable guiding means (not shown) direct the yarns *a* and *b* into a yarn clamp diagrammatically shown at 14 in which the two yarns are securely clamped before the knotter bills begin to operate. The suction on the two ends of yarn in the suction slots initially tensions the yarns while they are being acted upon by yarn crossing and tensioning fingers 16, 17 to position them in a crossed relation in the path of rotation of the two bills indicated generally at 18 and 19. Rotation of the bills through about 315° has the effect of looping the crossed yarns around the two bills in the configuration shown in Fig. 1. During this looping, the yarn crossing and tensioning fingers 16, 17 are appropriately moved to keep the yarn in tension between the bills and the clamp 14, and the suction means keeps the yarns in tension between slot 12 and the bills.

Fig. 2 shows how approximately 135° further rotation of the bills results in each bill picking up and cutting an end of yarn that extends between the bills and the suction slot 12, and the diagram of Fig. 3 shows the two loop formations on the bills at this stage on a larger scale. A further rotation of about 45° to the position of Fig. 4 results in the fingers 16 and 17 and a stripper 21 cooperating to tighten the formed knot and pull it off the bills, whereupon the finished knot of Fig. 5 is produced. As explained in Letters Patent No. 1,965,023 the joint between the two threads *a* and *b* is composed of a knot of the first thread *a* about a single thickness of the second thread *b* and a knot of the second thread *b* about a single thickness of the first thread *a*.

The individual bills like those shown in United States Letters Patent No. 2,146,713 each include a fixed blade 30 (Fig. 1) and a spring 31 (Figs. 3

and 4) between which there is pivotally mounted a movable blade **32**. In the rotation of the bills their movable blades **32** are controlled by suitable cam mechanism so that as the bills rise under the thread ends in Fig. 1, the movable blades are open in position for the threads to be received between the movable blade on the one hand and the fixed blade and spring on the other hand in each bill. The movable blades thereupon close and cut off and hold the tail-forming portions of the threads.

According to the present invention a jaw element of each bill, that is, the fixed blade, the movable blade or the spring, is provided with a shoulder against which the tensioned thread is held (for example by the suction slot **12**) as the open bills receive their respective tail-forming portions of thread. Thus, in each open bill the thread is held at the predetermined and desired distance from the tip of the bill. When the jaws of the bills close each thread is then cut at the predetermined and desired distance from the tip of its bill. Then when the loop formation on the two bills are pulled off over the cut and held ends of thread, the resulting tail portions *a'*, *b'* (Fig. 5) will each have the desired length, this length being determined by the distance of the above-mentioned shoulder from the tip of the bill.

In the bills shown in Figs. 1, 2 and 4 and separately and in greater detail in Figs. 6 and 7 the aforesaid shoulder is formed at **30a** on the fixed blade **30** of each bill. In the alternate form of bills of Figs. 8 and 9, in which the jaw elements are otherwise similar to those of Figs. 1, 2, 4, 6 and 7, the shoulder is formed at **32a** on the movable blade **32**. In the further alternate form of bills shown in Figs. 10 and 11, the shoulder is formed at **31a** on the spring **31**.

I claim:

1. A knot tier having rotary bills adapted to knot the threads and cut the tails of the knot, and means for positioning the threads for knotting and cutting by the bills, said means acting to tension the threads, a jaw element of each bill having a shoulder which defines the bottom of the opening between the jaws of the bill, and against which the tensioned thread is held in the bill at a predetermined distance from the tip of the bill for cutting.

2. A knot tier having rotary bills each including cooperating fixed and movable blades, said bills being adapted to knot the threads and cut the tails of the knot, and means for positioning the threads for knotting and cutting by the bills, said means acting to tension the threads, each of said fixed blades having a shoulder which defines the bottom of the opening between the blades, and against which the tensioned thread is held in the bill at a predetermined distance from the tip of the bill for cutting.

3. A knot tier having rotary bills each including cooperating fixed and movable blades, said bills being adapted to knot the threads and cut the tails of the knot, and means for positioning the threads for knotting and cutting by the bills, said means acting to tension the threads, each of said movable blades having a shoulder which defines the bottom of the opening between the blades, and against which the tensioned thread is held in the bill at a predetermined distance from the tip of the bill for cutting.

4. A knot tier having rotary bills each including cooperating fixed and movable blades and a spring adjacent to said movable blade, said bills being adapted to knot the threads and cut the tails of the knot, means for positioning the threads for knotting and cutting by the bills, said means acting to tension the threads, said spring having a shoulder which defines the bottom of the opening between the blades, and against which the tensioned thread is held in the bill at a predetermined distance from the tip of the bill for cutting.

5. A knot tier having rotary bills adapted to knot the threads and cut the tails of the knot, means for positioning the threads for knotting and cutting by the bills, clamping means acting on the main portions and suction means acting on the tail-forming portions of the threads to tension the threads while the knot is being tied, a jaw element of each bill having a shoulder which defines the bottom of the opening between the jaws of the bill, and against which the tensioned thread is held in the bill at predetermined distance from the tip of the bill for cutting.

6. A knot tier having rotary bills adapted to knot the threads and cut the tails of the knot, means for positioning the threads in the knot tier so that rotation of the bills forms a knot in the first thread about a single thickness of the second thread and forms a knot in the second thread about a single thickness of the first thread, said positioning means acting to tension the threads, and a jaw element of each bill having a shoulder which defines the bottom of the opening between the jaws of the bill, and against which the tensioned thread is held in the bill at a predetermined distance from the tip of the bill for cutting.

EDWARD J. ABBOTT.