

No. 870,527.

PATENTED NOV. 5, 1907.

B. E. BYRD.

KNOTTER.

APPLICATION FILED OCT. 31, 1906.

Fig. 1.

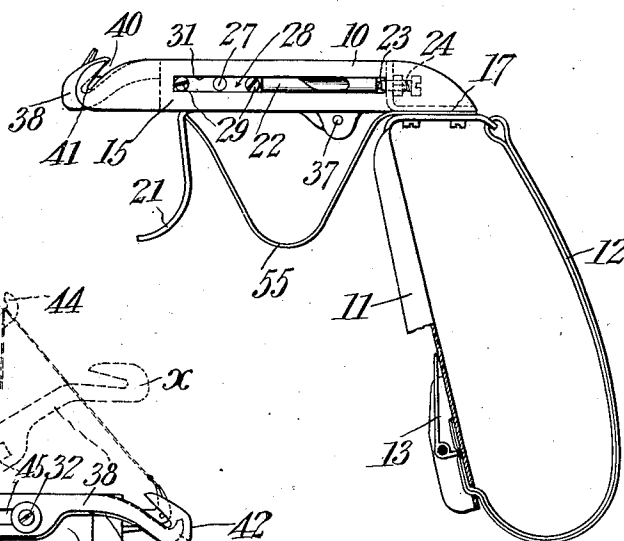


Fig. 2.

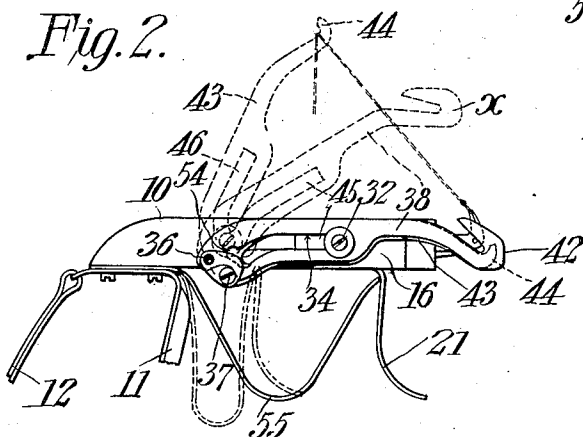


Fig. 3.

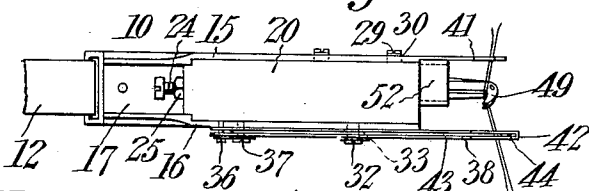


Fig. 4.

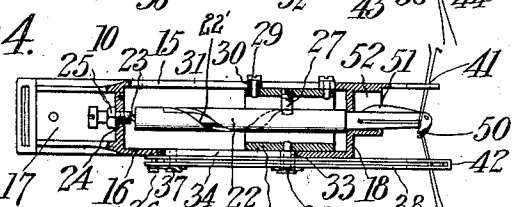
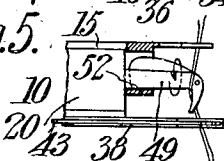


Fig. 5.



WITNESSES:

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Fig. 6.

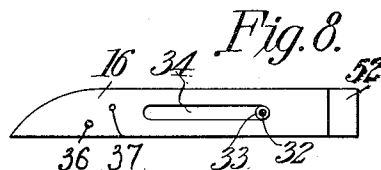
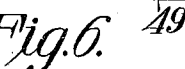


Fig. 9.

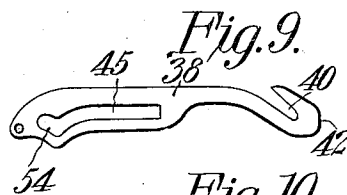


Fig. 10.



Fig. 7.

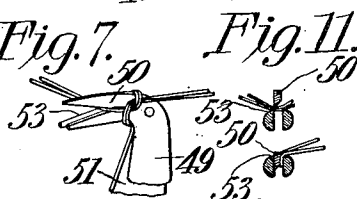


Fig. 11.

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# UNITED STATES PATENT OFFICE.

BRITTON E. BYRD, OF DURHAM, NORTH CAROLINA, ASSIGNOR TO BYRD MANUFACTURING COMPANY, OF DURHAM, NORTH CAROLINA.

## KNOTTER.

No. 870,527.

Specification of Letters Patent.

Patented Nov. 5, 1907.

Application filed October 31, 1906. Serial No. 341,455.

*To all whom it may concern:*

Be it known that I, BRITTON E. BYRD, a citizen of the United States, residing at Durham, in the county of Durham and State of North Carolina, have invented a new and useful Knotter, of which the following is a specification.

This invention relates to knot tying devices, and has for its principal object to provide a hand tool of very simple construction by which knots may be rapidly and effectively tied, and the thread or cord automatically severed by a single movement of the operating device.

A further object of the invention is to provide a novel form of knot tying bill, and means for actuating the same, the bill being so arranged as to sever the thread or cord close to the knot and before the bight or loop is drawn from the bill.

A still further object of the invention is to provide a simple form of bill actuating mechanism, and to provide for the automatic return of the bill to its initial position after each operation.

A still further object of the invention is to provide a novel form of loop tightener and knock off finger which will operate to grip the thread or cord and exert a positive pull on the same for the purpose of drawing the loop or bight tight in the knot forming operation.

With these and other objects in view, as will more fully hereinafter appear, the invention consists in certain novel features of construction and arrangement of parts, hereinafter fully described, illustrated in the accompanying drawings, and particularly pointed out in the appended claims, it being understood that various changes in the form, proportions, size and minor details of the structure may be made without departing from the spirit or sacrificing any of the advantages of the invention.

In the accompanying drawings:—Figure 1 is a side elevation of a knotter constructed in accordance with the invention. Fig. 2 is a similar view looking from the opposite side, a portion of the handle being omitted. Fig. 3 is a plan view of the knotter. Fig. 4 is a sectional plan view of the same. Figs. 5 and 6 are plan views, partly in section, of the head portion of the latter, showing the different positions of the bill during the knot forming operation. Fig. 7 is a detail perspective view of the bill detached. Fig. 8 is a side elevation of one of the frame members, showing the actuating pin for the loop tightener and knock off finger. Fig. 9 is a detail view of the loop tightener and thread guide. Fig. 10 is a similar view of the knock off finger which, also, forms a part of the loop tightener. Fig. 11 illustrates in cross section two positions of the members of the tying bill showing the position of the combined severing and clamping member before the thread cutting operation and after the thread cutting operation.

Similar numerals of reference are employed to indicate corresponding parts throughout the several figures of the drawings.

The principal working parts of the knotter are inclosed within a suitable casing 10 to which is secured a handle member 11 that is designed to rest against the palm or across the inner side of the hand, and from the frame extends a hand encircling strap 12, the lower end of which passes through an opening in the bottom of the handle, and is engaged by a clamp 13, the clamp permitting adjustment of the strap in accordance with the size of the hand.

The frame includes a pair of side webs 15 and 16 which are connected at the rear to an angular base 17, and at the front the side plates are connected by a cross bar 18 which has a bearing opening for the bill carrying shaft. The top of the casing is closed by a plate 20, while the whole of the bottom is preferably left open to permit convenient manipulation of the thumb piece 21 which is engaged by the thumb of the operator when in use.

Within the casing is a shaft 22, one end of which is reduced where it passes through a bearing opening at the front of the casing in order to form a shoulder that abuts against the front wall 18. The opposite end of the shaft has a reduced cone 23 which is mounted in a bearing screw 24 carried by the angular plate 17, the screw being adjusted to proper position and locked by a nut 25. The shaft 22 is provided with a helical groove 22' for the reception of a pin 27 that is carried by a slide 28 from which the thumb piece 21 depends. Projecting from one of the vertical walls of the slide is a pair of screws 29 carrying small anti-friction rollers 30 that ride in a slot 31 formed in the plate 15 and form suitable guides for the block. Projecting from the opposite side of the block is a screw 32 carrying an anti-friction roller or sleeve 33 which rides in a slot 34 formed in the plate 16.

The side plate 16 carries two pivot pins or screws 36 and 37 to one of which is pivoted a combined thread guide and loop tightener 38 of the construction best shown in Fig. 9, the free end of the guide having an obliquely disposed recess 40 into which the threads are introduced before the tying operation, the plate 15 at the opposite side of the knotter being extended forward and provided with a small recess 41 so that the thread or yarn may be properly held with relation to the knotter. The guide and tightener 38 is formed with two plates and maintained in spaced relation throughout their entire length and connected together at their free ends, as shown at 42, and between these two plates is arranged a knock off finger 43, the latter being pivoted on the stud or screw 37, and the free end being inclined to correspond to the lower wall of the recess 40 and terminating in a slight bill or hook 44 in or-

der to positively throw off the thread or yarn after the completion of the knotting and severing operations.

The roller 33 carried by the screw 32 extends through slots 45 and 46 formed in the members 38 and 43, respectively, and during the movement of the thumb piece toward the handle member 11 the roller riding in the slots will cause the members 43 and 38 to first grip the thread or yarn and exert a tensional strain thereon in order to tighten the knot and afterwards will advance the member 44 beyond the member 38 for the purpose of throwing off the knotted thread or yarn.

The bill comprises a main jaw 49 that is slotted for its entire length, a portion of the shank of the bill being also slotted, and in this slot is arranged the movable jaw member 50, the latter having a cam shaped shank 51 which during the rotation of the bill is engaged by a circular stationary flange or collar 52 carried by the front plate of the frame, said flange or collar being eccentrically disposed with relation to the axis of the shaft 22. One side of the main bill is sharpened to form a shearing edge 53 which co-acts with the secondary or movable bill to sever the thread immediately after the formation of the loop, and before the loop is drawn from the bill.

In operation the threads or yarns to be knotted are placed across the bill, being guided in the recesses 40 and 41 in the manner shown in Fig. 3. The thumb piece 21 is then drawn back, and the bill is revolved by the engagement of the pin 27 in the helical groove of shaft 22. During the first portion of the movement, that is to say, while traveling in the manner indicated in Fig. 5, the bill will remain closed, and will cross the thread or yarn, and during further rotation to the position shown in Fig. 6, a loop will be formed around the bill, and the bill will be opened, so that on slight further rotation it will grasp the thread or yarn at a point between the bill and the side plate 15. As the movement continues, the thread or yarn will be severed by the closing movement of the auxiliary bill or jaw, and just at this time the roller 33 will have arrived at the bend of the cam slot 46, and will force the member 43 upward in order to clamp the thread between the finger and the upper wall of the recess 40. Slight further movement will cause both the members 38 and 43 to move upward, and as they do so, tensional strain will be exerted on the thread or yarn, and the loop carried by the bill will be drawn over that portion of the thread or yarn which is still retained by the closed bill and the loop will be tightened to form a secure knot. The bill will then open to permit the release of the knotted thread and the roller will then enter the portion 54 of the slot 45, so that the member 38 will remain in the dotted line position *x* of Fig. 2, while the throw off finger continues forward and draws the knotted thread or yarn out from the recess 40 leaving the knotted thread or yarn perfectly free. On release of pressure of the thumb piece, the parts are restored to initial position by the spring 55 or a similar member.

With a device constructed in accordance with this invention, it is possible to tie knots both expeditiously and so tightly as to prevent accidental loosening after removal from the bill.

I claim:—

1. A hand carried and manipulated tier, including a frame, a helically grooved shaft mounted therein, an operating slide having a projection entering the grooves, a tying bill arranged at one end of the shaft, a combined thread guide, clamp and throw off device arranged at one side of the frame, and means operatively connecting said device to said slide.

2. In a device of the class described, a frame having a bearing opening at one end, a shaft having a reduced portion forming a shoulder, the reduced portion of the shaft extending through said opening, an adjustable screw forming a bearing for the opposite end of the shaft, a tying bill carried by the reduced end of the shaft, said shaft being provided with a helical groove, and a manually operable slide mounted within the frame and having a projection entering said groove.

3. The combination with a revoluble tying bill, of a pair of pivotally mounted members having cam slots, one of said members forming a thread guide, and the other a knock off finger, and a slidable member entering said cam slots and serving to effect movement of the members to first grip the thread and exert tensional strain thereon, and afterwards complete the movement of the knock off finger to release the thread.

4. The combination with a frame, of a revoluble tying bill, a manually operable slide for operating the same, a pair of pivotally mounted members having cam slots, one of said members having an inclined slot for the reception of the threads during the tying operation, and the other member forming a knock off finger, and a projection extending from the slide and entering the cam slots.

5. In a device of the class specified, the combination with a frame, of a tying bill, a pair of pivotally mounted arms each provided with cam slots and having different pivotal points respectively, one of said members being open for the reception of the other, and being recessed to form a thread guide, and means for operating said members to grip the thread, exert tensional strain thereon, and finally to release the thread.

6. The combination in a frame, of a revoluble tying bill, a pair of pivotally mounted arms, one forming a thread guide, and the other a knock off finger, and both coacting to grip the thread, and means for moving said members through different arcuate distances and at different speeds, respectively.

7. In a device of the class specified, the combination with a frame including side plates having longitudinal slots, a slide mounted within the frame and having anti-friction rollers projecting through said slots, a helically grooved shaft mounted within the frame, the slide having a projection entering said groove, a revoluble tying bill carried by the shaft at a point outside the frame, a pair of pivotally mounted arms arranged at one side of the frame, one of said arms being recessed to form a thread guide, and being open for the reception of the other arm, there being cam slots in said arms, said slots being arranged to receive one of the anti-friction rollers projecting from the slide, and a thumb or finger piece extending from said slide.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

BRITTON E. BYRD.

Witnesses:

W. J. CORBETT,  
J. B. MASON.