No. 755,110. PATENTED MAR. 22, 1904.

H. D. COLMAN.

KNOT TYING IMPLEMENT.

APPLICATION FILED FEB. 28, 1902.

NO MODEL. 4 SHEETS—SHEET 1.

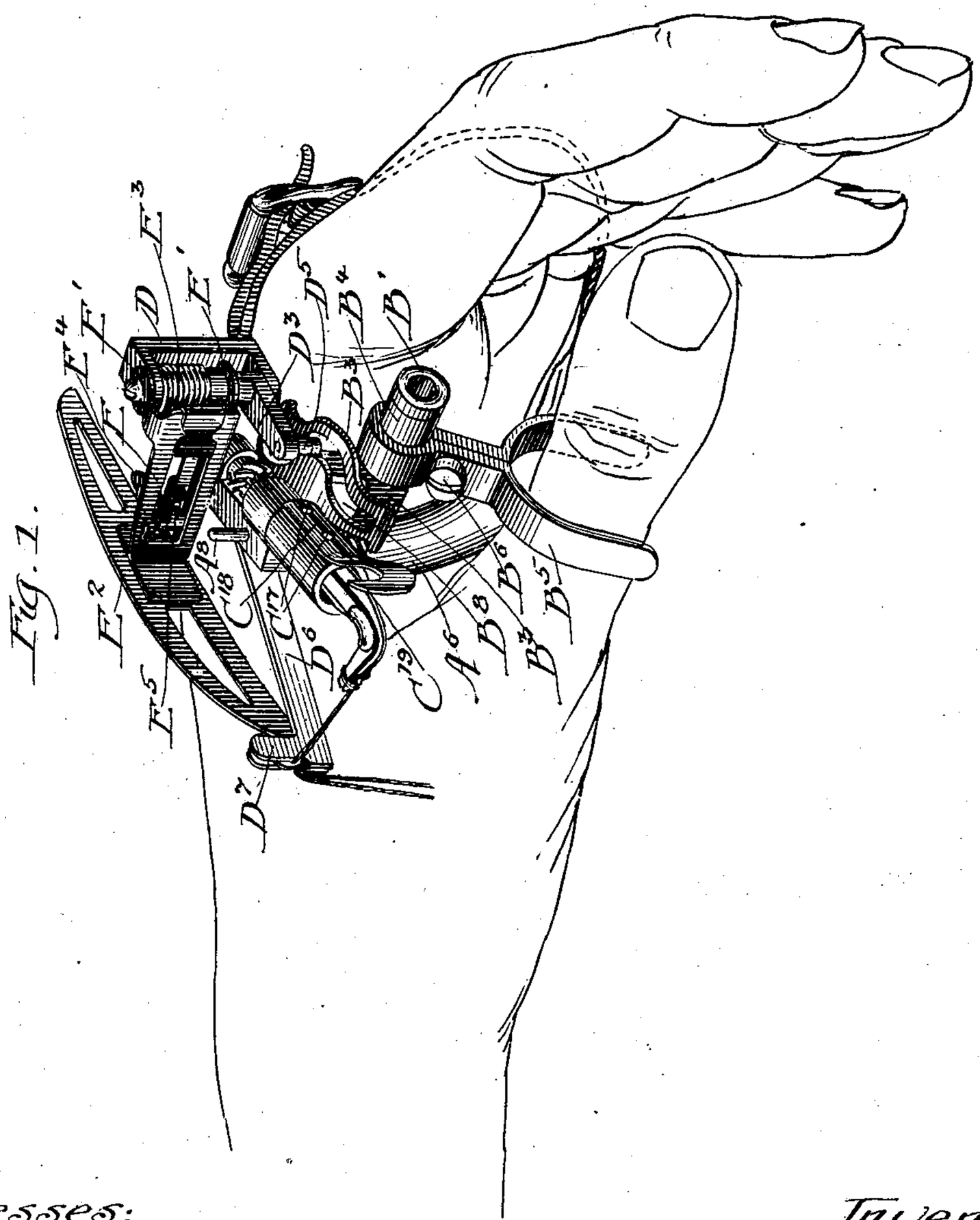


Fig. 1.

Witnesses:
Frank E. Blanchard
Geo. L. Chindahl

Inventor:
Howard D. Colman
By Luther L. Miller
Attorney.

No. 755,110. PATENTED MAR. 22, 1904.

H. D. COLMAN.

KNOT TYING IMPLEMENT.

APPLICATION FILED FEB. 28, 1902.

NO MODEL. 4 SHEETS—SHEET 2.

Fig. 2

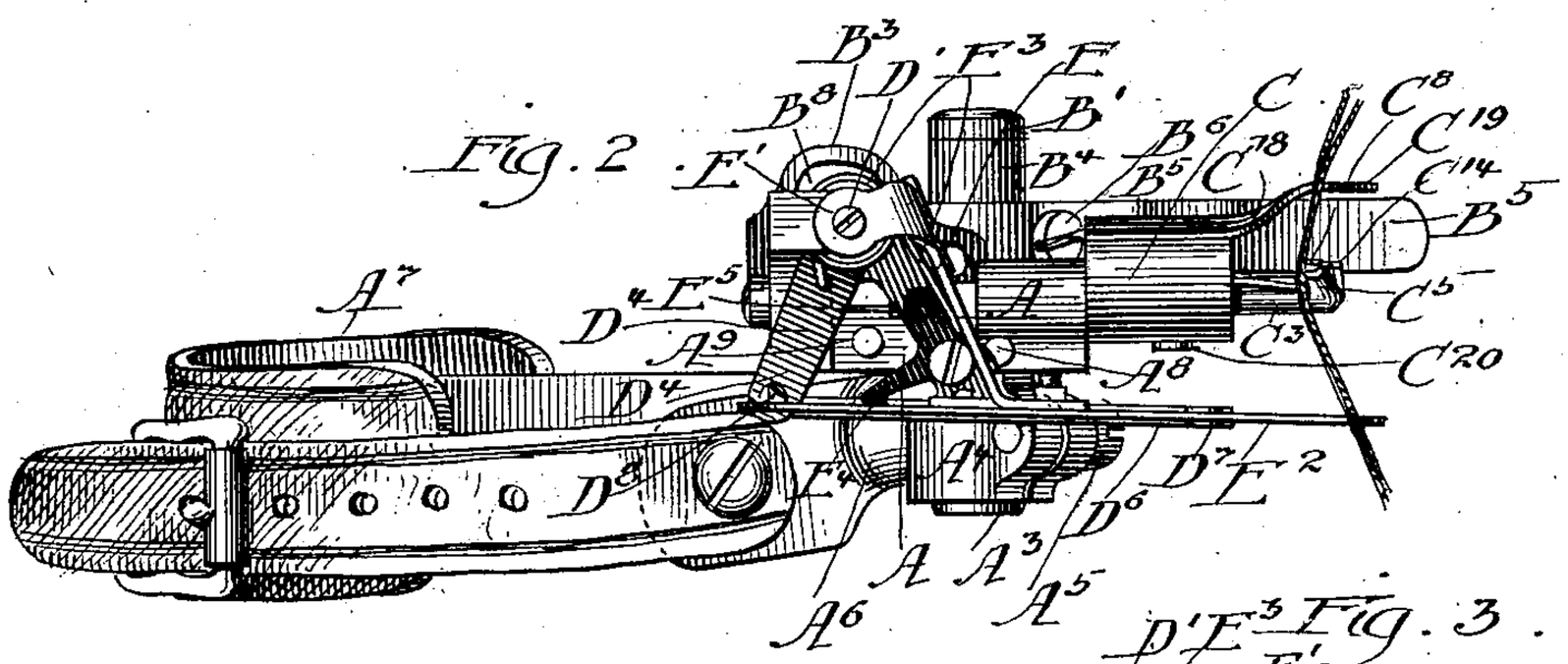


Fig. 3.

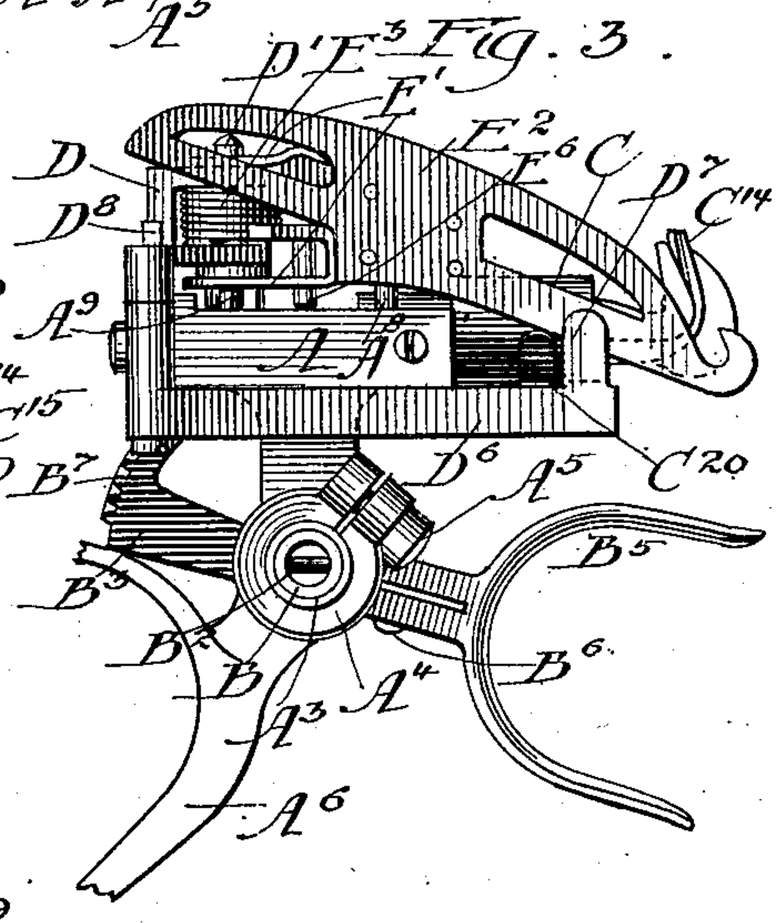


Fig. 4.

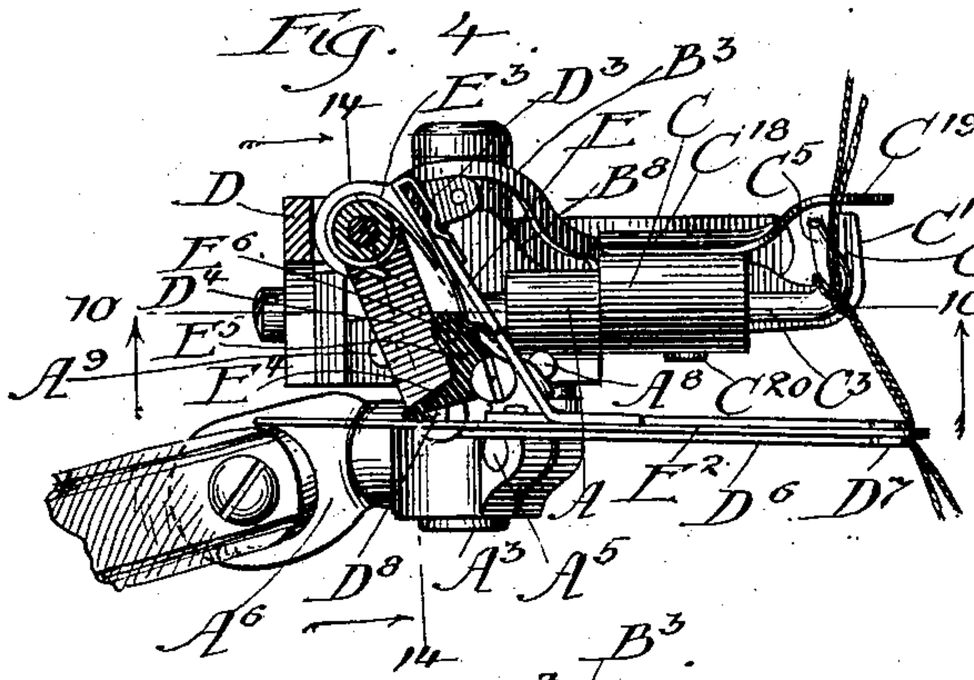


Fig. 5.

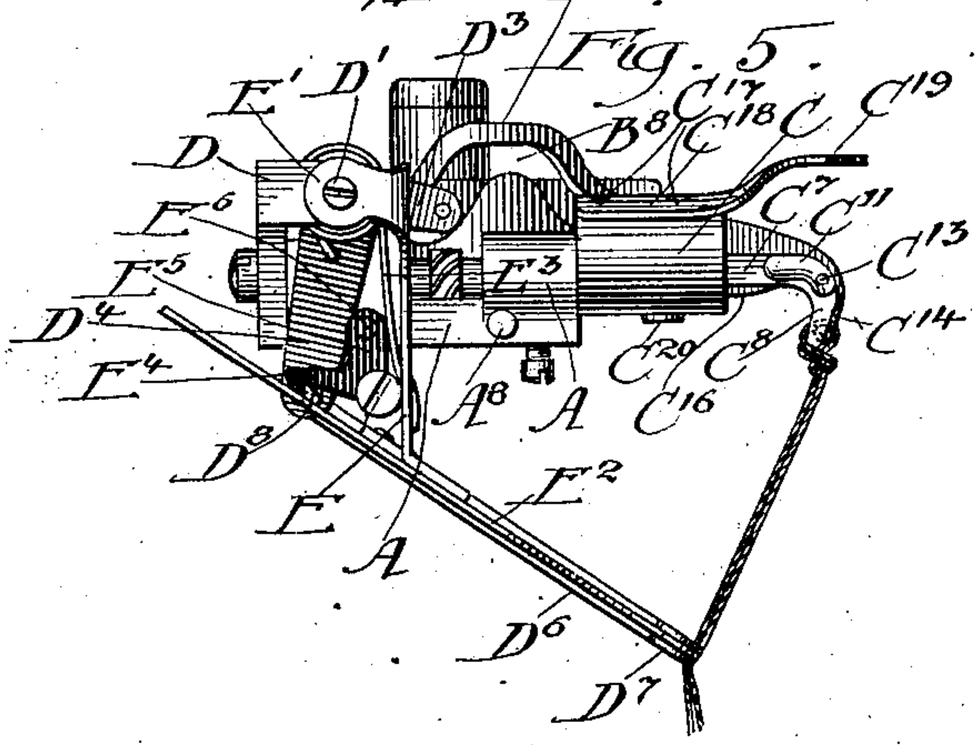
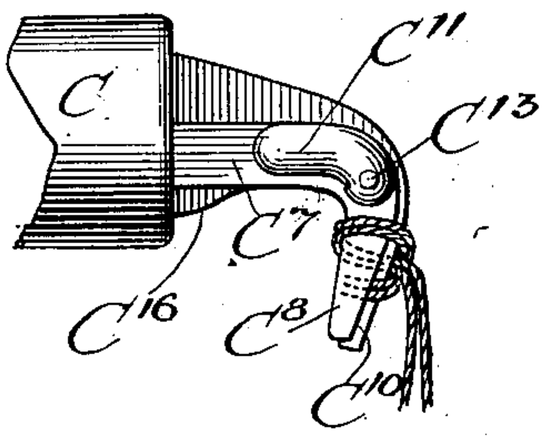


Fig. 6.



Witnesses:

Frank L. Blanchard

Geo. L. Chindahl

Inventor:

Howard D. Colman

By Luther L. Miller

Attorney

No. 755,110. PATENTED MAR. 22, 1904.

H. D. COLMAN.

KNOT TYING IMPLEMENT.

APPLICATION FILED FEB. 28, 1902.

NO MODEL. 4 SHEETS—SHEET 3.

Fig. 7.

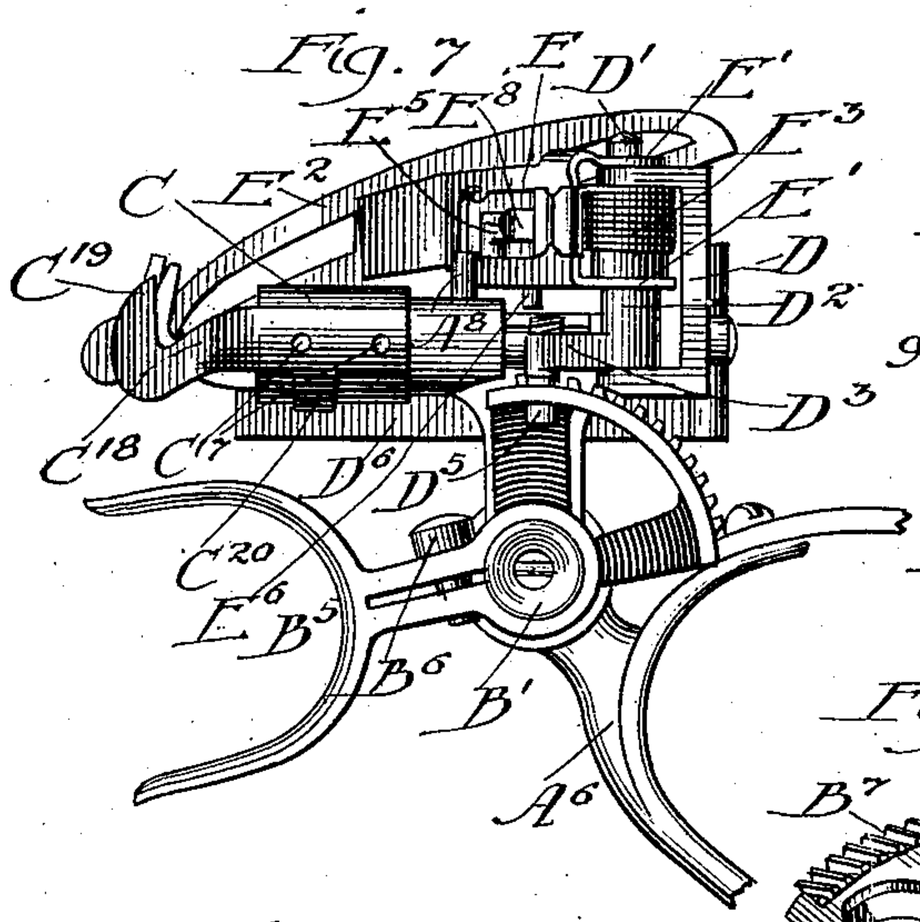


Fig. 8.

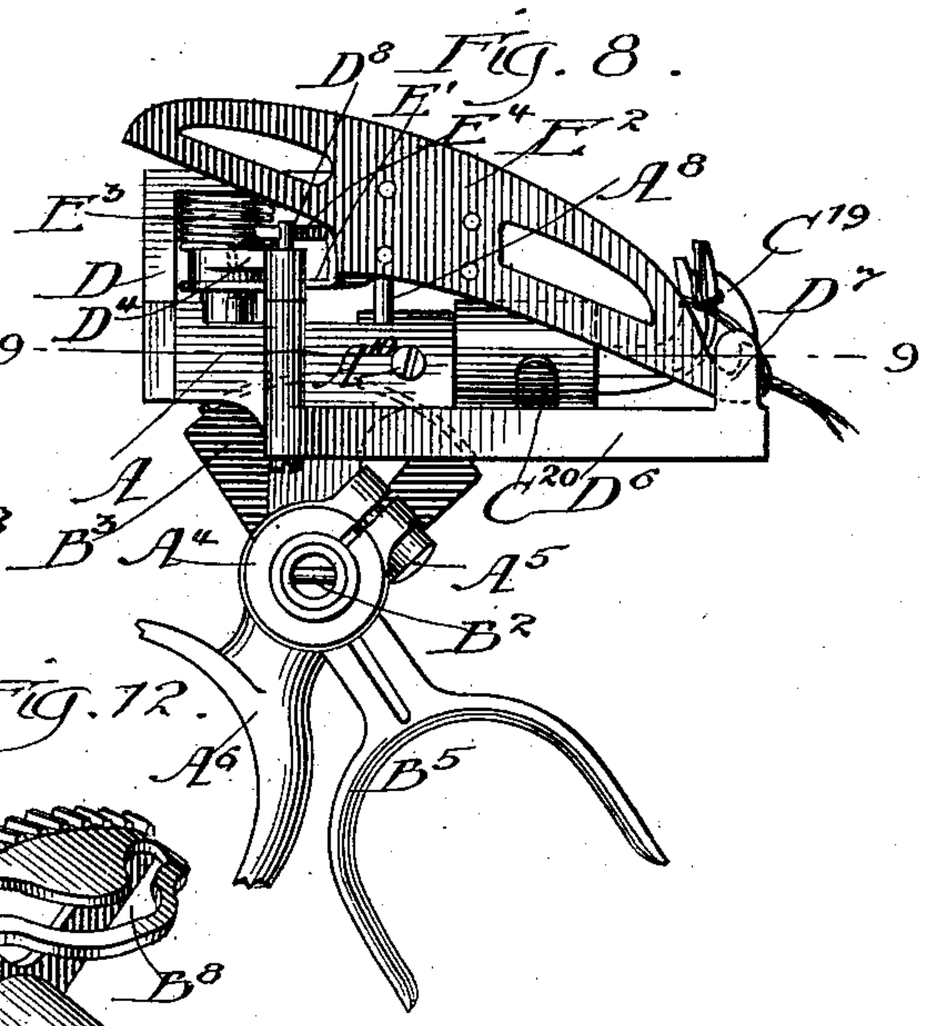


Fig. 12.

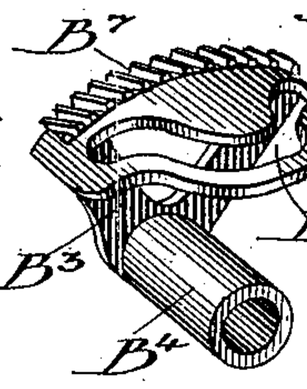


Fig. 9.

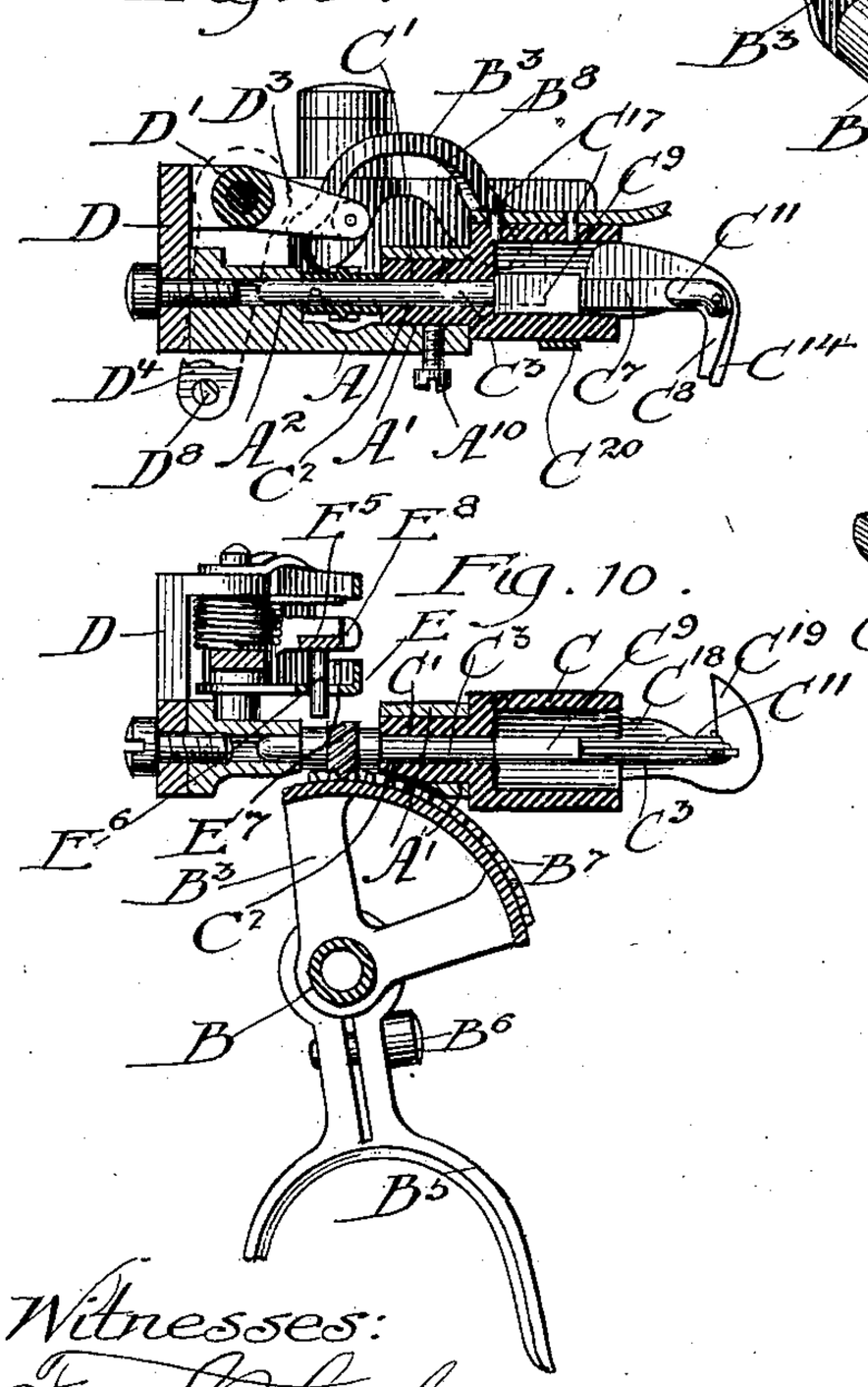


Fig. 13.

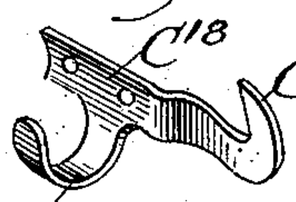


Fig. 11.

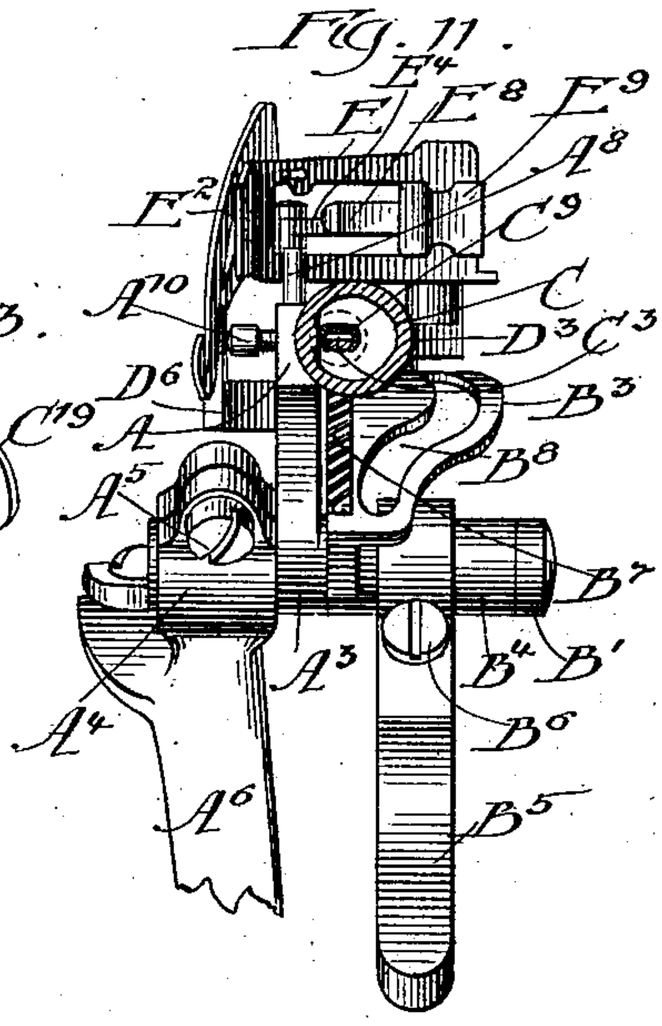


Fig. 10.

Witnesses:
Frank L. Blanchard
Geo. L. Chindahl

Inventor:
Howard D. Colman
By Lucien L. Miller
Attorney.

No. 755,110. PATENTED MAR. 22, 1904.

H. D. COLMAN.

KNOT TYING IMPLEMENT.

APPLICATION FILED FEB. 28, 1902.

NO MODEL. 4 SHEETS—SHEET 4.

Fig. 14.

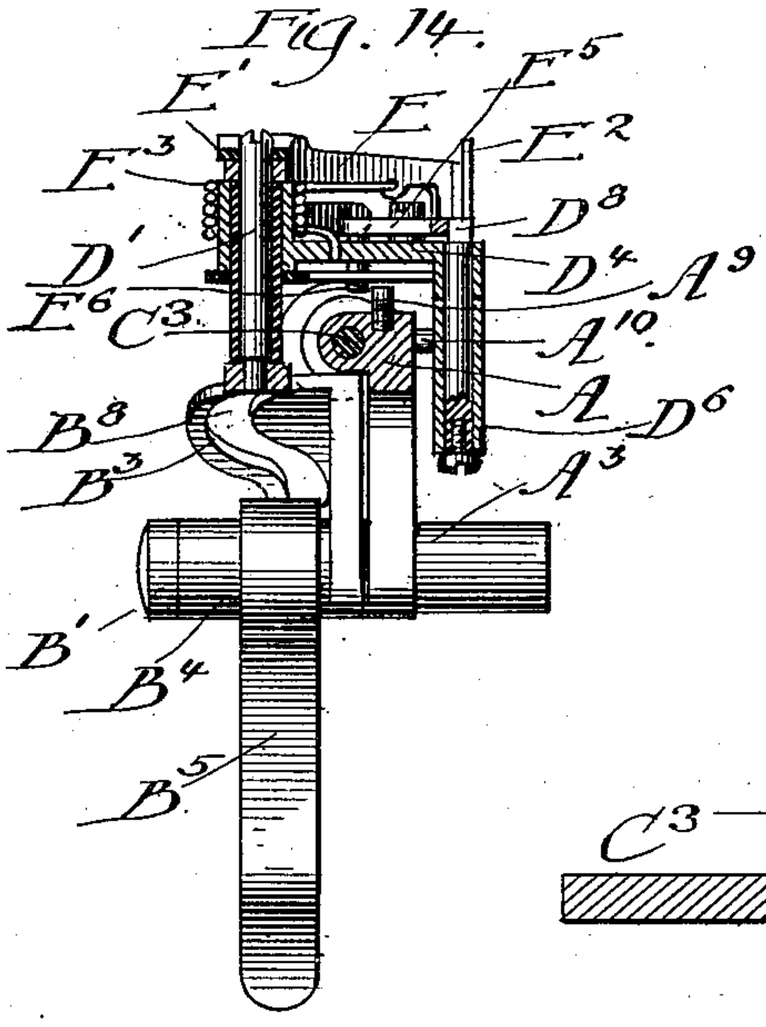


Fig. 15.

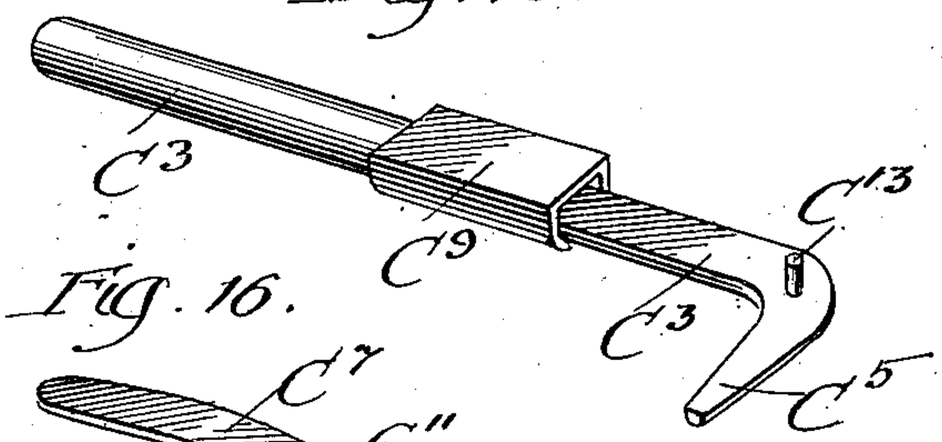


Fig. 16.

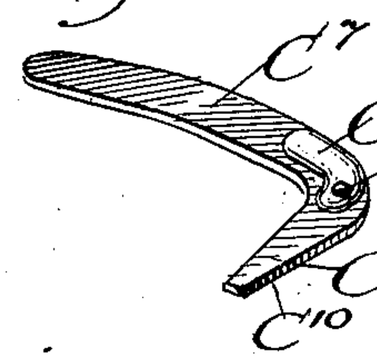


Fig. 17.

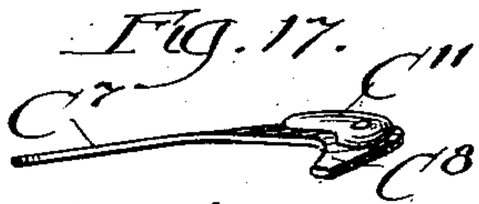


Fig. 18.

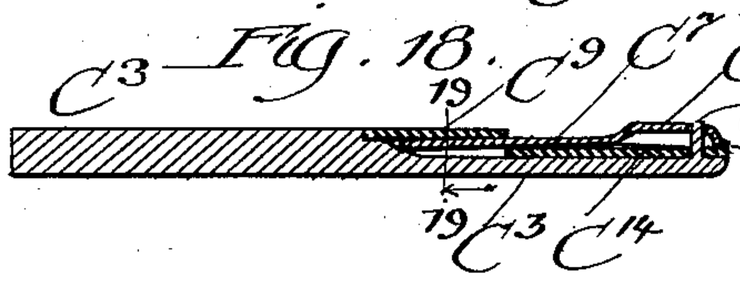


Fig. 19.

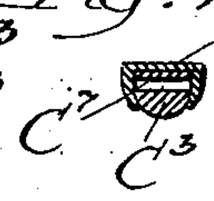


Fig. 20.

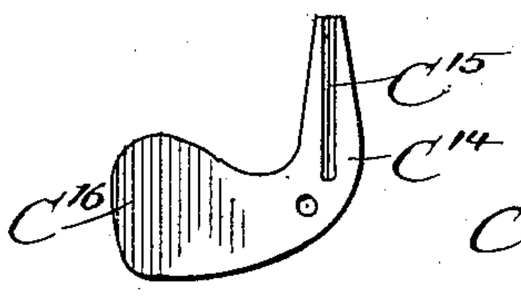


Fig. 21.

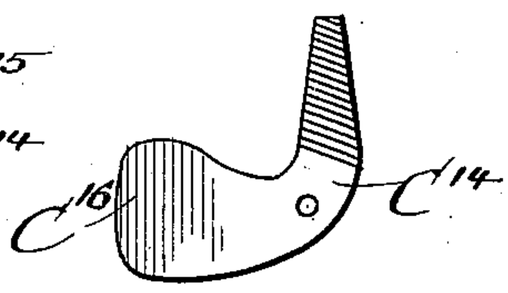


Fig. 22.

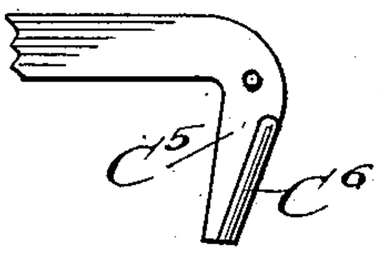


Fig. 23.

Fig. 24.

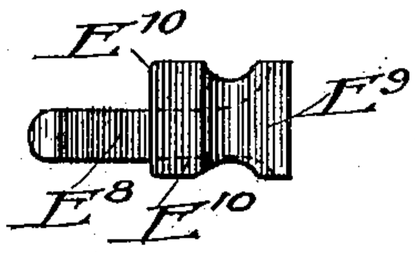


Fig. 25.

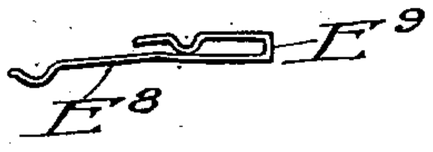
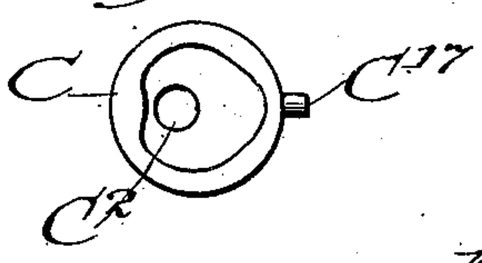


Fig. 26.



Witnesses:
Frank Blanchard
Geo. L. Chrisdahl

Inventor:
Howard D. Colman
By Luther L. Miller
Attorney.

No. 755,110. Patented March 22, 1904.

UNITED STATES PATENT OFFICE.

HOWARD D. COLMAN, OF ROCKFORD, ILLINOIS.

KNOT-TYING IMPLEMENT.

SPECIFICATION forming part of Letters Patent No. 755,110, dated March 22, 1904.

Application filed February 28, 1902. Serial No. 96,097. (No model.)

To all whom it may concern:

Be it known that I, HOWARD D. COLMAN, a citizen of the United States, residing at Rockford, in the county of Winnebago and State of Illinois, have invented certain new and useful Improvements in Knot-Tying Implements, of which the following is a specification.

One of the objects of this invention is the production of an improved knot-tying implement.

A further object of this invention is the production of means for renewing the cutting edges of the tying-bill of a knot-tying mechanism.

A further object of this invention is the production of a detachable bill-spring for tying-bills.

The invention further refers to a raised boss on the bill-spring adapted to provide sufficient slack in the formation of the knot to render the stripping of the knot from the tying-bill easy. Also by permitting the use of a longer pivot-pin said boss prevents the shearing and clamping jaw from being lifted wholly off and away from its pivotal pin when coarse thread is being held between the clamping-jaws.

A further object of this invention is the production of means for detachably securing the thread-guide in position.

A further object of this invention is the production of a spring of an improved form employed in this instance to actuate the latch for engaging the thread-holding arm with the positively-driven bell-crank arm.

A further object of the invention is the improvement generally of knot-tying implements whereby said implements are made more durable, adaptable to a wider range of use, more convenient, and more effective in operation.

The embodiment herein shown of this invention is intended to be worn constantly on the left hand of the operator and its parts to be actuated by a pivoted lever adapted to be engaged by the thumb of said hand. It is mounted upon the hand in such a manner that the free use of the thumb and fingers is not materially interfered with.

The mechanism here illustrated ties a spooler's knot. In its operation two threads are laid by the operator in an open thread-clamp and over a thread-guide, said threads passing intermediately over the tying-bill of the knotter. When the threads are in this position, the thumb-lever of the implement is depressed by the thumb of the hand upon which said implement is mounted, and this movement is communicated by suitable mechanism to the tying-bill to rotate said bill. The tying-bill is rotated through about one and one-third revolutions, winding the threads about said bill and cutting off and clamping within the bill the short ends of the threads being tied together. The clamping action of the thread-clamp is delayed until sufficient slack to form the knot has been taken up by the rotation of the tying-bill; but as soon as the knot has been formed and the waste ends of the threads cut off in the tying-bill the threads are clamped and the knot drawn tight and stripped from the tying-bill.

To aid in a ready understanding of the operation of the mechanism, I shall refer hereinafter to four principal positions assumed by the parts in the performance of their functions—to wit, the initial or first position, wherein the thumb-lever is at the highest point in its movement and the implement ready to receive the threads to be tied together; the second position, or that assumed by the parts when the thumb-lever has been somewhat depressed and the tying-bill rotated for three-quarters of a revolution; the third position, or that assumed by the parts when the tying-bill has been rotated one full revolution, and the fourth position, or that wherein the tying-bill has been turned through about one and one-third revolutions and the mechanism has been actuated to tighten the thread and strip the knot from the tying-bill.

In the accompanying drawings, Figure 1 is a perspective view of my improved knot-tying implement mounted upon the left hand of an operator, showing the mechanism in the act of tightening the knot and stripping it from the tying-bill. This is what I have designated as the fourth position of the mechanism. Fig. 2 is a top plan view of the tying mechanism, showing the parts in the initial or first position. Fig. 3 is a side elevation of the

mechanism, the parts being in the first position. Fig. 4 is a top plan view showing the parts in the second position. Fig. 5 is a view similar to that of the last preceding figure, showing the parts in the fourth position. Fig. 6 is an enlarged elevation of the tying-bill, showing the knot formed thereon. Fig. 7 is a side elevation of the mechanism, showing the parts in the initial position. Fig. 8 is a side elevation from the opposite side of the mechanism, similar to Fig. 3, showing the parts is the third position. Fig. 9 is a sectional view taken on dotted line 9 9, Fig. 8, the parts being in the fourth position. Fig. 10 is a vertical sectional view taken on dotted line 10 10, Fig. 4, the parts being in the fourth position. Fig. 11 is a transverse vertical section through the cam-barrel, illustrating the contour of the cam-surface thereof. Fig. 12 is a perspective view of the sector cam-gear. Fig. 13 is a similar view of the thread-guide. Fig. 14 is a vertical section on dotted line 14 14 of Fig. 4. Fig. 15 is a perspective view of the knotter-shaft. Fig. 16 is a similar view showing the bill-spring. Fig. 17 is a side elevation of the bill-spring, showing the torsional twist therein. Fig. 18 is a longitudinal central section through the knotter-shaft, the bill-spring, and the shearing and clamping jaw. Fig. 19 is a transverse section on dotted line 19 19 of Fig. 18. Fig. 20 is a side elevation, somewhat enlarged, of a grooved shearing and clamping jaw for the tying-bill. Fig. 21 is a similar view of a roughened shearing and clamping jaw. Fig. 22 is an enlarged side elevation of the forward end of the knotter-shaft, showing a rib adapted to coincide with the groove in the clamping side of the shearing and clamping jaw illustrated in Fig. 20. Fig. 23 is an enlarged view of the end of the tying-bill, showing the relative positions of the bill, the shearing and clamping jaw, and the bill-spring when the parts are in the third or clamping position. Fig. 24 is a side elevation of the spring employed to actuate the latch which engages the thread-holding arm with the positively-driven bell-crank arm. Fig. 25 is an edge of said spring. Fig. 26 is an end view of the cam-barrel, showing the conformation of the cam-surface within said barrel.

In the construction of that embodiment of my invention illustrated in the accompanying drawings I provide a standard A, having alined openings A′ and A^2 at its upper end and the integral transverse sleeve A^3 at its lower end. A clip A^4 surrounds said sleeve A^3 and is adapted to have frictional engagement with the outer surface of the sleeve by means of the clamping-screw A^5. The clip A^4 is formed integral with the handle A^6, which handle is provided with a strap A^7 in the loop form for surrounding the hand of the operator, and this loop is made adjustable to adapt it to hands of different sizes. I have shown a buckle for providing this adjustment; but any suitable means may be employed for this purpose. The connection between the sleeve A^3 and the clip A^4 permits of an adjustment in the position of the standard A with reference to the handle A^6. The upper side of the standard A is provided with a stop-pin A^8 and a delay-stud A^9, and the side of the standard has a set-screw A^{10} extending through the side walls of the opening A′, the functions of which stop-pin, delay-stud, and set-screw will appear later herein.

A tubular stud B, having a flanged head B′, is fixed within the sleeve A^3 by means of a pin B^2, extending through said sleeve and said stud, and a sector-cam gear B^3, having a long hub B^4, is loosely mounted upon said tubular stub B, said sector-cam being oscillated upon said stud by means of the thumb-fork B^5, which thumb-fork is frictionally secured to said hub by means of the clamping-screw B^6. The sector-cam B^3 is provided on its peripheral face with the raised skew-gear teeth B^7, also with the cam-groove B^8, which groove is of an outline somewhat resembling that of the letter **U**, with its arms widespread and curved outward at their upper ends.

C is a cam-barrel, its inner surface being somewhat irregular, but substantially of heart shape in transverse section. The cam-barrel is provided with a stem C′, extending eccentrically from its rear end, and this stem fits within the opening A′ of the standard A and is held in position therein by the set-screw A^{10} in said standard. The stem C′ of the cam-barrel is provided with an axial opening C^2, alined with the opening A^2 of the standard A, said alined openings C^2 and A^2 providing bearings for the knotter-shaft C^3. A skew-pinion C^4 is fixed to the knotter-shaft C^3, the teeth of said pinion being adapted to engage the skew-gear teeth B^7 upon the peripheral face of the sector-cam. The knotter-shaft C^3 is flattened for about one-half its length by being cut away, and the forward end of this cut-away portion is turned substantially at right angles to the length of the shaft in the point C^5 and provided at said point with the clamping-rib C^6. A bill-spring C^7, formed of thin spring material and having a point C^8 turned at right angles to its length to correspond to the point C^5 of the forward end of the knotter-shaft, is held in place beside said shaft by means of the sleeve C^9, which partially surrounds the knotter-shaft, and by the pivot-pin to be later herein described. This bill-spring is provided with a shear edge C^{10} and has a boss C^{11} formed on its outer opposite face, through which boss an opening C^{12} for receiving the pivot-pin C^{13} is provided. The shank of the bill-spring is bowed outward slightly near its middle and is twisted spirally a very little in order that the cutting edge of the bill-spring shall bear against the cutting edge of the shearing and clamping jaw (to be hereinafter described) with a uni-

form pressure from heel to point. A shearing and clamping jaw C^{14} is mounted upon the pivot-pin C^{13}, one side of said jaw being provided with a shear edge to coincide with the shear edge C^{10} at the inner edge of the bill-spring, while the other (the clamping) side has a groove C^{15} to coincide with the rib C^{6} of the point C^{5} of the knotter-shaft. The roughening of the clamping side of the shearing and clamping jaw (illustrated in Fig. 21) is a slight modification of the coinciding rib and groove just described. The rear end or wing C^{16} of the shearing and clamping jaw is made quite wide to lie within the cam-barrel and at all times substantially engage opposite sides of said barrel, so that the movement of said shearing and clamping jaw in either direction shall be positive. The boss C^{11}, formed on the bill-spring, permits the use of a longer pivot-pin C^{13} than otherwise could be employed, the advantage of which is that the shearing and clamping jaw will not be pushed wholly off and away from the end of said pivot-pin when coarse threads are being clamped. The boss C^{11} also provides an increased diameter over which the thread is wound in tying the knot, which latter feature permits the knot to be stripped more easily from the tying-bill. The pin C^{13} is fixed with relation to the forward end of the knotter-shaft C^{3} and besides providing a pivotal support for the shearing and clamping jaw C^{14} holds the bill-spring from displacement. The rear end of the bill-spring lies within the sleeve C^{9}, and when it is desirable to withdraw the bill-spring for sharpening its cutting edge or for renewal it is only necessary to lift the forward end of the spring from the pivotal pin C^{13} and pull the shank of the bill-spring from its holder C^{9}. The cam-barrel C is provided with the pins C^{17} at one side thereof, adapted to enter corresponding holes in the body of the thread-guide C^{18} to hold the latter in place upon the cam-barrel. The thread-guide is provided with a forwardly-extending hook C^{19} and with a curved arm C^{20}, adapted to encircle the lower side of the cam-barrel to hold the thread-guide in position thereon. This means of fastening the thread-guide to the barrel is convenient and effective, and by means of it the guide may readily be detached from the barrel and replaced in case of breakage.

The rear end of the standard A is provided with a bracket D, fixed with relation to the standard. A pintle D′ extends vertically through said bracket, and a hub D^{2}, having two bell-crank arms D^{3} and D^{4}, is loosely mounted on said stud. One of said arms D^{3} carries an antifriction-roller D^{5}, that lies within the cam-groove B^{8} of the sector-cam B^{3}. The other, D^{4}, of said arms carries the thread-clamping arm D^{6}, having at its forward end the two upwardly-extending spring-fingers D^{7}. The thread-clamping arm is connected with the outer end of the arm D^{4} by means of the pivotal pin D^{8}, and the upwardly-projecting end of this pin is made angular in form for a purpose to be later specified. A movement of the sector-cam B^{3} oscillates the hub D^{2} upon its pintle D′.

E is a thread-holding arm loosely mounted by means of its integral ears E′ on the hub D^{2} and pintle D′ and having its outer portion E^{2} formed at an angle with the plane of its body portion. The forward end of the outer portion E^{2} of said thread-holding arm is substantially in hook form to receive the thread when the same is laid across the tying-bill by the operative. It extends forwardly between the spring clamping-fingers D^{7}, which clamping-fingers are moved during the operation of the mechanism to clamp the threads between said clamping-fingers and the hook of the thread-holding arm.

A spring E^{3}, coiled about the hub D^{2}, is attached at one end to the arm D^{4} and at the other end to the thread-holding arm E and by its elasticity tends to hold said arm D^{4} and the thread-holding arm E apart. The stop-pin A^{8} limits the forward movement of the thread-holding arm E. A spring-latch E^{4} is pivotally mounted upon the thread-holding arm E, which latch is adapted to engage the angular upper end of the pin D^{8}, by which engagement the thread-holding arm and the bell-crank arm D^{4} are locked together. The integral arm E^{5} of the latch E^{4} also has a downwardly-extending trigger-pin E^{6}, which projects through an opening E^{7} in the arm E and is adapted to engage the delay-stud A^{9} on the standard A. The delay-stud A^{9} limits the rearward movement of the arm E through the medium of the trigger-pin E^{6} after having pushed the trigger-pin to the limit of its movement in the opening E^{7}. The size of the opening E^{7} determines the limit of the movement of the latch E^{4}. The integral arm E^{5} of the latch E^{4} is adapted to be engaged by a flat spring E^{8}, that surrounds the rear end of the thread-holding arm and holds the latch E^{4} in a position to engage said angular pin D^{8}. The form of the spring E^{8} is such that it is held in position without extraneous securing means. The body portion E^{9} of said spring is in loop form and the ears E^{10} prevent vertical displacement of the spring.

From the foregoing description it will be seen that a movement of the thumb-fork B^{5} rotates the knotter-shaft by means of the skew-gearing between the sector-cam and said shaft. The arm D^{3}, having the antifriction-roller D^{5}, lying within the cam-groove B^{8} of the sector-cam, is also positively moved, as is the bell-crank arm D^{4} and the thread-clamping arm D^{6}, pivotally secured to said arm D^{4}. The thread-holding arm E is moved only when its latch E^{4} engages the stud D^{8} on the bell-crank arm D^{4}. When the latch engages said stud, the thread-holding arm is drawn back, swinging outward upon its pivotal bearing away

from the tying-bill, during which movement it tightens the knot and strips the thread from the bill. During the rotation of the tying-bill the thread-clamping fingers D^7 are moved forward upon the thread-holding arm E, reaching the hook at its forward end and engaging the thread immediately after the necessary slack to form the loop upon the rotating tying-bill has been supplied.

In the operation of the implement the left hand of the operator is slipped within the handle-strap A^7, the loop having been adjusted to the size of the operator's hand. The thumb is placed within the thumb-fork B^5 and the latter thrown to its highest position, whereby the parts are placed in the first or initial position. The ends of the threads to be united, lying side by side, are then placed by an outward movement of the right hand of the operator over the outer end E^2 of the thread-holding arm E and of the thread-guide C^{15}, and these being inclined downward the two threads naturally seek the forward ends of the thread-holding arm and the thread-guide, passing intermediately across the knotter-shaft C^3 directly under the point of the tying-bill. A downward pressure upon the thumb-fork B^5 moves the sector cam-gear B^3 and rotates the knotter-shaft. A movement of the thumb-fork sufficient to cause the parts to assume the second position—to wit., to rotate the tying-bill through three-quarters of a revolution—causes the clamping-fingers D^7 to move forward on the thread-holding arm E and to clamp said threads within the hooked forward end of said thread-holding arm. This clamping of the threads, however, is not done until the tying-bill has taken up sufficient slack to form the knot. In the second position the shearing and clamping jaw stands open to receive the end of the thread passing over the tying-bill to the thread-guide, which, as the bill passes from the second to the third position, said jaw shears on the side nearest the thread-guide and clamps on the side toward the thread-holding arm. A further rotation of about one-quarter or one-third of a revolution of the tying-bill places the parts in the fourth and last position assumed by the mechanism. During this last movement the thread-holding arm, with the threads clamped within the hook at the forward end of said arm by the clamping-fingers D^7, is swung outward upon its pivotal support, taking up the slack in the threads that is presented as the tying-bill turns toward the thread-holding arm, and as the knot is drawn from said bill the short ends of the threads are pulled from the clamping-jaws of the bill. At about this time the trigger-pin E^6 of the spring-latch E^4 is brought into contact with the delay-stud A^9, said latch is rocked upon its pivot against the action of the spring E^8, and the engagement between the thread-holding arm and the bell-crank arm D^4 is broken. The spring E^3 tending to separate the thread-holding arm from the bell-crank arm D^4 throws the thread-holding arm forward to its normal position against the stop-pin A^8.

As hereinbefore stated, the bill-spring may readily be removed by lifting its forward end from the pivot-pin C^{13} and pulling said bill-spring out of its holder. The shearing and clamping jaw is removed by first withdrawing the bill-spring or by raising the forward end of the bill-spring off the pivot-pin C^{13} a sufficient distance to slip the shearing and clamping jaw from said pivot-pin.

While I have shown a single means for attaching the bill-spring to the knotter-shaft and for holding it in engagement with the shearing and clamping jaw, it will readily be seen that separate means might be used to perform the two functions mentioned without departing from the spirit of this invention.

The coincidence of the rib on the point C^5 of the knotter-shaft and the corresponding groove C^{15} in the clamping side of the shearing and clamping jaw insures a firmer hold on the short ends of the threads held between the clamping-jaws when the waste ends of the threads have been severed by the shearing jaws of the tying-bill. However, any roughening of the clamping side of the clamping and shearing jaw, Figs. 20 and 21, or of the adjacent surface of the point C^5 of the knotter-shaft manifestly will produce substantially the same result.

The position of the tying mechanism with relation to the handle may be adjusted by loosening the screw A^5 and turning the standard A with reference to the handle A^6. The position of the thumb-fork B^5 with relation to the cam-sector B^3 is adjustable in a similar way.

It is clear that various slight changes might be made in the general form and arrangement of the several parts described without departing from the spirit and scope of my invention, and hence I desire to have it understood that I do not wish to limit myself to the precise details set forth.

I claim as my invention—

1. A tying-bill comprising a shaft having an outer member, an intermediate member, a third member detachable from the shaft, and means for attaching said last-mentioned member to the shaft and holding it in engagement with the intermediate member.

2. A tying-bill comprising a shaft having a clamping member, an intermediate shearing and clamping member, a shearing member detachable from the shaft, and means for attaching said last-mentioned member to the shaft and holding it in engagement with said intermediate shearing and clamping member.

3. A tying-bill comprising a shaft having an integral clamping member, an intermediate

shearing and clamping jaw pivotally mounted on said shaft, a bill-spring detachable from the shaft, and means for attaching said bill-spring to the shaft and holding it in engagement with the shearing and clamping jaw.

4. A detachable bill-spring for tying-bills, having a raised boss on the surface of said bill-spring, to provide slack for stripping the knot from the tying-bill.

5. A bill-spring for tying-bills, having a raised boss on the surface of said bill-spring, to provide slack for stripping the knot from the tying-bill.

6. A bill-spring for tying-bills, having a raised boss on the surface of said bill-spring, with an opening in said boss for receiving the pivot-pin of the tying-bill.

7. A detachable bill-spring for tying-bills, having a shearing edge and a spring-shank, said shank being spirally twisted to produce a uniform pressure of the shearing edge of the bill-spring upon an opposing shearing edge.

8. A knotter-shaft flattened at its forward end and provided with a holder for receiving the shank of a bill-spring.

9. A knotter-shaft flattened for a portion of its length and having a sleeve to provide a holder for the shank of a bill-spring.

10. A detachable thread-guide for knot-tying implements, having a perforated body portion and a spring-arm integral with said body portion, which arm is adapted to embrace a fixed portion of the tying mechanism to hold said thread-guide in place.

11. A spring for knot-tying implements, having a loop adapted to embrace the arm upon which it is intended to be mounted, and two ears extending from said body portion adapted to engage portions of the arm to hold said spring from lateral displacement.

12. In a knot-tying implement, in combination, a tying-bill comprising a shaft having an outer member, an intermediate member, a third member detachable from the shaft, and means for attaching said last-mentioned member to the shaft and holding it in engagement with the intermediate member; means for rotating said tying-bill; and means for actuating said intermediate member.

13. In a knot-tying implement, in combination, a tying-bill comprising a shaft having an outer member, an intermediate member, a third member detachable from the shaft, and means for attaching said last-mentioned member to the shaft and holding it in engagement with the intermediate member; means for rotating said tying-bill; means for actuating said intermediate member; and means for tightening the knot and stripping it from said tying-bill.

14. In a knot-tying implement, in combination, a tying-bill comprising a shaft having an outer member, an intermediate member, a third member detachable from the shaft, and means for attaching said last-mentioned member to the shaft and holding it in engagement with the intermediate member; means for rotating said tying-bill; means for actuating said intermediate member; and a thread-holding mechanism comprising a thread-clamping arm having two spring-fingers, and a thread-holding arm having a forward end adapted to carry the thread between said spring-fingers.

15. In a knot-tying implement, in combination, a knotter-shaft; a detachable bill-spring; a shearing and clamping jaw pivotally mounted between said shafts and said bill-spring; means for attaching said bill-spring to said shaft and holding it in engagement with said shearing and clamping jaw; means for rotating said knotter-shaft; means for actuating said shearing and clamping jaw; a thread-clamp; and means for pulling up the slack in the thread between the thread-clamp and the tying-bill to tighten the knot and strip said knot from the tying-bill.

16. In a knot-tying implement, in combination, a knotter-shaft; a detachable bill-spring; a shearing and clamping jaw pivotally mounted between said shaft and said bill-spring; means for attaching said bill-spring to said shaft and holding it in engagement with said shearing and clamping jaw; means for rotating said knotter-shaft; means for actuating said shearing and clamping jaw; a thread-clamp; means for operating said thread-clamp to clamp the thread; and means for drawing up the slack in the thread between said thread-clamp and the tying-bill and strip said knot from the tying-bill.

17. In a tying-bill, in combination, a knotter-shaft having a hooked forward end; a rib on said forward end; a bill-spring; and a shearing and clamping jaw pivotally mounted between the forward end of the knotter-shaft and said bill-spring, said shearing and clamping jaw being provided with a shear edge on one side and with a groove on the other side.

18. In a knot-tying implement, in combination, a tying-bill comprising a shaft having an outer member, an intermediate member, a third member detachable from the shaft, and means for attaching said last-mentioned member to the shaft and holding it in engagement with the intermediate member; means for rotating said tying-bill; a cam-barrel for actuating said intermediate member; a thread-clamp comprising a thread-clamping arm having two spring-fingers, and a thread-holding arm hooked at its forward end and adapted to carry the thread between said spring-fingers; and means for moving said thread-clamp to tighten the knot and strip it from the tying-bill.

19. In a knot-tying implement, in combination, a knotter-shaft flattened at its forward end; a bill-spring having a boss upon its side to provide additional slack in the thread; a

sleeve secured to said shaft for receiving the end of said bill-spring; a pivot-pin fixed with relation to said knotter-shaft and adapted to enter an opening in said bill-spring; a shearing and clamping jaw loosely mounted upon said pivot-pin; means for rotating said knotter-shaft; a cam-barrel for actuating said shearing and clamping jaw; and means for tightening the knot and stripping the threads from the clamping-jaw.

HOWARD D. COLMAN.

Witnesses:
L. D. MORRISON,
NELLIE BUNKER.