

(No Model.)

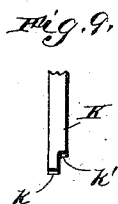
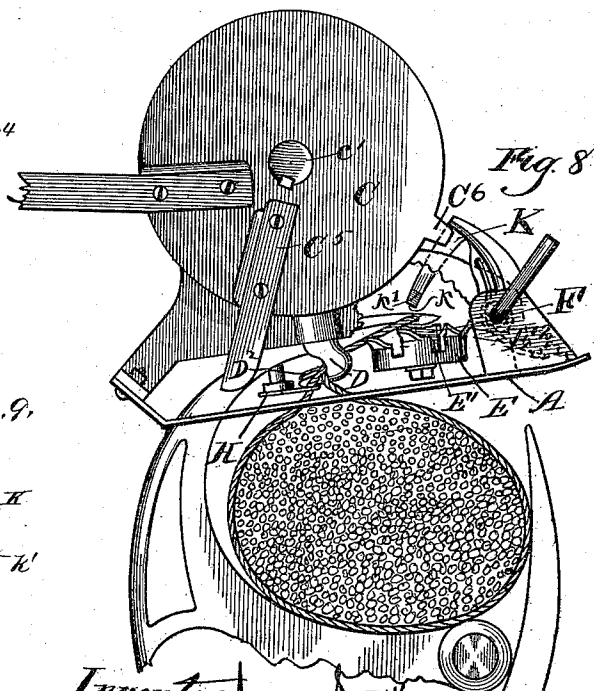
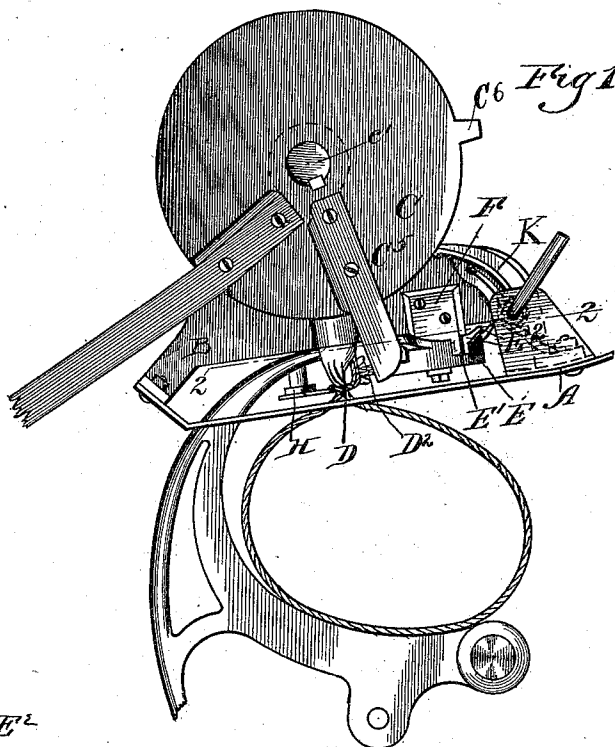
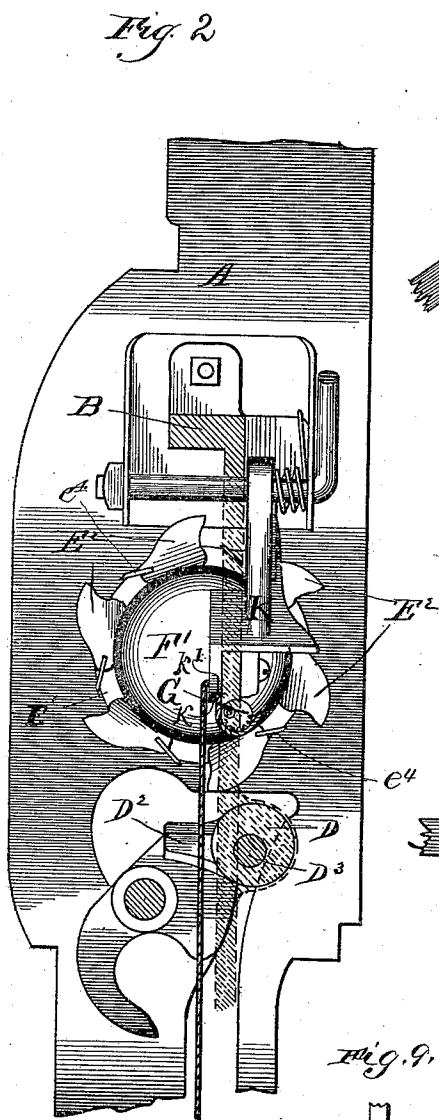
2 Sheets—Sheet 1.

A. STARK.

CORD KNOTTER FOR GRAIN BINDERS.

No. 470,454.

Patented Mar. 8, 1892.



Witnesses:
Jean Elliott
Julia Usher

Inventor: Andrew Stark
By Barton & Barton his Attys

(No Model.)

2 Sheets—Sheet 2.

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CORD KNOTTER FOR GRAIN BINDERS.

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Fig. 3.

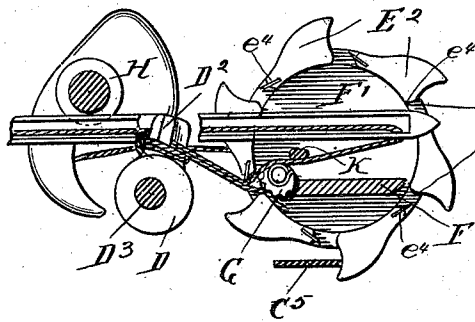


Fig. 7.

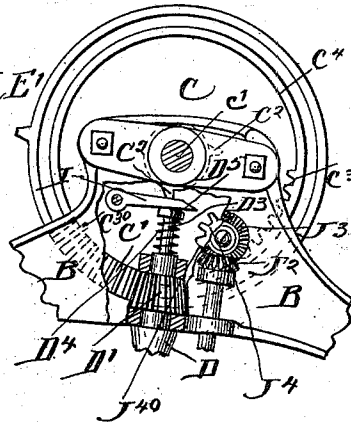


Fig. 4.

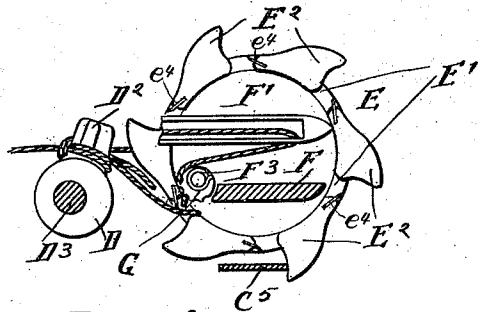


Fig. 5.

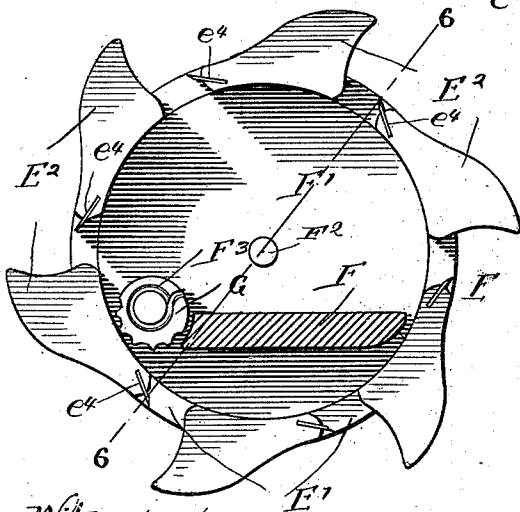
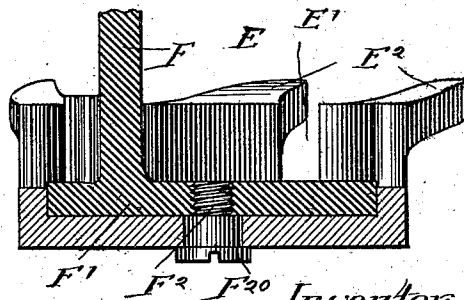


Fig. 6.



Witnesses:

Jean Elliott

Charles P. Chapman.

Inventor:

Andrew Stark

By Burton and Burton
his Attorney.

UNITED STATES PATENT OFFICE.

ANDREW STARK, OF CHICAGO, ILLINOIS.

CORD-KNOTTER FOR GRAIN-BINDERS.

SPECIFICATION forming part of Letters Patent No. 470,454, dated March 8, 1892.

Original application filed February 11, 1884, Serial No. 120,422. Divided and this application filed December 4, 1889. Serial No. 332,512. (No model.)

To all whom it may concern:

Be it known that I, ANDREW STARK, a citizen of the United States, residing at Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Cord-Knotters for Grain-Binders, which is fully set forth in the following specification, reference being had to the accompanying drawings, forming a part thereof.

10 In the drawings, Figure 1 is a rear elevation of the knotter and binder arm or needle, the position of the parts being that which they occupy just after the jaws have opened to receive the cord in completing the knot.
15 Fig. 2 is a sectional plan showing the breast-plate, cord-holder, and knotter-bill, the position of the parts being that which they occupy at rest and the section being made at the line 2 2 on Fig. 1. Fig. 3 is a detail plan
20 showing the cord-holder, knotter-bill, and the tucker and stripper and the needle, the parts being in the position occupied just before the cord is cut. Fig. 4 is a similar detail showing the holder and bill in their relative positions
25 the instant after the cord is severed. Fig. 5 is a plan of the holder on a larger scale than the other figures. Fig. 6 is a section at the line 6 6 on Fig. 5. Fig. 7 is a detail front elevation. Fig. 8 is a rear elevation of the knotter and binder arm, the position of the parts being that which they occupy just after the knotter-bill has commenced to move before the needle has retreated. Fig. 9 is a detail elevation of the nose of the slack-hook.

35 This application is a division of my application, Serial No. 120,422, filed February 11, 1884, and now pending in the Patent Office. In this application I design to include everything that relates to the cord-cutting devices.

40 A is the breast-plate.

B is the knotter-frame, to which the breast-plate is secured and in which is journaled the knotter-bill D.

45 c' is the knotter-driving shaft, to which is secured the knotter-driving wheel C, having the rack C', which engages the knotter-pinion D' to operate the bill D. The knotter-bill has its lower jaw integral with the body and has the upper jaw D² operated in the manner which is fully described in my said application, Serial No. 120,422, by means of the

plunger D³, extending up through the knotter-spindle and protruding from its upper end and controlled or held in that position by the spring D⁴, reacting between the end of the spindle and the stop-nut D⁵ at the end of the plunger, said plunger being depressed, and thereby the vibrating jaw opened, by the projections C² on the hub of the wheel C coming into contact as the wheel revolves with the lever I, pivoted on the frame B and resting upon the top of the plunger and receiving the contact of the projection C² upon its upper surface.

55 E is the cord-holder, which consists of an upwardly-open cup having notches E' in its upper margin to receive the cord and lugs or flanges E² projecting from it, whereby it receives movement from the projection C³ on the wheel C. This cup E is journaled at its center on a pivot secured to the bracket F, which is secured to and projects downwardly from the frame B. The bracket F is expanded at its lower end and forms a circular disk F', which fits within the cup E, and the screw F², which is inserted up through the bottom of the cup at its center and into the bracket F by its head F²⁰, retains the cup on the bracket.

65 G is the cord-clamp, which is a circular piece pivoted eccentrically upon the upper side of the flange F' within the cup E, near enough to the wall thereof so that in one position the cord may be tightly bound between it and the wall and in the opposite position there shall be a space sufficient for a cord to pass freely between it and the wall. A coiled spring F³, one end being fastened to the eccentric clamp G and the other to the bearing of the clamp, tends to hold the latter in position to grasp the cord firmly between itself and the wall of the cup. The flanges or lugs E² extend out far enough to be in the path of the projection C³. The cord-cutting device is a knife e⁴, rigid with the cup E, and therefore revolved by it, one such knife being located at the margin of each of the notches E', the essential characteristic of its position being that the cutting-edge shall be between the clamp and the knotter-bill, and inasmuch as the holder is located wholly beyond the knotter-bill and receives the cord on the side

toward the bill, as will hereinafter appear, the knife is essentially located farther from the center of the holder than the clamp.

H is the tucker and stripper. It has the spindle journaled in the knotter-frame at the opposite side of the frame B from the knotter-bill and is actuated by means of the beveled pinion J², which is made fast upon the upper end of said spindle and receives motion through the beveled pinion J³, meshing with it, said pinion J³ being fixed on a short shaft which is journaled horizontally in the frame B, and has at its opposite end the mutilated pinion J⁴, which is actuated by the rack C³ and detached tooth C³⁰ on the wheel C, and controlled in position by the delay-surfaces C⁴, co-operating with the delay-surfaces J⁴⁰ on the pinion J⁴.

K is a hook, which may be employed to afford slack cord, which the knotter-bill may take up around itself in making a loop for the knot. It is lifted by the engagement with it of the projection C⁶ on the knotter-actuating wheel C, and it runs off that projection in time to cause its point *k* to descend between the needle and the holder-cord and hold back a loop of cord as the needle retreats, as seen in Fig. 2, and it is re-engaged by the projection C⁶ and lifted in time to free that loop when the knotter-bill needs it. This slack-hook may be utilized to insure the proper lodgment of the spool-cord in the notch of the holder when the needle retreats by providing it with a shoulder *k'* on the side toward the holder-cord, which may engage and depress the latter as the hook descends.

The operation of this mechanism is fully described in my said application, Serial No. 120,422, and I will describe here only so much of it as is material to the operation of the cutting devices.

The outer end of the cord being held at starting between the clamp and the wall of the holder E and running out through one of the notches E' and the inner end of the cord being laid alongside the outer end by the needle, and the knotter having revolved and formed the loop for the knot and the jaw having opened to receive the outer ends of the cord, the parts being in the position shown in Fig. 1, the projection C⁵ on the wheel C comes into contact with one of the lugs E² and rotates the holder E, causing the cord lying in the notch E' to be carried over toward the open jaw, which, as the bill continues to revolve, receives the cord and closes upon it, thereby finishing the knot ready for cutting. In this operation the cord is drawn taut by the holder, the proximate sides of the holder and knotter-bill moving in opposite directions by reason of the fact that the said holder and bill revolve about their axes in the same direction, whereby the holder has pulled the cord in one direction while the knotter-bill has pulled it in another, thus both tightening the loops on the bill and straining the cord, so that it will be readily severed. At this stage the

cord is drawn over the edge of the knife. It is immaterial whether the edge of the knife is in contact with the cord during the antecedent process—that is, before the cord is taut—because it is not sufficiently sharp to cut by mere contact without pressure; but having now come to the position shown in Fig. 3 and the cords being strained over the cutting-edge a very little additional movement suffices to sever the cord, as seen in Fig. 4. It will be noticed that before this stage is reached the notch in which the cords lie has passed the clamp, which is located inside the cup E, and thereby the end originally held between the clamp and the wall is released and immediately after the other end is grasped on the other side of the notch, so that when the cutting occurs there is only one cord to be severed, the other pulling out freely from the notch. The point at which the cord will be cut will of course vary slightly with the tenacity of the cord and the sharpness of the cutting-edge, and will also be affected somewhat by the shape of the knotter-bill, because the strain of the cord drawn, as described, by the contrary motion of the holder and bill, if the bill is considerably tapered, will cause the loops to slip down on the bill-yielding cord, more or less, and so prevent the cutting, because preventing the culmination of the strain until the holder moves farther, and thereby carries the knife farther. Under the most favorable conditions in these respects the cord might possibly be severed at the instant the knife is carried past the axis of the bill, and it is practically impossible to so arrange the parts or shape them that the cutting could occur sooner than that.

I claim—

1. In combination with the knotter-bill and a revolving cord-holder having a flange notched to receive the cord, a clamp co-operating with such flange to hold the cord, mechanism which revolves the holder and the bill in opposite directions at their proximate sides after the cord is received between the jaws of the bill, and thereby strains the cord taut, and a knife over whose cutting-edge the cord is strained by such movement of the holder, whereby the rotation of the holder causes the cutting of the cord, substantially as set forth.

2. In combination with the knotter-bill and a revolving cord-holder consisting of an upright cup or ring having in its upstanding flange notches, into one of which the cord is laid by the advancing needle at each knotting operation, a knife for each such notch rigid with the holder, a clamp co-operating with the flange to hold the cord, and mechanism which revolves the holder and the bill in opposite directions at their proximate sides after the cord is received between the jaws of the bill, and thereby strains the cord taut between the holder and the bill and causes the holder to carry and press its knife against the cord to sever the same, substantially as set forth.

3. In combination with the knotter-bill

and the revolving cord-holder having a flange having notches, into one of which the cord is laid by the advancing needle at each knotting operation and having rigid with it a knife for each such notch, a clamp co-operating with the flange to hold the cord, and mechanism which revolves the holder and the bill in opposite directions at their proximate sides after the cord is received between the jaws of the bill, and thereby strains the cord taut, the knife being in such position on the holder that it is carried against the cord by such movement of the holder, substantially as set forth.

4. In combination with the knotter-bill, a cord-holder consisting of an upright cup or ring having notches in its upstanding flange, in one of which the cord is laid by the advancing needle at each knotting operation and having rigid with it a knife for each such notch, a clamp co-operating with such notched flange to clamp the cord on the opposite side of the flange from the knotter-bill, and mechanism which moves the holder while the cord is held therein and causes it to strain the cord taut between it and the bill and in the same movement carry and press the knife against the cord to sever the same, substantially as set forth.

5. In combination with the knotter-bill, a cord-holder flange notched at the edge to receive the cord, a clamp co-operating with such notched flange to clamp the cord upon the opposite side of the flange from the knotter-bill, mechanism which moves the holder while the cord is held therein and causes it to strain the cord taut between it and the bill, and a knife over whose cutting-edge the cord is strained by such movement of the holder, substantially as set forth.

6. In combination with the knotter-bill, the revolving cord-holder having an annular flange or ring notched to receive the cord, a

cord-clamp co-operating with such flange to clamp the cord upon the opposite side of the flange from the knotter-bill, mechanism which revolves the holder and bill in opposite directions at their proximate sides after the cord is received between the jaws of the bill and thereby strains the cord taut, and a knife over whose cutting-edge the cord is strained by such movement of the holder, whereby the rotation of the holder carries the cord bodily into the open jaws of the bill and by the same movement causes the cutting of the cord, substantially as set forth.

7. In combination with the knotter-bill and the cord-holder consisting of an upwardly-open cup or flanged disk, having in its upstanding flange notches, into one of which the cord is laid by the advancing needle at each knotting operation, substantially as set forth, the clamp co-operating with the flange to hold the cord in the intervals between the notches, the mechanism which gives the knotter-bill and holder opposite motion at their proximate sides after the bill receives the cord between its jaws, whereby the cord is strained by such motion, and a knife rigid with the holder for each of such notches and so located with respect to the notch that it is pressed against the strained cord by said movement of the holder, the position of the clamp being such that the notch passes it and releases one edge of the cord before the knife severs the cord, whereby the knife is caused to cut only one cord, substantially as set forth.

In testimony whereof I have hereunto set my hand, at Chicago, Illinois, in the presence of two witnesses, this 25th day of November, 1889.

ANDREW STARK.

Witnesses:

CHAS. S. BURTON,
JEAN ELLIOTT.