(No Model.) 2 Sheets—Sheet 1.

A. STARK.

CORD KNOTTER FOR GRAIN BINDERS.

No. 492,591. Patented Feb. 28, 1893.

Fig. 1.

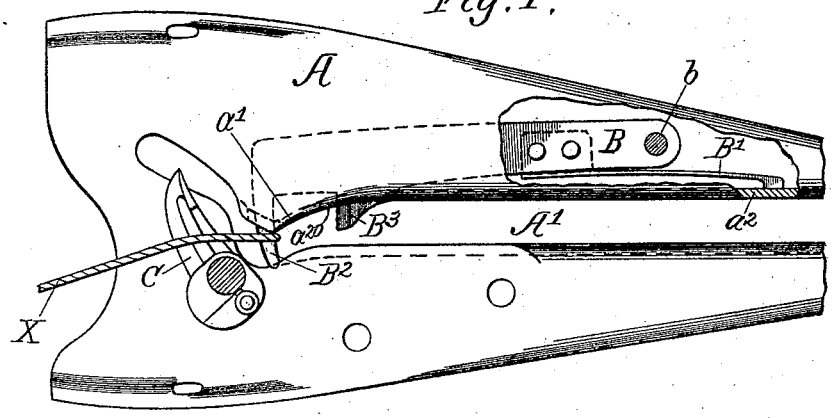
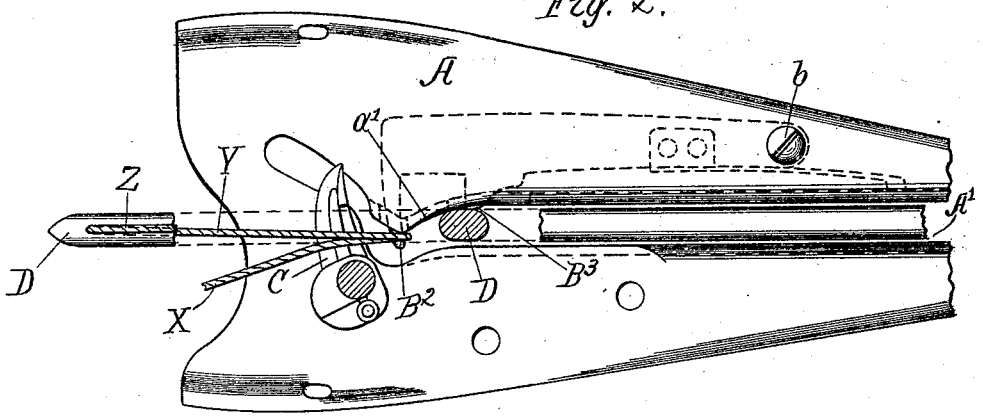


Fig. 2.



Witnesses.
E. F. Wray.
Jo. Schneider

Inventor.
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By Burton & Burton
his attys

(No Model.) 2 Sheets—Sheet 2.

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Fig. 3.

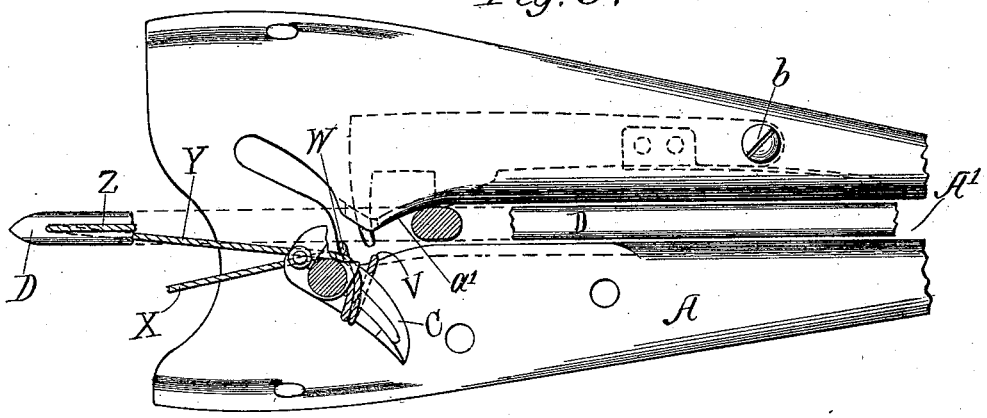
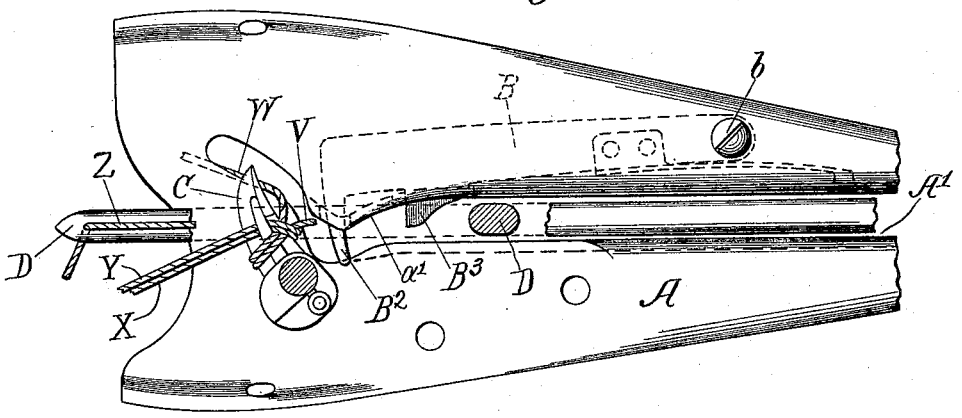


Fig. 4



Witnesses.
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Inventor:
Andrew Stark
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UNITED STATES PATENT OFFICE.

ANDREW STARK, OF CHICAGO, ILLINOIS.

CORD-KNOTTER FOR GRAIN-BINDERS.

SPECIFICATION forming part of Letters Patent No. 492,591, dated February 28, 1893.

Application filed August 20, 1892. Serial No. 443,632. (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 are fully set forth in the following specification, reference being had to the accompanying drawings, forming a part thereof.

This invention is designed to provide means for stopping the holder cord laid by the receding needle, on the side of the knotter bill toward the incoming grain, and there detaining it while the bundle is accumulated and until the needle cord is brought by the advancing needle to position where both cords may be engaged by the bill to form the knot; such cord stop to be adapted to so completely bar the slot while the bundle is being accumulated as to make it absolutely certain that the cord cannot get past it during that stage, and, at the same time, to be so entirely out of the way when the time comes for the bill to take the cords into the portion of the slot beyond the stop, that there shall be no danger of the retention of the cords on the stop at such later stage, and to accomplish these results by a cord stop which shall not require for its operation any mechanism except the needle itself.

In the drawings, Figure 1 is a detail plan of the breast-plate, cord-stop thereon, and knotter-bill in position of rest, with the holder cord drawn over the stop as it would lie during the accumulation of the bundle, the breast-plate being broken away at one point to show the cord stop and spring under the web of the plate. Fig. 2 is a similar view, showing the needle fully advanced, and the needle cord laid ready for the bill. Fig. 3 is a similar view, showing the position of the parts after the knotter has made about one-half of its revolution, and just after the cord stop has been withdrawn to open the passage for the cord. Fig. 4 is a similar view with the parts at the position occupied at the instant the knotter-bill completes its revolution and after the needle has commenced to recede just before the cords are cut off, and before the stripping of the knot from the bill commences, the band cords being shown in the position they would occupy at about the time the discharger reaches the bundle, but before it has moved it.

A is the breast-plate.

B is the cord stop arm. B′ is its spring.

C is the knotter-bill.

D is the needle.

X represents the holder cord; Y, the needle cord; Z, the running cord from the needle eye to the tension or spool.

V is the inner or needle side of the band cord,—that is to say, that part of the needle-cord which is between the bill and the bundle after the bill has engaged the cords.

W is the outer or discharge side of the band,—being that portion of the cord termed the "holder" cord, which extends from the knotter bill to the bundle after the bill has engaged the cords. Between the cords V and W, therefore, the bundle is assumed to be encircled, and the cord X is represented as running in the direction which it will take to the holder. The holder itself is not shown, because not forming any part of this invention which is adapted to be used with any of the well-known types of holders.

The knotter-bill and the means for receiving it are of familiar types, and the action of the bill is assumed to be the usual one,—viz: that it makes one continuous revolution in one direction only to perform the knotting operation. But the invention in question is not necessarily limited to use with a knotter-bill of this type, or having this precise action, though the details of the structure illustrated are suited to that type and action.

A′ is the cord and needle slot of the breast-plate. In the common form of breast-plate, the same slot answers for both purposes, but this invention is applicable to other constructions, and this slot may sometimes be referred to as the "cord slot," and sometimes as the "needle" slot, according to the operation which is being described. The form of the breast-plate illustrated is one in which the slot A′ has a deflected portion near the knotter-bill, the deflected edge *a′* of the slot on the side opposite the knotter-bill having the function of causing the cord to slide toward the axis of the bill in better position to be engaged by the latter. The cord stop arm B is illustrated as pivoted to the breast-plate at *b*, on the side of the slot opposite the knotter-

bill, quite a distance back,—that is, toward the entering side,—from the knotter-bill and the deflected portion of the breast-plate slot; and it has the finger B^2, which may be conveniently formed substantially in the arc of a circle about the pivot of the stop arm, projecting toward the other side of the slot,—that is, toward the side at which the knotter-bill axis stands. This stop finger B^2, when in operative position, emerges past the edge of the slot at the side on which it is located, at the crest of the oblique cord-guiding edge a' of the slot A'. The spring B', attached to the arm B, extends inward past the pivot of said arm, and its inner end bears upon the flange a^2 at the margin of the breast-plate slot, so that the spring constitutes an elastic heel-extension of the arm, and the form and position of the parts is such that the tension of the spring tends to hold the stop arm B with its stop finger B^2 protruded entirely across the slot a', as seen in Fig. 1. The same edge of the arm from which the stop finger B^2 projects is provided with another projection B^3, which protrudes through a notch or aperture a^{20} in the flange a^2, when the arm is thrown over by the spring, so that the stop finger B^2 projects across the slot; and in this position of the arm, the projection B^3 protrudes far enough into the slot so that it will be encountered by the needle on its sloping edge, which is toward the incoming needle, and said projection B^3 is located in such position that the needle, when at its most advanced position, occupies the position from which it has forced said projection aside; that is, so that the needle, in coming to its most advanced position, collides with the sloping edge of the projection B^3, and forces the latter aside, and holds it thus until the needle recedes from that position.

The distance which the projection B^3 projects into the path of the needle in the construction illustrated is not so great as the entire protrusion of the stop finger B^2 beyond the margin of the cord slot, so that when the projection B^3 is thus forced back as far as it can be by the needle, the cord stop finger B^2 is still protruding beyond the margin of the cord slot far enough to securely hold the cords drawn tightly across it, although its protrusion at this stage may not be sufficient to insure the holder cord remaining on it during all the process of accumulating and packing the bundle against that cord, with all the tendency of such process to push the cord sidewise and dislodge it from such a projection.

The operation of this device will be understood from the foregoing description by persons familiar with the art, to be as follows:—The receding needle having laid the holder cord over the stop finger B^2, while the latter stands projecting across the cord slot and barring the same, the bundle will be accumulated against the cord, which is prevented from getting beyond the stop because of the complete bar which the latter forms in the slot. When the packing of the bundle is completed and the needle has advanced with the needle cord, and the bundle is grasped between the needle and compressor in the usual action, all the variable and uncertain action of the grain against the cord, which is inseparable from the process of packing the bundle, is ended, and the needle cord is snugly lodged on and drawn over the stop finger, so that when the needle, at the very last portion of its advancing movement, collides with the projection B^3, and forces the stop arm B aside, causing the stop finger B^2 to withdraw part way behind the margin of the slot, the cord lodged on that finger will be carried over with it without any danger of slipping off from it, and the needle cord, being at that instant, lodged also upon the finger or brought near to it, the cords will be in the position shown in Fig. 2 when the bill starts, and before it has picked up the cords or lifted them off from the stop finger. By the time this latter action occurs, the bill has revolved to a position substantially at right angles to the plane of the cord strain, or plane of the band, or a little farther and when the cords are thus lifted from the finger, there is no longer any possibility of their slipping from the bill, and the bill will carry them while it revolves to the position shown in Fig. 3, the holder cord, which may now be referred to as the outer band cord W, being first forced off the point of the finger, and, by the strain of the bundle, drawn into the portion of the slot behind the finger, against whatever stop or guide may be provided by the form of that outer portion of the slot, as seen in Fig. 3, the inner or needle cord, which may be now spoken of as the "inner band cord" V, being drawn by the rotation of the knotter-bill along the edge of the breast-plate slot opposite the side from which the stop finger protrudes past the end of that finger, as seen in Fig. 3. Up to this point,—that is, while the bill has been making this first half revolution, the needle is substantially at rest, its crank being at that stage passing the center as is the customary construction, so that the stop projection B^3 is not freed from the needle, and this will be the case, even though the needle may have moved slightly, because the breadth of the projection and of the needle causes the two to be in engagement throughout from a half to three-quarters of an inch of such movement of the needle. While the knotter-bill is continuing its revolution and carrying the cords farther around in the outer portion of the cord slot, the needle, which has now commenced to recede, withdraws off from the projection B^3, and allows the cord stop again to bar the slot; and the position of the parts and cords when the bill finishes its revolution is substantially as shown in Fig. 4, the band cords V and W diverging from the knot on the bill, the former inward and the latter outward, but both beyond the stop finger which

is closed across the slot behind them in the path through which they have come. The subsequent processes are the usual ones, the cords being severed, and the knot stripped off from the bill as the bundle is discharged.

Obviously, it is not vitally material whether the cord stop arm be pivoted to the breast plate or to another part which may be rigid with the breast-plate, nor whether that arm be located above or below the breast-plate. But there are advantages in locating it below the breast-plate and pivoting it to the latter as in the form shown. It is also obvious that pivotal action is not the only possible action which will give precisely the same results as respects the position and movement of the stop finger, but the pivotal action is the more easily obtained and convenient. I do not therefore limit myself to the position of the finger as being above or below the breast-plate, or as being connected directly to the breast-plate, or as being pivoted to the part which supports it,—whether it be the breast-plate or another part,—but considering these details as desirable, I claim them specifically.

I do not in this application claim broadly a latch which normally closes the slot and has a projection encountered by the needle to cause the latter to open the slot, because I have shown another construction embodying that substance in my pending application, Serial No. 423,987, filed March 7, 1892. But in that case the latch is not specifically shown as constituting or carrying the cord stop or cord-arresting finger, and the present application is specifically distinguished by this feature.

I claim—

1. In a knotter for grain binders, the knotter-bill, the needle, and the breast-plate having the cord slot, in combination with a movable arm having a cord stop which normally extends across the slot between the knotter-bill and the bundle space, said arm having also a protrusion into the path of the needle, and thereby adapted to be actuated by the needle to withdraw the stop from across the slot, and thereby open a path for the cord past the knotter-bill: substantially as set forth.

2. In a knotter for grain binders, in combination with the knotter-bill, the needle and the breast-plate having the cord slot; a movable arm having a projection which normally bars the cord slot between the knotter-bill and the bundle and constitues a cord stop; said arm having a protrusion into the path of the needle in position to be encountered and held aside by the latter at the end of its advancing movement, said arm being provided with a spring to restore it to normal position when the needle recedes from contact with it: substantially as set forth.

3. In a knotter for grain binders, in combination with the knotter-bill, the needle, and the breast-plate having the cord slot; an arm pivoted to the breast-plate on the side opposite the knotter-bill axis and having a projection which normally extends across the slot near the knotter-bill and constitutes a cord stop; and a spring which tends to hold said arm with said stop barring the slot, said arm having a protrusion into the path of the needle in position to be encountered and held aside by the latter at the outer limit of its movement, to withdraw the cord stop projection and open a passage for the cord past the bill: substantially as set forth.

4. In a cord knotter for grain binders, in combination with the knotter-bill, the needle and the breast-plate having the cord slot, the edge of which, on the side opposite the plane of the knotter-bill axis, is deflected toward that plane to guide the cord laid by the receding needle toward the knotter-bill shaft; an arm pivoted to the breast-plate on the side of the slot opposite the knotter-bill axis, and having a finger projecting toward the opposite side of the slot and emerging past the edge of the slot from which it protrudes at the crest of said obliqe deflection of that edge, and having a protrusion into the path of the needle, whereby it is adapted to be actuated by the needle when said projection is encountered and withdrawn to open the slot for the cord: substantially as set forth.

5. In a knotter for grain binders, in combination with the knotter-bill, the needle and the breast-plate having the cord slot; an arm movable with respect to the breast-plate having a projection which normally bars the cord slot and constitutes a stop for the cord, and having a protrusion into the path of the needle in a position to be encountered and held aside by the latter to withdraw the stop projection, said protrusion being so proportioned to the stop projection that the latter is not wholly withdrawn behind the edge of the cord slot from which it protrudes: substantially as set forth.

In testimony whereof I have hereunto set my hand, in the presence of two witnesses, at Chicago, Illinois, this 8th day of August, 1892.

ANDREW STARK.

Witnesses:

CHAS. S. BURTON,

JOS. SCHNEIDER.