(No Model.) 3 Sheets—Sheet 1.

A. STARK.

GRAIN BINDER.

No. 492,590. Patented Feb. 28, 1893.

Fig. 1.

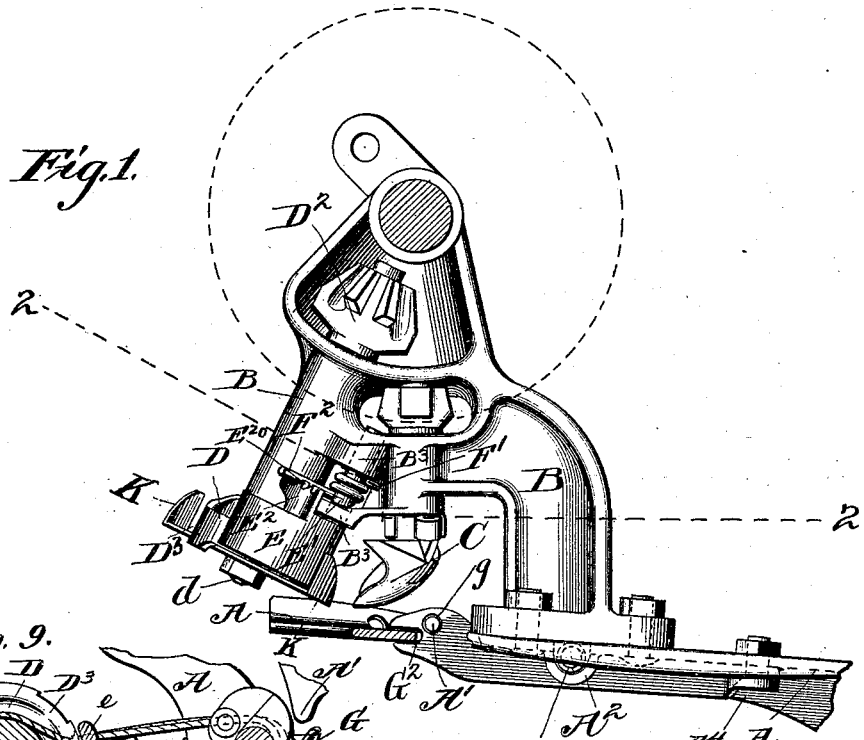


Fig. 9.

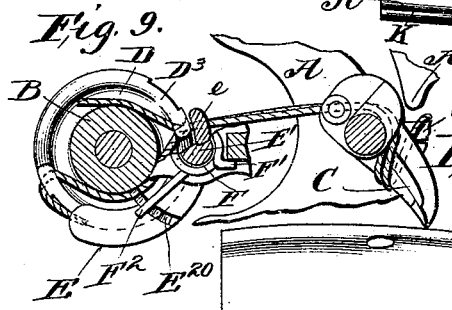
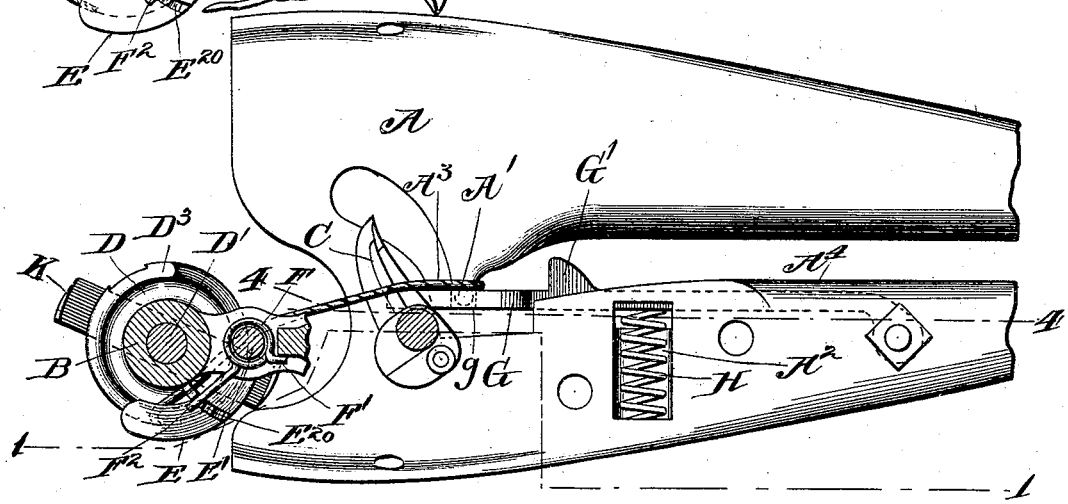


Fig. 2.



Witnesses:
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Jean Elliott

Inventor
Andrew Stark
By Burton & Burton
his attys

(No Model.) 3 Sheets—Sheet 2.

A. STARK.

GRAIN BINDER.

No. 492,590. Patented Feb. 28, 1893.

Fig. 3.

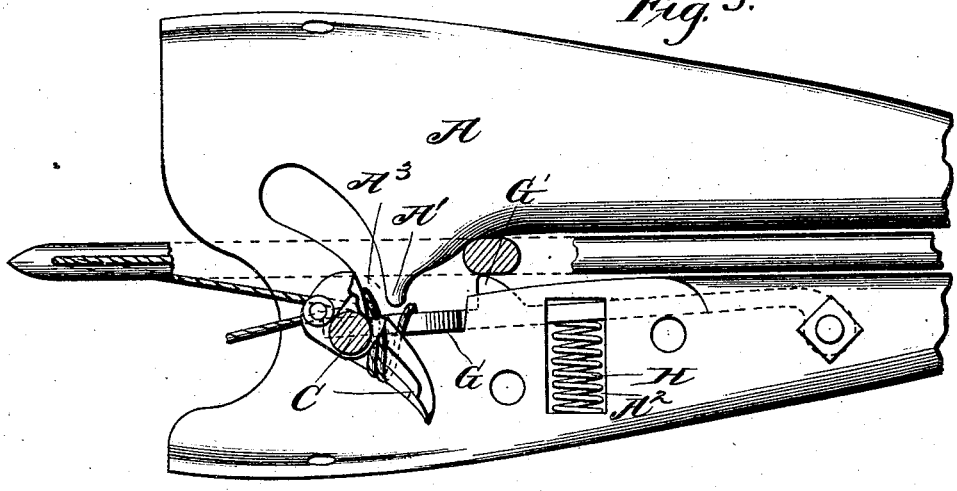


Fig. 7.

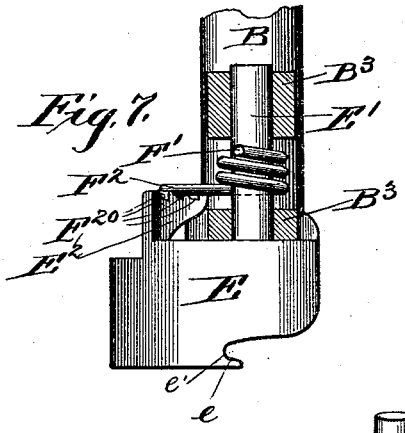


Fig. 6.

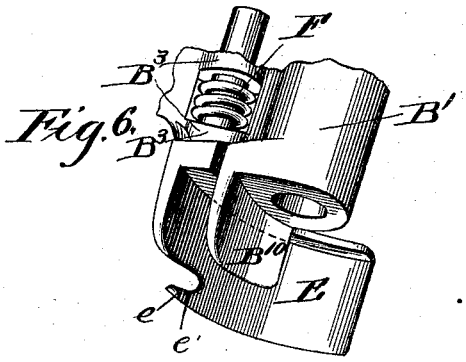
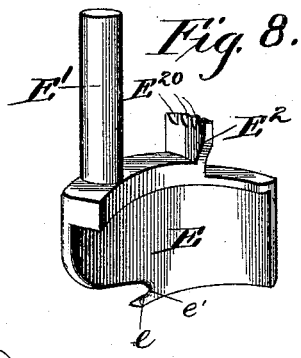


Fig. 8.



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(No Model.) 3 Sheets—Sheet 3.

A. STARK.

GRAIN BINDER.

No. 492,590. Patented Feb. 28, 1893.

Fig. 5.

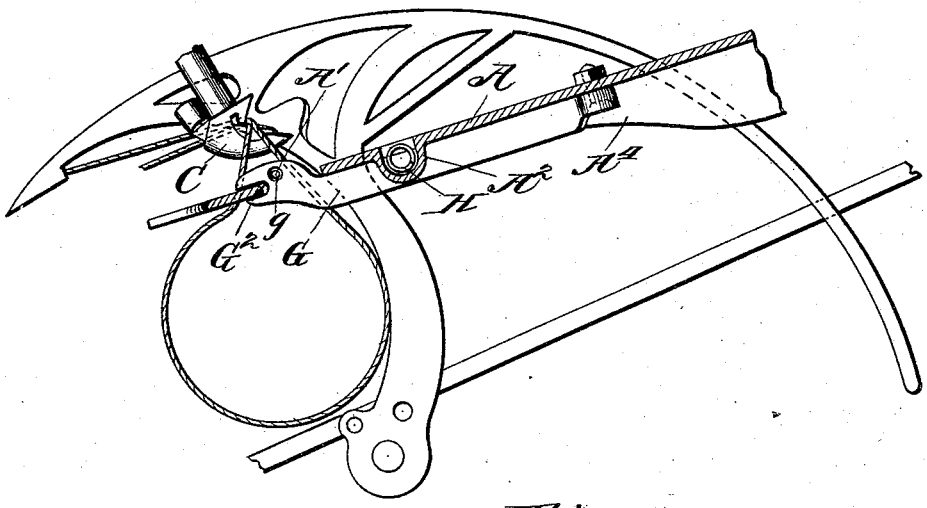
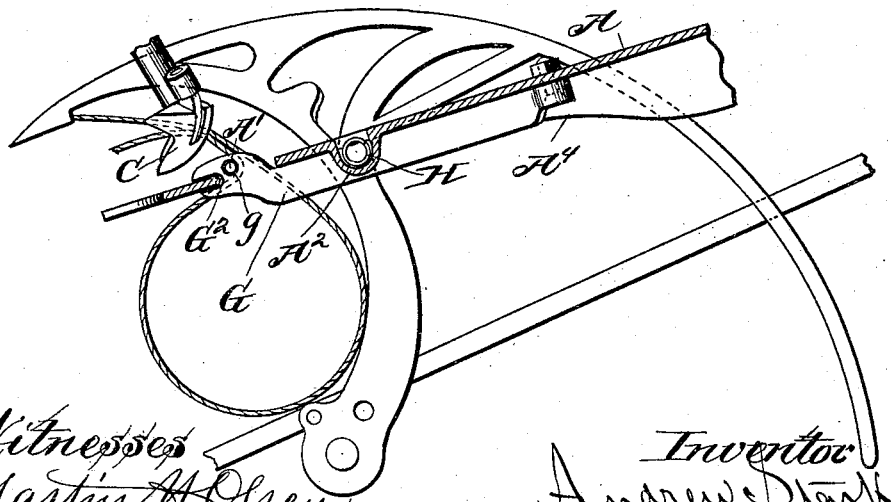


Fig. 4.



Witnesses:
Martin H. Olsen.
Jean Elliott

Inventor:
Andrew Stark
By Burton & Burton
his Attys

UNITED STATES PATENT OFFICE.

ANDREW STARK, OF CHICAGO, ILLINOIS.

GRAIN-BINDER.

SPECIFICATION forming part of Letters Patent No. 492,590, dated February 28, 1893.

Application filed March 7, 1892. Serial No. 423,987. (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 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 an improvement in the detail construction of a grain binder, having the purpose of simplifying and cheapening the cost, and rendering more certain the action of the devices for tying the knot.

In the drawings, Figure 1 is a forward side elevation of the knotter frame and mechanism thereon, the breast-plate being cut away at the line 1—1 on Fig. 2 to show a detail otherwise partly hidden. Fig. 2 is a sectional plan of the same parts, section being made as indicated by the lines 2—2 on Fig. 1. (The position of the knotting mechanism in Figs. 1 and 2 is that occupied during the accumulation and packing of the bundle, the knotting mechanism being at rest.) Fig. 3 is a view similar to Fig. 2, but showing the position of the parts when the needle is at the limit of its movement, having carried the cord around the bundle, and the knotter-bill having made about a half revolution. Fig. 4 is a detail side elevation of the needle and knotter-bill and breast-plate, the latter being shown in section at the line 4—4 on Fig. 2, the position of the needle being that reached by it just before the knotter-bill starts and after the needle cord is laid over the bill. Fig. 5 is a similar view of the same parts shown in Fig. 4, but the position being the same as shown in Fig. 3,—that is, the needle having reached the limit of its movement. Fig. 6 is a perspective of the holder spindle bearing and clamping saddle, partly made up of a flange on said bearing. Fig. 7 is a stubbleward side elevation of the same, the bearings of the spindle of the movable wing of the saddle being shown in vertical section. Fig. 8 is a perspective of of said movable wing of the saddle. Fig. 9 is a detail section at the same plane as Fig. 2, showing the relative positions of the holder and knotter bill and latch in the breast-plate slot at the stage in the operation which is represented in Fig. 3.

A is the breast-plate.

B is the knotter frame which is attached to the breast-plate and has integral with it the bearings for the knotter spindle, the cord holder disk spindle, and the outer clamp spindle, and also the inner member of the saddle, which co-operates with the outer clamp and the cord holder disk.

C is the knotter-bill with the ordinary spindle and pinion adapted to give the knotter bill a single revolution, and a delay surface to lock it when at rest in the position for discharging the knot.

D is the cord holder disk, which is of the type commonly known as a segmental crown disk, having a spindle D′ journaled in the knotter frame, and a pinion D^2 at the upper end with gear teeth and delay surfaces adapted to give one half revolution to the holder during each knotting operation.

K is the double edged knife attached to and driven with the holder disk D.

One feature of this invention relates to the saddle or clamp for the holder, which has one of its wings hinged at a line which is fixed with respect to the other wing, of which in the specific construction herein shown the inner wing B^{10} is formed as a flange projecting from the end of the bearing B′ of the holder spindle, said flange being formed concentric with said bearing, the radius for its outer surface being substantially equal to the radius of the inner surface of the flange D^3 of the holder, so that said flange of the holder is adapted to revolve close outside the said wing B^{10} of the saddle.

E is the outer wing of the saddle, shaped to conform substantially to the outer circumferential surface of the flange D^3 of the holder, and provided with the spindle or stem E′, projecting upward at a point near the receiving end of the saddle, and provided with bearings in the knotter frame alongside the holder spindle bearings at B^3 B^3. The space between said bearings B^3 is adapted to receive a spring F, which, being lodged therein, has the end F′ stopped against the frame, while the end F^2 is adapted to be lodged in any one of the notches E^{20} upon the flange E^2, which projects upward from the wing E. The spring is adapted to be laid into the space between the bearings B^3, before the spindle E′ is in-

serted up through them, so that when thus inserted the spindle will pass through the coils of the spring, and the spring will be thereby retained in place without any further contrivance for that purpose. The holder being put in place, the spindle being passed through its bearing, its flange entering between the inner and outer wings of the holder, and being itself retained in position longitudinally by the nut *d*, which holds it on its spindle, and by the pinion D^2 at the upper end of the spindle holding the latter in place, will retain the outer wing E of the saddle without any further contrivance for that purpose. The axial line of the spindle E′ of the saddle E, produced downward, passes about through the point at which the cord is first received and grasped or bound to the saddle as the holder revolves carrying the cord into the saddle. The farther end of the wing E is about ninety degrees farther on around the holder, and the said wing, in its pivotal movement about its spindle, therefore swings its said farther end in toward the holder flange. The spring F, stopped at one end against the frame, as described, and at the other end engaging the notched flange, E^2 of the saddle, tends to swing the saddle on its pivot in toward the holder flange, and to cause, therefore, elastic pressure inwardly upon the holder flange, or upon the cord which may be between said flange and the swinging end of said wing of the saddle; but the pressure or grasp of the holder and saddle upon the cord at the entrance in the line of the spindle E′, it will be observed is practically unyielding, since, at that pivotal line the saddle wing has no movement toward or from the holder, and the amount of such movement is practically unappreciable over the first one-third of the circumferential extent of the saddle wing E, and in this respect this clamping device is similar to that shown in my application, filed October 17, 1891, Serial No. 409,062, patented May 31, 1892, No. 475,821, but the means of obtaining this rigid grasp at the entrance and the yielding grasp at the farther end of the clamp constitutes an improvement upon the construction shown in my said former application, and also, the clamp with the outer wing in a separate piece from the inner wing and from the bearing of the holder is more economical in construction in view of the simplicity of the means of pivoting it to the bearing and applying the spring thereto, as described. It will be understood that the tension of said outer wing, or clamp, will be adjusted as found necessary, by lodging the end F^2 of the spring F in one or another of the notches E^{20}. The outer wing E of the saddle is cut away at the lower edge at the side from which the cord is carried to it by the holder, so that the cord may pass under it at that side, and definiteness of position is given to the cord after it has been carried into the holder by the shoulder or notch which marks the limit of the cut-away portion of the saddle at the point *e*′, and to more perfectly insure the cord being stopped at this point, and not under any circumstances carried farther under the edge of the saddle wing, I prefer to leave the point *e* projecting forward and form the lower body of the notch as seen in the drawings.

Another feature of this invention relates to means for detaining the cord while the bundle is being accumulated and packed during the commencement of the knotter-bill's movement, so that both cords shall certainly be within the sweep of the bill and be engaged thereby, and yet so that the cords may be readily carried past whatever so arrests and detains them, as the bill continues its revolution, and may, therefore, be in position to pull on the bill in the direction to strip the knot therefrom when it is finished. The device employed for this purpose consists of the latch or gate G, which is pivoted to the breast-plate on the side of the needle slot at which the knotter-bill stands, said latch being provided with the nose G′, projecting into the needle slot and nearly to the opposite side thereof at about the point at which the said opposite side of the needle slot commences to slope toward the knotter-bill, as is customary for the purpose of guiding the needle cord over toward the bill. The nose G′ is sloping on the side from which the needle enters, and is abrupt at the other side. The latch G extends beyond said nose substantially in the direction of the path of the needle, and is provided with a slight recess or aperture *g*, into which the point of the cord-guiding finger A′ of the breast-plate may project, and beyond said finger the latch crosses the farther portion A^3 of the needle slot, and has at the end the notch G^2, which engages the edge of the breast-plate beyond said portion of the slot, so that at the position shown in Fig. 2, the latch constitutes a gate completely barring the needle slot, both at the grainward and stubbleward side of the finger A′. This is the normal position of the latch, which is held in said position by the coiled spring H, lodged in the seat provided for it in the hollow boss A^2 on the breast-plate, said boss being open at the end toward the latch so that the spring extends out at that end against the latch which extends past said open end of the boss, the spring being stopped by the opposite closed end of the boss, and covered and held in position by the foot of the frame B when it is bolted to the breast-plate.

It will be seen that this device requires no machine-work to adapt it to use, the boss and the cavity therein being cast in the breast plate, so that the spring may be dropped into it and safely retained therein by its reaction against the latch at one end and the end of the boss at the other, the latch itself being stopped in the direction in which the spring tends to force it by the customary flange A^4 at the edge of the breast-plate slot.

The operation of this gate will be understood from the figures. Fig. 2 shows the

holder cord extending across the finger A′, as it is lodged by the retreating needle, and resting in the angle between said finger and the latch, and securely retained against any possibility of displacement during the packing of the bundle by the co-operation of the latch and finger. Fig. 4 shows the latch and bill in the same position, but the needle having advanced, and having laid the needle cord upon the bill and against the finger, and the said finger co-operating with the latch, thereby detaining both cords against escape past the finger. Figs. 3 and 5 show the position of the parts after the needle has advanced to the limit of its stroke, having thereby collided with the nose G′ of the latch at its sloping edge, and forced the latch back, opening the gateway so that the cords can pass by the point of the finger A′ into the slot beyond. At this stage, the stress of the bundle upon the cord will probably prevent the needle cord from passing, but the holder cord will slide past the finger, and be stopped against the farther edge of the slot, as seen in said Figs. 3 and 5, and as the knotter-bill continues its revolutions a little farther than is shown in said figures, it will carry the needle cord also through the still open gate-way past the point of the finger, and the retreating needle will withdraw from the nose G′, and permit the gate to close again ready to arrest the holder cord, as it is laid by the needle in its retreat over the finger. The length of time that the gate may be held open by the needle, it will be seen can readily be modified to correspond to the action of the knotting mechanism, of whatever sort the latter may be, the breadth of the needle web which comes in contact with the nose G′, or the extent of said nose being made such as to hold the gate open during any desired portion of the movement to the needle which occurs during the knotting operation.

Another feature of this invention relates to the combination of the cord holder disk with double knife attached and the segmental saddle clamp co-operating therewith, as shown in Figs. 1, 2 and 9 of the drawings. The cord holder disk D is provided with two upstanding segmental flanges, the driving faces of which are nearly parallel with the spindle and adapted to come to rest in position to allow the cord from the holder clamp and from the needle to pass in front of the driving face and be carried into the saddle clamp E, together at each half revolution of the holder as caused by the half revolution of the pinion D^2. Said upstanding segmental flanges of the holder disk D are also cut away, or sloped back from near their points so as to admit of the cord being properly laid in front of the driving face by the needle before the disk commences to revolve, in a manner similar to that shown in my application aforesaid, filed October 17, 1891, Serial No. 409,062.

K is the knife, revolving with the disk, for cutting the cord between the holder and the knotter-bill at the completion of each knotting operation. This knife is attached to the under side of the cord holder disk and is made with two cutting edges, corresponding with the two segmental flanges and two actuating faces of the holder disk. Each of these cutting edges is placed back of the radial line extending from the center of the spindle past the driving face of its corresponding segment, and at such a distance from the segmental flange as to permit it to pass between the outer member of the saddle clamp E, and the knotter-bill. The bearings for the knotter-bill spindle and the bearings for the cord holder disk, and the cord clamp, are all placed substantially in line with each other and on the same side of the plane of the needle, and the disk revolving with the knife attached comes to rest in such a position as to leave both open spaces between the upturned flanges so nearly in line with the plane of the needle as to permit the holder cord to fall into the space nearest to the knotter as the needle recedes, and to allow the needle as it advances again to lay the second, or needle cord, alongside the other in position to be acted upon by the same segmental flange as the disk revolves, thus insuring the holding of both cords in equal tension at the proper position for the knotter bill to receive them as it revolves, and by the further revolution of the disk and the bill putting both cords in tension together for the action of the knife in cutting them between the holder and the knotter-bill.

I claim—

1. In combination with a revolving holder, a clamp which saddles the holder flange, having one wing rigid with the holder bearing and the other wing hinged at a line fixed with respect to the rigid wing; substantially as set forth.

2. In combination with a revolving holder, a clamp which saddles the holder flange having both of its wings inflexible and one of them fixed with respect to the axis of the holder's rotation, and the other hinged at a line fixed with respect to the first wing; and a spring which tends to hold the hinged wing toward the flange: substantially as set forth.

3. In combination a rotary holder having an upstanding flange to engage the cord, and a clamp which saddles such flange and has one of its wings hinged at a line fixed with respect to the other, the axis of the hinge being parallel with the axis of rotation of the holder: substantially as set forth.

4. In combination with the holder having the upstanding flange to engage the cord, the saddle clamp having the outer wing pivoted to the holder bearing at the end of said saddle wing at which the cord enters the saddle substantially in line with the point at which the cord is first grasped between the holder flange and the saddle wing; and a spring which tends

elastically to hold the remote end of the saddle wing toward the holder flange; substantially as set forth.

5. In combination with the holder having the upstanding flange to engage the cord; the clamping saddle comprising the outer wing provided with a spindle which forms its pivot, and bearings B^3 B^3 for said spindle, said frame being formed with a recess between said bearings, and the helical spring adapted to be lodged in said recess and to admit the spindle through it, one end of said spring being stopped against the frame, and the other engaged with said saddle wing; substantially as set forth.

6. In combination with the holder having the upstanding flange to engage the cord; a clamping saddle comprising an outer wing provided with a spindle which forms its pivot; bearings for the spindle formed in the frame, and a recess between said bearings; a spring lodged in said recess and around the spindle, and stopped against the frame at one end; the saddle wing having the notched flange E^2 extending upward past the lower of said bearings, and affording lodgment for the other end of the spring; substantially as set forth.

7. In combination with the holder having the upstanding flange to engage the cord, a saddle clamp for the same having the inner wing rigid with the holder spindle bearing, and the outer wing comprising the horizontal flange which overhangs the holder flange, and having a spindle adapted to be inserted upward into bearings formed adjacent to the holder spindle bearing; whereby the holder flange retains the outer saddle wing in place; substantially as set forth.

8. In combination with the breast-plate having the slot for the needle, and the finger A′ projecting from one side of the slot; the latch G extending alongside the path of the needle to the finger and provided with a nose G′ grainward from the finger; and a spring tending to hold the latch yieldingly toward the plane of the needle with its nose protruding into the path of the latter and its grainward portion barring the slot, whereby the advance of the needle, bringing it into engagement with said nose, causes it to force the latch aside and away from the point of the finger to open the slot past the latter: substantially as set forth.

9. In combination with the breast-plate having the slot for the needle and the finger A′ projecting from one side of the slot; the latch G extending alongside the path of the needle to the finger and provided with a nose G′ grainward from the finger; and a recess opposite the finger to receive the end thereof; and a spring tending to hold the latch yieldingly toward the plane of the needle with its nose protruding into the path of the latter, and the point of the finger entered in said recess; whereby the advance of the needle bringing it into engagement with said nose, causes it to force the latch aside and away from the point of the finger to open the slot past the latter; substantially as set forth.

10. In combination with the breast-plate having the slot for the needle and the finger A′ projecting into the slot from one side thereof, the latch G, pivoted to the breast-plate and extending alongside the path of the needle past the end of the finger and notched at its extremity, and having the edge of the slot beyond the finger engaged in said notch; whereby that end of the latch is supported by the breast-plate; said latch having the nose G′, adapted to be engaged as described, by the needle, and being provided with a spring tending to hold the latch toward the point of the finger; substantially as set forth.

11. In combination, substantially as set forth, the breast-plate having the needle slot provided with the deflected portion extending around the finger A′, the latch G, pivoted to the breast-plate, extending alongside the stubbleward portion of the slot, and across the deflected portion to the point of the finger, and provided with the nose G′, projecting into the slot grainward of the finger and adapted to be encountered by the advancing needle; the breast-plate having the hollow boss open at the end abutting on the needle slot, and the spring lodged in said boss and stopped against the other end thereof and reacting at the open end upon the latch to force it yieldingly toward the plane of the needle; substantially as set forth.

12. In combination with the breast-plate having the needle slot provided with a deflected portion near the knotter-bill to guide the cord toward the axis of the bill; a latch connected to the breast-plate and extending across the deflected portion of the slot to the end of the cord-guiding slope of the edge of said deflected portion and constituting a gate to close the slot at that point, said latch having a projection extending into the path of the needle and adapted to be encountered thereby as the needle advances to push the latch aside and open the slot; and a spring reacting against the latch to hold it yieldingly in closed position; substantially as set forth.

13. In combination with a breast-plate having a cord slot extending past the axis of the knotter, a movable obstruction in the slot normally closing it against the passage of the cord near the point where it is drawn over the bill by the recession of the needle; and a reciprocating needle arranged and adapted to move the obstructing latch or gate and retain it in such position as to open the slot for the passage of the cord while the knotter is revolved, substantially as set forth.

14. The combination, substantially as shown, of a cord holder disk having segmental upstanding flanges, each adapted to receive and carry the holder and needle cords together; a saddle clamp co-operating with said disk to hold the cords; and a knife attached to and revolving with said holder disk, arranged and adapted to cut both of the cords between said

disk and the knotter-bill at each knotting operation.

15. In a grain binder, a knotter-bill with its pinion and delay surface adapted to give the knotter one revolution in tying the knot; a double segment crown cord holder disk with its pinion and delay surface adapted to give the disk a half revolution during each knotting operation, and bring it to rest with the spaces between the segments in position to receive the needle and holder cords together; a saddle cord holder clamp with one flange fixed and the other adapted to yield to the pressure of the cord; and a knife opposite each segmental flange revolving with the holder disk outside of the saddle clamp; all arranged and combined, substantially as set forth.

In witness whereof I have hereunto set my hand, in the presence of two witnesses, at Springfield, Clark county, Ohio, this 4th day of March, 1892.

ANDREW STARK.

Witnesses:
L. J. HEROLD,
W. F. BAUER.