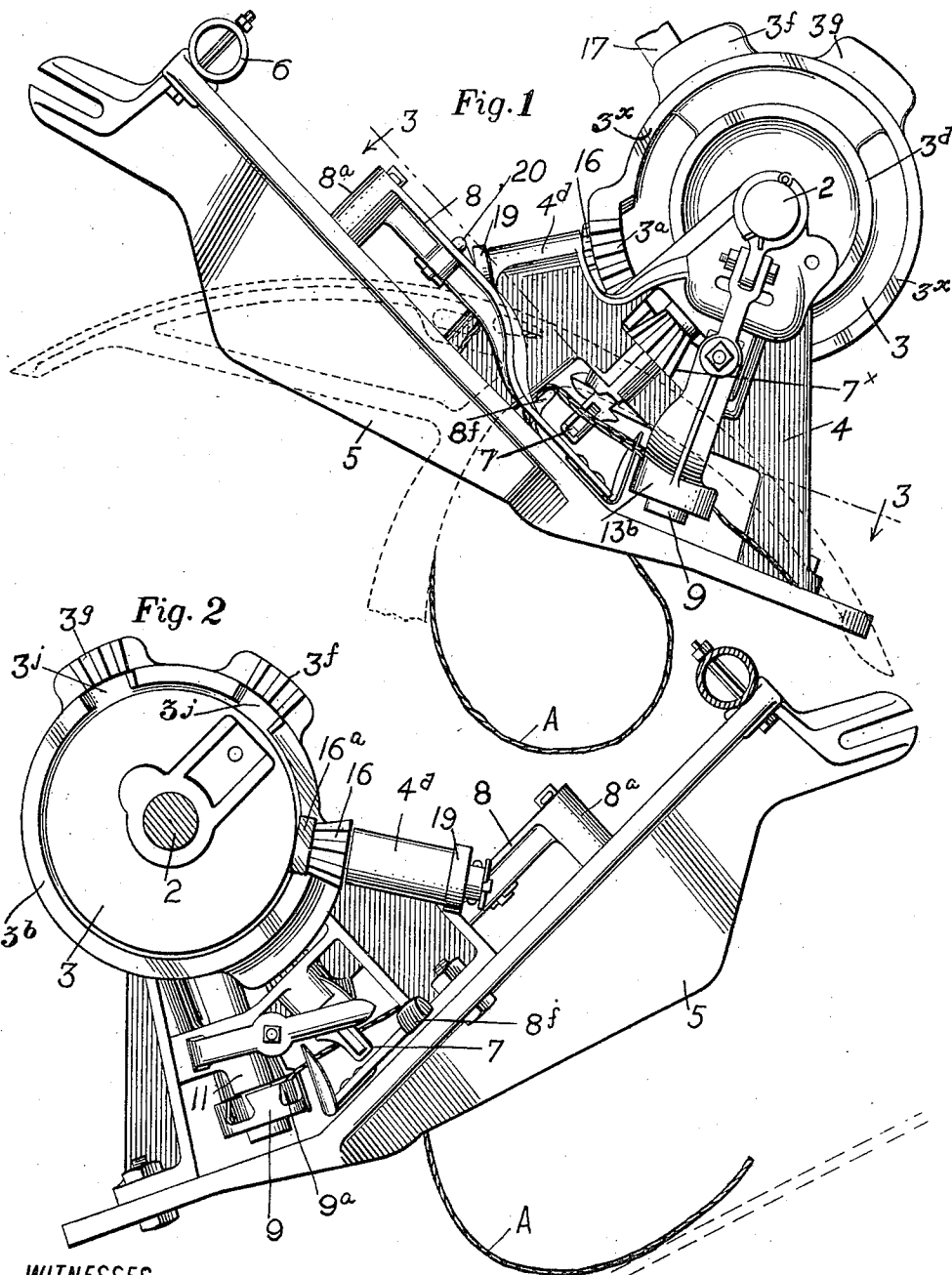


J. BODA.
CORD KNOTTER FOR GRAIN BINDERS.
APPLICATION FILED SEPT. 27, 1909.

995,585.

Patented June 20, 1911.

4 SHEETS—SHEET 1.



WITNESSES:

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Joseph Boda
By Burton Burton
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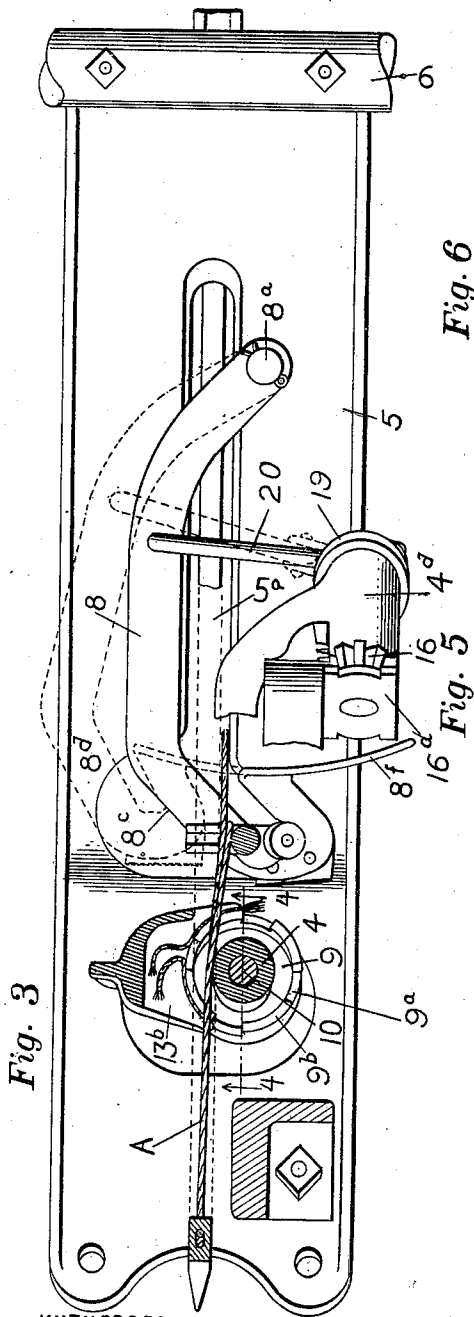


Fig. 3

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John M. Culver
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Fig. 6

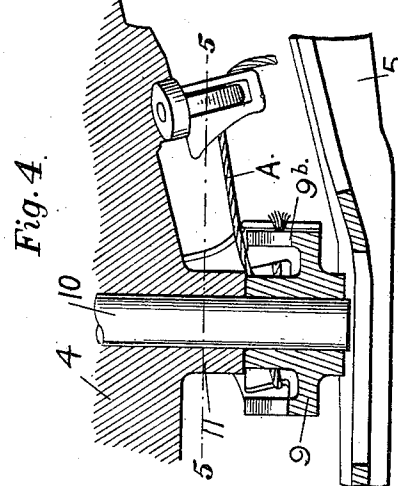
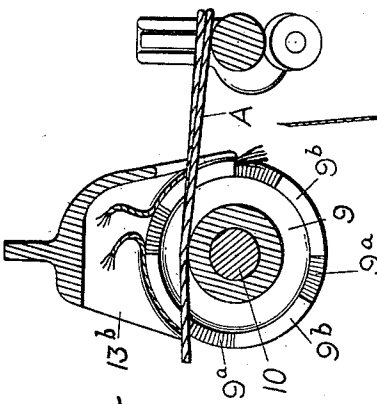
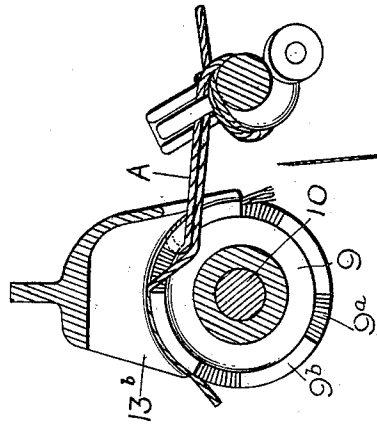


Fig. 4

INVENTOR

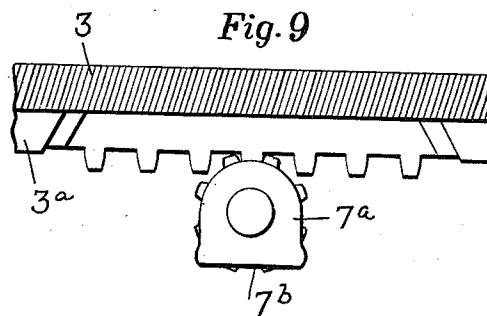
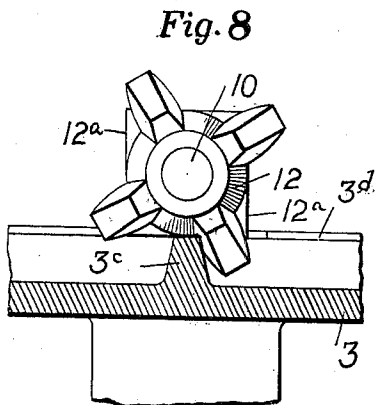
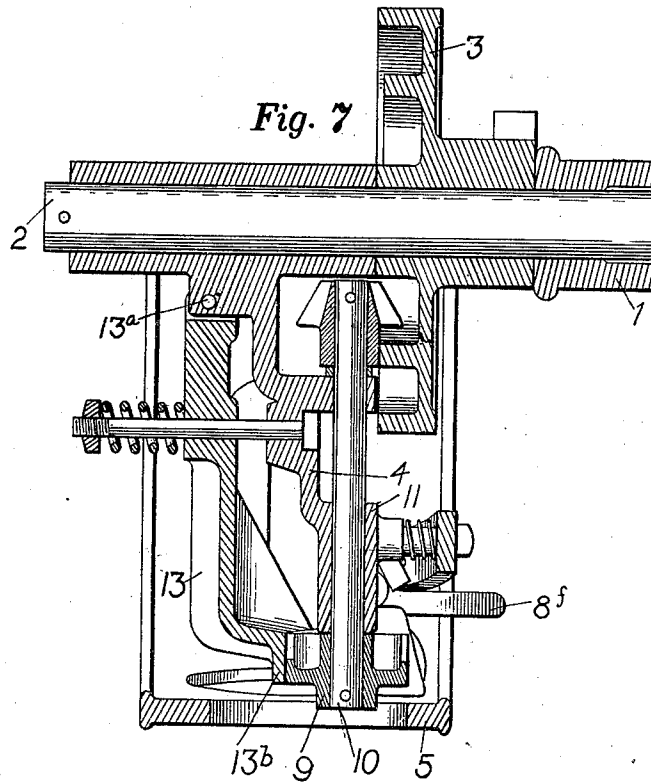
Joseph Boda
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4 SHEETS—SHEET 3.



WITNESSES:
John M Culver
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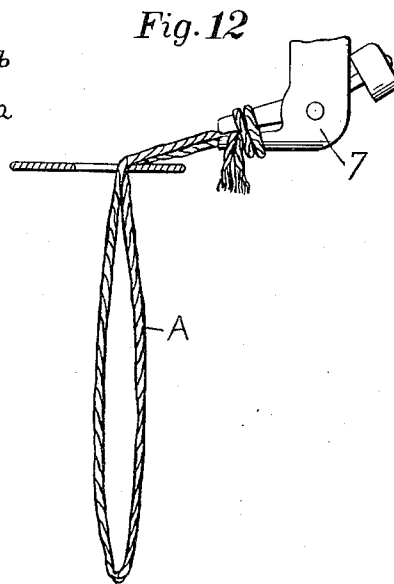
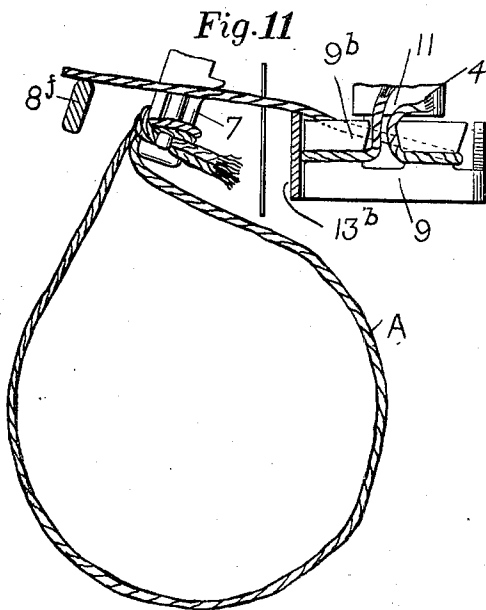
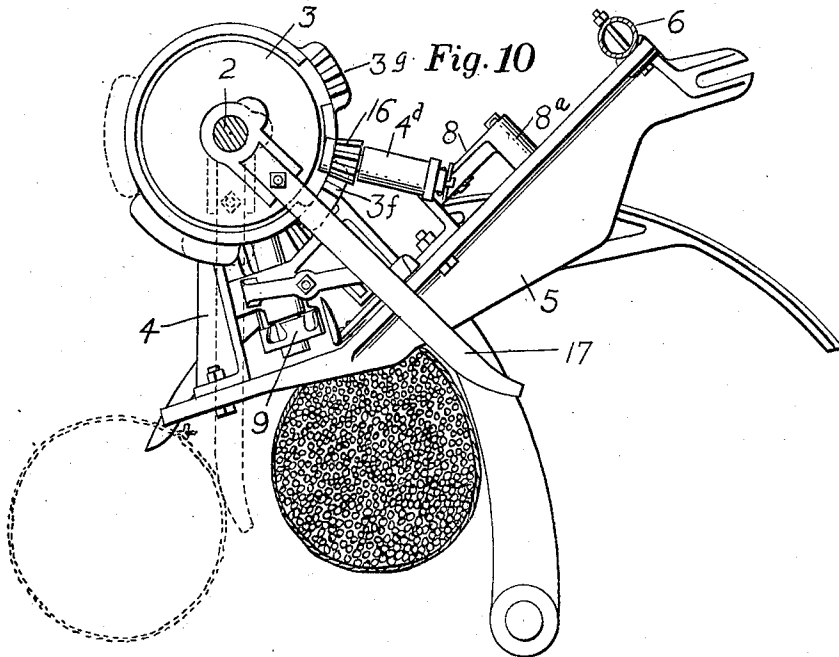
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4 SHEETS-SHEET 4.



WITNESSES:
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UNITED STATES PATENT OFFICE.

JOSEPH BODA, OF PLANO, ILLINOIS, ASSIGNOR TO INDEPENDENT HARVESTER COMPANY, OF PLANO, ILLINOIS, A CORPORATION OF MAINE.

CORD-KNOTTER FOR GRAIN-BINDERS.

995,585.

Specification of Letters Patent. Patented June 20, 1911.

Application filed September 27, 1909. Serial No. 519,843.

To all whom it may concern:

Be it known that I, JOSEPH BODA, a citizen of the United States, residing at Plano, in the county of Kendall and State of Illinois, have invented new and useful Improvements in Cord-Knotters for Grain-Binders, of which the following is a specification, reference being had to the accompanying drawings, forming a part thereof.

The purpose of this invention is to provide an improved construction for a cord knotter of a grain binder, particularly in respect to the construction of the cord holder and means of actuating the cord guide and knife arm and in the positioning and movement of both those parts with respect to the knotter bill.

It consists in features of construction and their combinations shown and described as indicated in the claims.

Figure 1 is a rear side elevation of a cord knotter embodying the invention. Fig. 2 is a forward side elevation of the same. Fig. 3 is a partly sectional plan view of the same, section being made at the line 3—3 on Fig. 1, through the knotter actuating wheel and the frame, and the upper part of the wheel being broken away. Fig. 4 is a detail section at the line 4—4 on Fig. 3. Fig. 5 is a section at the line 5—5 on Fig. 4. Fig. 6 is a section at the same plane as Fig. 5, showing the holder and knotter bill at a different stage of the formation of the knot. Fig. 7 is a section axial with respect to the knotter driving shaft and cord holder shaft. Fig. 8 is a detail section of the knotter actuating wheel in a plane at right angles to a pinion for transmitting operating movement to the knife arm, the parts being shown at the position of engagement of an actuating tooth of said wheel with said pinion. Fig. 9 is a detail section of the knotter actuating wheel, showing the knotter pinion in upper end plan view at the middle point of engagement with its actuating gear segment on said wheel. Fig. 10 is a view similar to Fig. 2, showing the parts in full line at the position occupied upon the completion of the knot and before the discharge of the bundle.

Fig. 11 is a detail partly sectional elevation of the parts shown in Fig. 6 at the position occupied during the retreat of the needle, the parts shown in section being represented as cut in the plane of the needle's path.

Fig. 12 is a detail view showing the knotter bill and cord-deflecting arm in the relative positions occupied for stripping the knot, the cord-deflecting arm being shown in section transverse to the plane of the needle's path.

The knotter shown in the drawings in general form in the relation of its principal parts, is of a familiar type of construction. The drawings present it substantially apart from the binder to which it pertains, there being shown of the binder, only, a portion 1, of the upper binder arm, in which there is journaled the binder operating shaft 2, on which there is mounted fast the knotter actuating wheel 3. Suspended by the knotter frame 4, to whose lower end it is made fast as customary, is the breast plate 5, whose upper end is secured in the customary manner to an arm or rod 6 of the binder frame, positioning the knotter frame fixedly with respect to the binder frame, notwithstanding its loose or pivotal mounting on the shaft 2. The construction thus far described will be recognized as standard or substantially universal in cord knotters in common use. In the knotter frame 4, there is journaled a customary form of knotter bill 7, at the upper end of whose spindle above the bearing thereof in the frame, there is a bevel pinion 7^a, which meshes with a gear segment 3^a, on the knotter actuating wheel 3, said gear segment being interposed as usual between two ends of a delay surface 3^x, on the knotter actuating wheel, and the pinion 7^a having the usual construction, consisting of the hub 7^a at its upper end which is circular in cross section throughout three quarters of its extent and has at the remaining one quarter a flat delay surface 7^b, for cooperating with the delay surface 3^x, to hold the pinion and knotter bill stationary during the rotation of the wheel 3, through that portion of its circumference occupied by the delay surfaces 3^x; the construction and operation in this respect being usual and familiar. The knotter bill is positioned on its spindle with respect to the delay surface 7^b, so that the bill comes to rest with said jaws, trending substantially transverse to the plane of rotation of the wheel 3; that is across the needle slot 5^a of the breast plate 5, and in position therefore to stop the cord A, which lodges thereon or extends thereabove when

the needle retreats and while it stands in gavel-receiving position, such position of the cord being that shown in Fig. 2 and Fig. 4.

The cord holder is of the type commonly known as a "cup" holder or "crown disk" holder, comprising a cup shaped member 9, whose inner flange or cup wall is cut away by four notches 9^a, so as to leave standing four fingers 9^b alternating with the notches. This cup is mounted fast on the holder shaft 10 which is journaled in the bearing 11 on the knotter frame, and at the upper end above said bearing, has a pinion 12, which has four teeth and which is actuated by a single tooth 3^c on the same face of the wheel 3, as that on which the gear segment 3^a, is formed, the said holder shaft receiving by said engagement a quarter revolution for each revolution of the knotter actuating wheel, the pinion 12 and the knotter actuating wheel 3, having substantially coöperating delay surfaces 12^a, and 3^d, respectively for holding the holder fixedly at rest in the intervals of its quarter revolutions. For co-operating with the rotating member 9, of the holder, is the holder clamp 13. This clamp consists of an L-shaped member pivoted at its upper end at 13^a, to the underside of the bearing of the shaft 2, in the knotter frame 4, and having at its lower end an off set arm forming the shoe 13^b, which bears against the outer surface of the flange of the cup 9, at the side thereof, opposite the knotter actuating wheel 3, being the side, therefore, which moves toward the knotter bill in the rotation of the cup. The axis of the cup holder is inclined to the axis of the knotter bill, at such an angle that the cord laid by the needle over the knotter bill, lodges in a notch of the holder cup at the side thereof remote from the knotter bill, as seen in Fig. 1, being prevented from lodging in the notch nearest the knotter bill by three causes; first, the inclination of the holder with respect to a line drawn from the eye of the needle at the extreme position across the top of the knotter bill, that is, the line in which the cord is normally placed by the needle; second, that at the position of rest of the holder when the cord is laid across it, the four notches stand in two lines at right angles to each other, oblique to the path of the cord, the remote notch being in said path, so that the opposite notch at the side toward the knotter bill, is at one side of the needle cord, as clearly seen in Fig. 3, and third, that the shoe 13^b, at the portion which stands in the path of the cord at the side of the holder toward the knotter bill, is made a little higher than the flange of the knotter cup, as seen in Fig. 4, causing the cord to be lodged on the upper edge of said shoe, rather than on the upper edge of the flange of the cup, so that even if the notch nearest the bill were in the

plane of the path of the cord drawn from the cord receiving notch of the holder, the cord would be prevented from engaging said nearest notch.

The construction thus far described, results in a progressive formation of the knot which may be understood from Figs. 3, 4, 5 and 6, the action being that the cord having its end held in the holder hereafter described, is laid by the retreating needle on the upper edge of the shoe at the side of the holder cup toward the bill, and thence across the bill, and when the needle returns, placing the cord around the bundle, the cord is again laid across the bill and into the remote notch of the holder cup, as seen in Fig. 5. The bill and holder-operating gear teeth on the knotter actuating wheel are so positioned thereon that the bill and holder start their revolution substantially together, the bill wrapping the cord around it as shown in Fig. 6, while the holder revolves ninety degrees from the position shown in Fig. 5 to the position shown in Fig. 6, yielding cord to the bill to an amount equal to twice the travel in its path of rotation of the edge of the finger 9^b of the holder about which the cord was folded at the commencement of the movement. During the early part of such movement, the other strand of the cord, that is that portion which was last laid by the needle into the holder, is yielded freely through the eye of the needle and after said strand of the cord is engaged between the next following finger 9^b of the cup holder and the shoe, said strand is still yielded with the first strand, but with increasing restraint as the said finger carries the cord farther and farther into engagement between it and the shoe; and by the time the parts have reached the position shown in Fig. 6, both cords are held with substantially equal firmness of grasp between the shoe and the respective flanges of the holder which are bearing against said strands respectively. The cord thus yielded by the rotation of the holder at the side at which the cords are engaged, is substantially sufficient to form the loop which encompasses the bill, and from that point on, to the completion of the rotation of the bill, the loop is tightened on the bill, the cords having already been received in the jaw as seen in Fig. 6, and both strands stretching from the bill to the holder, are drawn taut ready to be cut as hereinafter described.

A cord guide 8, is fulcrumed on the breast plate at 8^a (seen in Figs. 1 and 2) and has the cord severing knife rigidly attached to the end remote from its fulcrum and up-standing substantially parallel to the flange of the holder cup across the plane of the path of the cord (see Figs. 1 and 2), during the period of formation of the knot as may be seen in Figs. 5 and 6. While the

knotter bill is moving from the position at which it is shown in Fig. 6, to the position of rest, at which it is seen in Fig. 5, the knife arm is operated by means which will now be described, for thrusting the knife against the taut cords for severing them. For causing this movement, there is journaled in a bearing 4^a of the knotter frame, the shaft of a beveled pinion 16 which meshes with two separated gear segments 3^t, and 3^s, on the forward side of the knotter actuating wheel, outside of an annular delay flange 3^b, which is interrupted at 3ⁱ, 3^j, radially inward from said gear segments 3^t, 3^s. The pinion 16, has a delay hub 16^a, suitably formed to hold the pinion non-rotating throughout the rotation of the wheel 3, except at the part at which the segments 3^t, and 3^s, engage said pinion, the interruptions 3ⁱ, of the delay surface being suitably related to the delay hub to permit the rotation of the pinion at that point, and the extent of the gear segments 3^t, and 3^s, being such that each of them gives to the pinion a half revolution. To the lower end of the pinion shaft, that is the end toward the breast plate, there is secured a crank disk 19, from which the pitman link 20, extends to the knife arm 8, being pivotally connected thereto intermediate the fulcrum of the knife arm and the knife-carrying end, so that each half rotation of the pinion 16, by the engagement thereof with one of the gear segments 3^t, and 3^s, swings the knife arm in one direction or the other, thus giving to the knife arm such motion as it would receive by ordinary crank connection with the continuous rotating shaft, but controlling said movement so that the oscillations are both made in a small portion of the rotation of the wheel 3, and at two points in that rotation, both contained within ninety degrees, so that the entire movement of the knife arm occurs during one quarter of the revolution of the wheel 3, the arm being stationary in the remaining three quarters, its stationary position being that at which the knife is out of service; that is in the position shown in Figs. 5 and 6. The knife arm beside carrying the knife as described, and giving it a movement timed as desired with respect to the formation of the knot and stretching of the cords for cutting, is shaped so as to perform the further service of providing a cord-stop across the breast plate slot for lodgment of the cord in the retreat and also in advancement of the needle, this function being performed by making the knife arm in the form most clearly seen in Fig. 3, in which it is shown trending from its fulcrum on the breast plate obliquely across the needle slot in the breast plate and thence parallel with the slot to a point nearly opposite the knotter bill, and thence obliquely back and across said slot

to the knife-carrying end between the knotter bill and holder. The oblique trend of the last mentioned portion 8^c of the knife arm adapts it not only to provide lodgment for the cord strands but to also deflect them laterally toward the shank or spindle of the knotter bill, causing them to be close to the spindle when the knotter bill revolves for wrapping the cord for forming the loops of the knot, and thus insuring the retention of the cords on the bill until they are wrapped, after which escape is impossible.

The arm 8 is constructed and actuated for additional functions in connection with the stripping of the knot from the bill and the laying of the cord in the retreat of the needle. For these functions the obliquely trending edge 8^c which serves to guide the cord toward the spindle of the knotter bill is produced as one edge of an oblique hook which terminates the arm 8 at the end remote from its fulcrum, the cord being deflected into the hook to the end thereof, along said oblique edge 8^c, the hook at the rest position of the arm, that is during the formation of the knot on the bill, being positioned with the end of the hook substantially in line with the knotter bill axis, so that the band cords are engaged by the hook close up to the knotter bill above the breast plate when the knot is finished; and the swinging movement of the arm 8, which brings the knife against the cords for severing them draws the band cords, and may draw the bundle, over to a position beyond the point of the bill in the direction in which the bill trends, which is cross-wise of the plane of the needle slot and band. The gear segments which mesh with the pinion 16, for actuating the arm 8, are positioned on the knotter actuating wheel with respect to the knotter bill actuating segment and with respect to the bundle discharge arm 17, (which is bolted to the side of the knotter actuating wheel, and projects therefrom in the usual manner, for swinging through the bundle space to eject the bundle), so that the said swinging movement of the arm 8 for deflecting the band cords and severing the cord beyond the knot occurs while the knotter bill is at rest after having finished the wrapping of the cords about it to form the knot, and before the discharge arm has traversed the bundle space for materially disturbing the position of the bundle; and the delay surface between the gear segments 3^t and 3^s is of such extent that the arm 8, stands at rest with the hook 8^a, at the opposite side of the plane of the needle's slot from that in which the axis of the knotter bill stands, while the discharge arm traverses the bundle space for ejecting the bundle, so that a pull of the bundle on the knot still hanging on the knotter bill is caused to be lengthwise of the bill, the cords being deflected in that

direction over the hook, and this results in the stripping of the bill from the knot by a pull in the proper direction without imposing undue strain upon the bill or the
5 cords.

It may be understood that the retreat of the needle carrying the cord back above the bill into position for receiving a new bundle, occurs at the usual time with respect to the
10 operation above described, and it would thus lay the cord across the knotter bill before the stripping of the knot from the bill has occurred. In order to prevent the cord thus laid at this stage from either pre-
15 maturely stripping the knot or obstructing the stripping, the arm 8 is provided with a transversely extending finger 8ⁱ, which is upraised so as to constitute a lodgment for the cord thus laid by the retreating needle,
20 at a point at the opposite side of the bill from the holder and high enough so that the cord running from the point of grasp of the holder onto such finger, is sufficiently above the knotter bill to avoid engagement with
25 the loops of cord on the bill. This finger is preferably curved in an arc above the fulcrum of the arm 8, so that in the swinging of the arm back and forth the position of the cord lodged on it is not changed. This
30 finger 8ⁱ, necessarily extends only from the side of the hook 8^a opposite the oblique or guiding edge 8^e, since it is to stop and hold the cord only while the arm is deflected to carry the said oblique edge out of the cord
35 path.

I claim:

1. In a cord holder for grain binders, in combination with the binder arm or needle, a rotating knotter bill and a rotating mem-
40 ber of a cord holder, means for rotating the bill and the holder member, adapted to give the holder member less than half a revolution for each full revolution of the bill, and for moving them in the same direction at
45 the sides of their respective axes at which the cord is laid, the holder member having cord engaging projections transverse to the plane of its rotation, and cord-receiving notches between the projections and a clamp-
50 ing shoe bearing against the projections at the opposite side of the needle's path from the axis of the holder, the latter being positioned for lodgment of the cord laid by the needle in a notch at the side of the holder
55 remote from the knotter bill.

2. In a cord knotter for grain binders, in combination with the binder arm or needle, a rotating knotter bill and a rotating mem-
60 ber of a cord holder having their axes at the same side of the plane of the needle's path; means for rotating the bill and holder member in the same direction about their respective axes, adapted for giving the holder member less than half a revolution for each
65 full revolution of the bill, said holder mem-

ber having cord-engaging projections transverse to the plane of its rotation, and cord-receiving notches between the projections; a clamping shoe bearing against the pro-
70 jections at the opposite side of the needle's path from the axis of the holder, the latter being positioned for lodgment of the cord laid by the needle in a notch at the side of the holder remote from the knotter bill.

3. In a cord holder for grain binders, in
75 combination with the binder arm or needle, a rotating knotter bill and a rotating member of a cord holder, means for rotating the bill and holder member, adapted for giving the holder member one quarter of a revolu-
80 tion for each full revolution of the bill and for moving them in the same direction at the sides of their respective axes at which the cord is laid by the needle; said holder member having four cord engaging projec-
85 tions transverse to the plane of its rotation, and cord-receiving notches between the projections, a clamping shoe cooperating with the holder member at the opposite side of the needle's path from the axis of the holder
90 member, the latter being positioned for lodgment of the cord by the needle in a notch at the side of the holder remote from the bill.

4. In a cord knotter for grain binders, in combination with the binder arm or needle,
95 a rotating knotter bill and a rotating holder member having their axes at the same side of the plane of the needle's path; means for rotating the bill and holder member in the same direction about their respective axes
100 adapted for giving the holder member one quarter of a revolution for each full revolution of the bill; said holder member having four cord-engaging projections transverse to the plane of its rotation, and cord-receiv-
105 ing notches between the projections; a clamping shoe cooperating with said holder member at the opposite side of the needle's path from the axis of said member, the latter being positioned for lodgment of the
110 cord by the needle in a notch at the side of the holder remote from the bill.

5. In a cord knotter for grain binders, in combination with the binder arm or needle, a rotating knotter bill and a rotating cord
115 holder member; means for rotating the bill and holder member adapted for giving the latter less than half a revolution for each full revolution of the bill and for moving both said bill and holder member in the
120 same direction at the sides of their respective axes at which the cord is laid; said holder member having cord-engaging projections transverse to the plane of its rotation, and cord-receiving notches between the
125 projections; a clamping shoe cooperating with said holder member at the opposite side of the needle's path from the axis of the holder member; the latter being positioned for lodgment of the cord laid by the
130

needle in a notch at the side remote from the bill, the rotating means being adapted for bringing the holder to rest at the completion of each revolution of the bill with the notch of the holder which is at the side toward the bill situated at the same side of the cord path as the axis of the holder.

6. In a cord knotter for grain binders, in combination with the binder arm or needle, a rotating knotter bill and a rotating cord holder member having their axes at the same side of the needle's path; means for rotating the bill and holder member in the same direction about their respective axes; said holder member having cord-engaging projections transverse to the plane of its rotation, and cord-receiving notches between the projections; a shoe cooperating with said holder member for clamping the cord thereagainst at the opposite side of the needle's path from the axis of the holder, the latter being positioned for lodgment of the cord laid by the needle in a notch at the side of the holder remote from the knotter bill; means for rotating the bill and holder member in the same direction about their respective axes, adapted for rotating the holder in steps amounting each to less than half a revolution for each full revolution of the knotter bill, and for halting the holder at each step with the notch which is at the side of the holder toward the bill situated on the same side of the cord path as the axis of the holder.

7. In a cord knotter for grain binders, in combination with the binder arm or needle, a rotating knotter bill and a rotating cord holder member, the holder member having four projections transverse to the plane of its rotation and cord-receiving notches between the projections, and positioned for lodgment of the cord at the side remote from the bill; a clamp cooperating with said rotating holder member for holding the cord, situated at the opposite side of the needle's path from the axis of the holder; means for rotating the bill and holder member, adapted for rotating the holder member in steps amounting to a quarter revolution for each full revolution of the bill and bringing it to rest with the notch opposite that in which the cord is laid by the needle situated at the same side of the cord path as the axis of the holder.

8. In a cord holder for grain binders, in combination with the binder arm or needle, a rotating knotter bill, and a rotating cord holder having their axes at the same side of the needle's path, the holder member having four cord-engaging projections transverse to the plane of its rotation, and cord-receiving notches between the projections; a shoe cooperating with said holder member for holding the cord situated at the opposite side of the needle's path from the axis

of the holder, the latter being positioned for lodgment of the cord laid by the needle in a notch at the side of the holder remote from the knotter bill; means for rotating the bill and holder member in the same direction about their respective axes, adapted for giving the holder member one quarter of a revolution for each full revolution of the bill, and for bringing said holder member to rest at the conclusion of the revolution of the bill with the notch at the opposite side from that in which the cord is laid by the needle situated at the same side of the cord path as the axis of the knotter bill.

9. In a cord knotter for grain binders, in combination with the binder arm or needle, a rotating knotter bill and a rotating cord holder having their axes at the same side of the needle's path, and means for rotating them in the same direction about their respective axes adapted for giving the holder member one quarter of a revolution for each full revolution of the bill; the holder member having four projections transverse to the plane of its rotation and notches between them and being positioned for lodgment of the cord in a notch at the side remote from the bill; a clamp cooperating with said rotating member for holding the cord on the projections, such clamp being extended between the knotter bill and the rotating holder member, and being at such extended part higher than the cord-engaging projections of the holder.

10. In a cord knotter for grain binders, in combination with the binder arm or needle, a rotating knotter bill, and a rotating cord holder; means for rotating the bill and holder member; the holder member having four projections transverse to the plane of its rotation, and cord-receiving notches between the projections; a shoe cooperating with the projections for clamping the cord, situated at the opposite side from the needle's path from the axis of the holder, the latter being positioned for lodgment of the cord laid by the needle at the side remote from the knotter bill; means for rotating the bill and holder, adapted for giving the holder a quarter revolution for each full revolution of the bill and for moving both said bill and holder in the same direction at the sides of their respective axes at which the cord is laid, and for bringing the holder to rest at the conclusion of each full revolution of the bill, with the notch which is at the side toward the bill situated on the same side of the cord path as the axis of the holder, the shoe being extended between the knotter bill and the rotating member of the holder, and being at such extended part higher than the cord-engaging projections of the holder.

11. In a cord knotter for grain binders, in combination with the binder arm or needle

dle, a rotating knotter bill and a rotating cord holder member, said holder member having four projections transverse to the plane of its rotation and cord-receiving notches having four cord-engaging projections transverse to the plane of its rotation, and cord-receiving notches between the projections and positioned for lodgment of the cord at the side remote from the bill; a shoe cooperating with said member for holding the cord on the projections, situated at the opposite side of the needle's path from the axis of the holder; means for rotating the cord holder member, adapted for giving the holder a quarter revolution for each full revolution of the bill and for moving both said members in the same direction at the sides of their respective axes at which the cord is laid, the holder projections having their rear edges under-cut for overhanging the notches.

12. In a cord knotter for grain binders, in combination with the binder arm or needle, a rotating knotter bill and a rotating cord holder member, said holder member having four projections transverse to the plane of its rotation and cord-receiving notches between the projections, and positioned for lodgment of the cord at the side remote from the bill; a shoe cooperating with said member for holding the cord on the projections, situated at the opposite side of the needle's path from the axis of the holder; means for rotating the cord holder member, adapted for giving the holder a quarter revolution for each full revolution of the bill and for moving both said members in the same direction at the sides of their respective axes at which the cord is laid; the holder projections having their rear edges under-cut for overhanging the notches, and the rotating means being adapted for finishing each quarter revolution of the holder with the notch opposite that in which the cord is laid having its mouth situated at the opposite side of the needle's path from the cord clamp.

13. In a cord knotter for grain binders, in combination with the binder arm or needle, a rotating knotter bill and a rotating cord holder, having their axes at the same side of the needle's path; means for rotating them in the same direction about their respective axes, adapted for giving the holder member one quarter of a revolution for each full revolution of the bill; said holder member having cord-engaging projections transverse to the plane of its rotation, and cord-receiving notches between them, and being positioned for lodgment of the cord in a notch at the side remote from the bill; a clamp cooperating with said rotating member for holding the cord on the projections, the rotating means being adapted for finishing each quarter revolution of the holder

with the notch at the side proximate to the bill situated at the opposite side of the cord path from the clamp, the clamp being extended between the knotter bill to the holder member and being at such extended part higher than the cord-engaging projections of the holder, said holder projections being undercut for overhanging the notches.

14. In a cord knotter for grain binders, in combination with the binder arm or needle, a rotating knotter bill and a rotating cord holder member, the cord holder member having four projections transverse to the plane of its rotation, and cord-receiving notches between them, and being positioned for lodgment of the cord in a notch at the side remote from the bill; a clamp cooperating with said member for holding the cord on the projections situated at the opposite side of the cord-path from the holder axis; means for rotating the bill and holder member, adapted for giving the holder member one quarter of a revolution for each full revolution of the bill and for bringing said member to rest after carrying the mouth of the notch opposite that at which the cord is laid past the cord path.

15. In a cord knotter for grain binders, in combination with the binder arm or needle, a breast plate having a slot for the needle's path, a knotter bill, a gear wheel for rotating it adapted to bring it to rest with the jaws trending across the needle slot of the breast plate, a cord-guide arm fulcrumed at one side of the entering path of the needle and deflected from its fulcrum across the plane of said path outside the swing of the needle, and deflected back across said path within the swing of the needle proximate to the knotter bill, and at said last mentioned deflected portion providing an oblique lodgment for the cord trending toward the axis of the knotter bill, and means for actuating said cord guide comprising a rock shaft journaled on the knotter frame, having at one end a crank arm; a link from said crank arm to said guide arm; a pinion at the other end of the rock shaft and a gear segment on the knotter actuating wheel adapted to give the pinion and rock shaft one complete revolution during a partial revolution of the knotter actuating wheel.

16. In a cord knotter for grain binders, in combination with the binder arm or needle, a breast plate having a slot for the needle's path; a knotter bill; a gear wheel and a gear segment thereon for rotating the bill, adapted to bring it to rest with the jaws trending across the needle slot of the breast plate; a cord guide arm extending past the knotter bill between the same and the breast plate, and having substantially at the point where it passes the bill a lateral recess for engaging the band cords between the bill and the breast plate; a cord-severing knife

mounted on said arm at the discharge side of the bill; a gear segment on the knotter-bill actuating wheel, and a gear pinion actuated by such segment, and connections from said pinion to the arm for oscillating it by the rotation of the pinion; said gear segment being positioned for engaging the pinion and oscillating the arm after the rotation of the knotter bill is finished.

17. In a cord knotter for grain binders, in combination with the binder arm or needle, a breast plate having a slot for the needle's path; a knotter bill; a wheel having a gear segment for rotating the bill adapted to bring it to rest with the jaws trending across the slot of the breast plate; an arm fulcrumed on the breast plate extending past the knotter bill between the same and the breast plate, having substantially at the point where it passes the knotter bill a lateral recess for engaging the band cords, and having its edge extending back of said recess in the direction which the needle enters sloped obliquely transverse to the plane of the needle's path; means for actuating and governing the position of said arm, comprising a rock shaft journaled on the knotter frame, having at one end a crank, a link connecting said crank to said arm; a gear pinion on said shaft, and a gear segment and delay surfaces on the knotter-bill actuating wheel, positioned thereon for holding the arm at rest with said cord-engaging recess situated at the same side of the needle slot as the knotter bill axis and said oblique edge extending from said recess across the needle slot, and for giving the rock shaft a full rotation to oscillate the arm after the rotation of the knotter bill is completed.

18. In a cord knotter for grain binders, in combination with the binder arm or needle, a breast plate having a slot for the needle's path, a knotter bill, a wheel having a gear segment for giving the bill a full rotation in a partial rotation of said wheel, adapted to bring the bill to rest after the completion of the knot trending across the needle slot of the breast plate; an arm fulcrumed on the breast plate extending past the knotter bill between the same, and the breast plate having a cord-guiding edge which at the position of rest of said arm extends obliquely across the needle's slot from the side opposite the knotter bill axis to a point at the same side as said axis and between the bill and the breast plate, and having at the farther end of said edge a hook for laterally engaging the band cords; means for actuating and governing the position of said arm, comprising a rock shaft on the knotter frame having a crank; a link from the crank to said arm for oscillating it by rotation of the rock shaft; a pinion on the rock shaft, and two gear segments with intervening de-

lay surfaces on the knotter actuating wheel, positioned for cooperating with said pinion to give the rock shaft two half revolutions after the completion of the knot-forming action of the bill.

19. In a cord knotter for grain binders, in combination with the binder arm or needle, a breast plate having a slot for the needle's path; a knotter bill; a wheel having a gear segment for rotating the bill adapted to bring it to rest with the jaws trending across the needle slot of the breast plate; an arm fulcrumed on the breast plate, extending past the knotter bill between the same and the breast plate, having an oblique cord guide edge at the needle entering side of the bill; a cord-engaging hook at the farther end of said guide edge, and a cord severing knife carried by said arm at a point beyond the bill and remote from its needle-entering side; means for oscillating said arm comprising a rock shaft on the knotter frame, a crank on said shaft and a link from the crank to the arm; a pinion on the shaft, and gear segments and delay surfaces on the cord knotter actuating wheel, positioned for giving the pinion and rock shaft after the substantial completion of the rotation of the bill two half revolutions with an interval of rest, and means for discharging the bundle, positioned and actuated for so discharging it in said rest interval.

20. In a cord knotter for grain binders, in combination with the binder arm or needle, a breast plate having a slot for the needle's path; a knotter bill; a wheel having a gear segment for rotating the bill, adapted to bring it to rest trending across the needle slot of the breast plate; a cord guide arm mounted for oscillating crosswise of the needle slot above the breast plate, having an obliquely extending hook one of whose edges extends obliquely across the needle slot near the bill and an upraised cord stop finger extending from the opposite edge of said hook transversely of the breast plate slot; and means for oscillating said arm, comprising a rock shaft on the knotter frame, a crank thereon and a link from the crank to said arm, a gear pinion on the rock shaft and gear segments and delay surfaces on the knotter-bill actuating wheel, positioned for engaging said gear pinion to give it two half revolutions with an interval of rest after the substantial completion of the knotter bill's revolution.

21. In a cord knotter for grain binders, in combination with the binder arm or needle, a breast plate having a slot for the needle's path; a knotter bill; a wheel having a gear segment for rotating the bill, adapted to bring it to rest with the jaws trending across the needle slot of the breast plate; a cord holder; an arm fulcrumed for swinging transversely of the plane of the needle's path

between the knotter bill and the breast plate, having proximate to the knotter bill an obliquely extending hook one of whose edges constitutes an oblique cord guide for
5 deflecting the cord toward the knotter bill axis; a cord stop finger extending from the opposite side of the hook at the opposite side of the bill from the holder having its upper edge positioned above a line extending from
10 the cord lodgment on the holder to a point on the surface of the knotter bill, for holding the cord laid by the retreating needle across the knotter bill without disturbing the knot; a discharge arm; means for oscillating said cord guide arm, comprising a
15 rock shaft on the knotter frame, a crank on said rock shaft, a link from said crank to

said cord guide arm, a pinion on said shaft and gear segments and delay surfaces on the knotter bill actuating wheel positioned and
20 spaced thereon for giving the rock shaft half a revolution after a substantial completion of the knotter bill's revolution and before the discharge arm displaces the bundle, and a second half revolution to a position
25 back of the position of rest after the discharge arm has traversed the bundle space.

In testimony whereof I have hereunto set my hand at Plano, Ill., this 10th day of Sept., 1909.

JOSEPH BODA.

Witnesses:

J. W. LONG,
CHAS. BLAKELY.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."
