No. 755,748. PATENTED MAR. 29, 1904.

C. COLAHAN.

GRAIN BINDER.

APPLICATION FILED OCT. 21, 1902. RENEWED JAN. 2, 1904.

NO MODEL. 2 SHEETS—SHEET 1.

Fig. 1

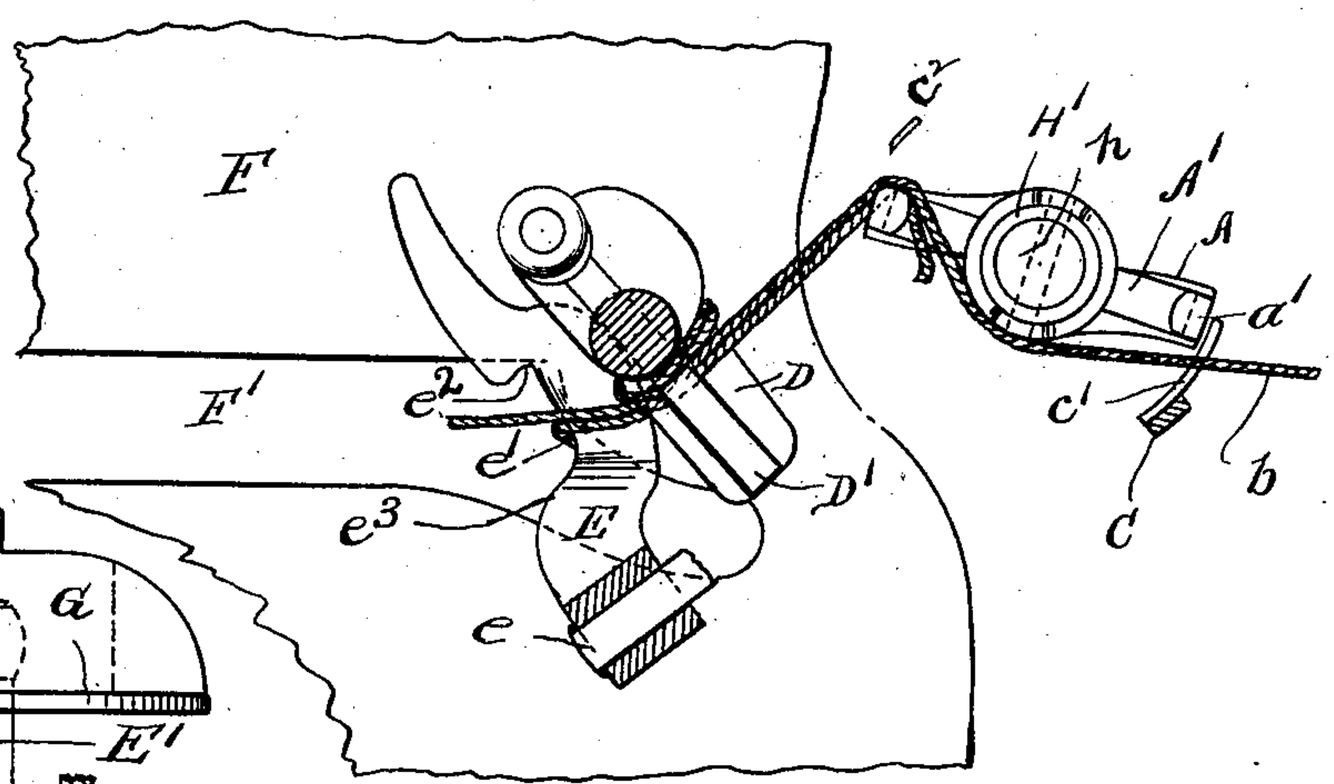


Fig. 3

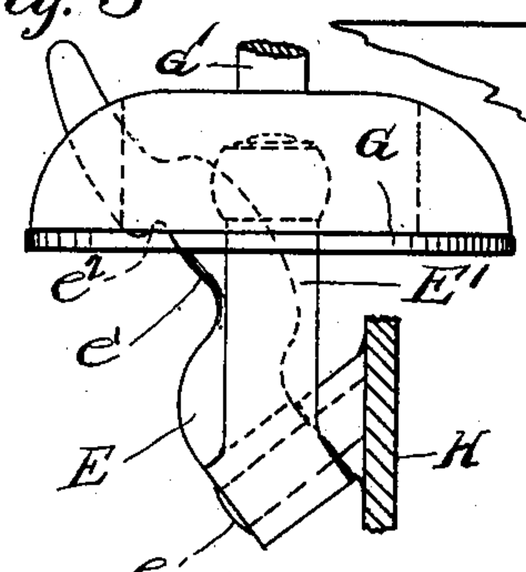


Fig. 2.

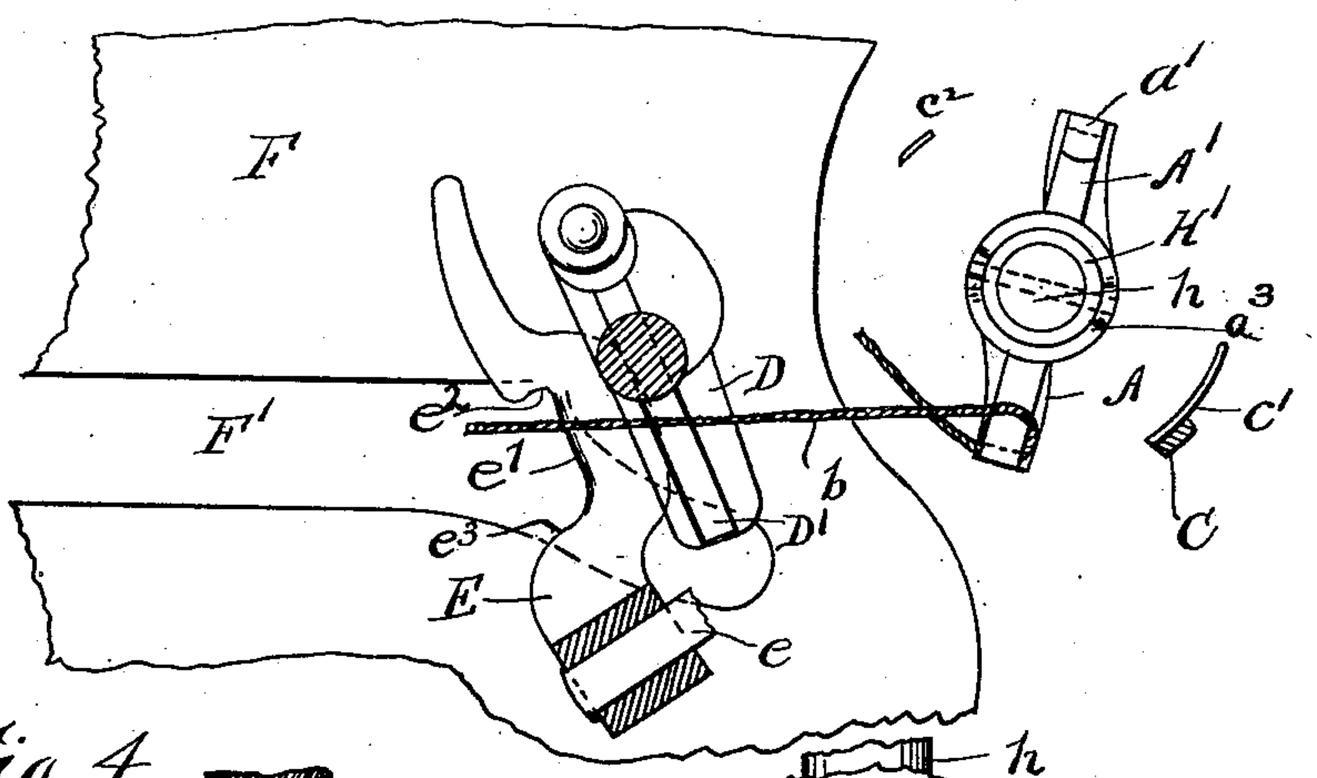


Fig. 4

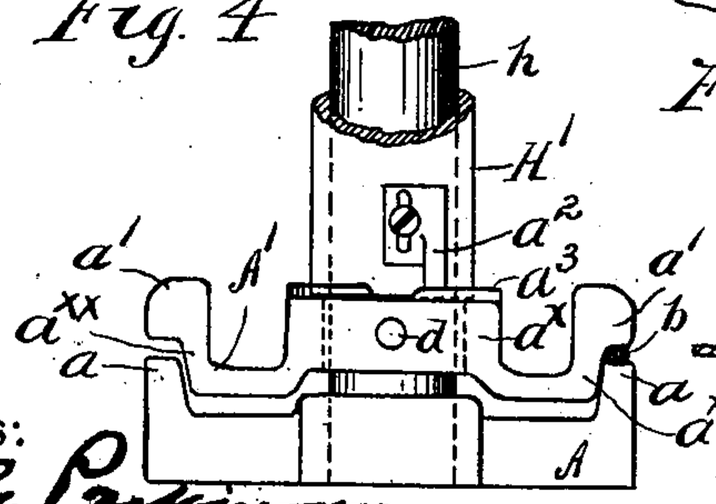
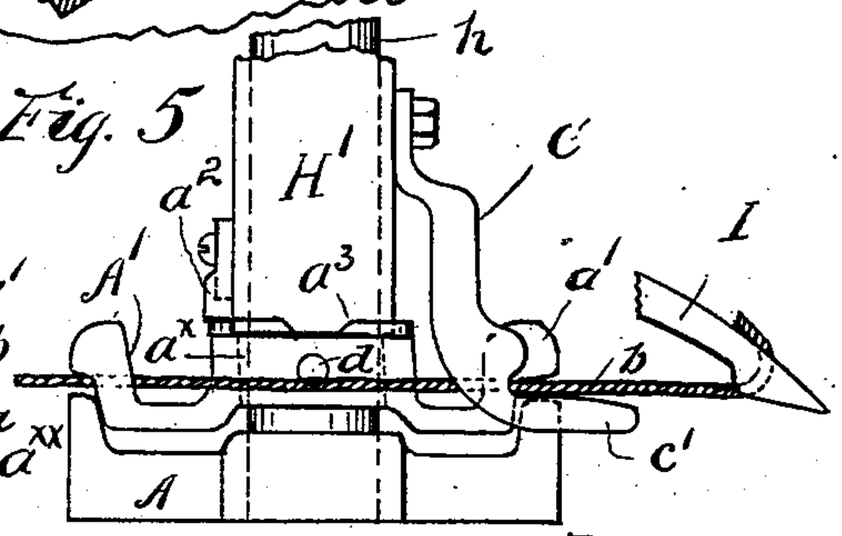


Fig. 5



Witnesses:
Joseph E. Parkinson
M. H. Colahan

Inventor,
Chas Colahan

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NO MODEL. 2 SHEETS—SHEET 2.

Fig. 6

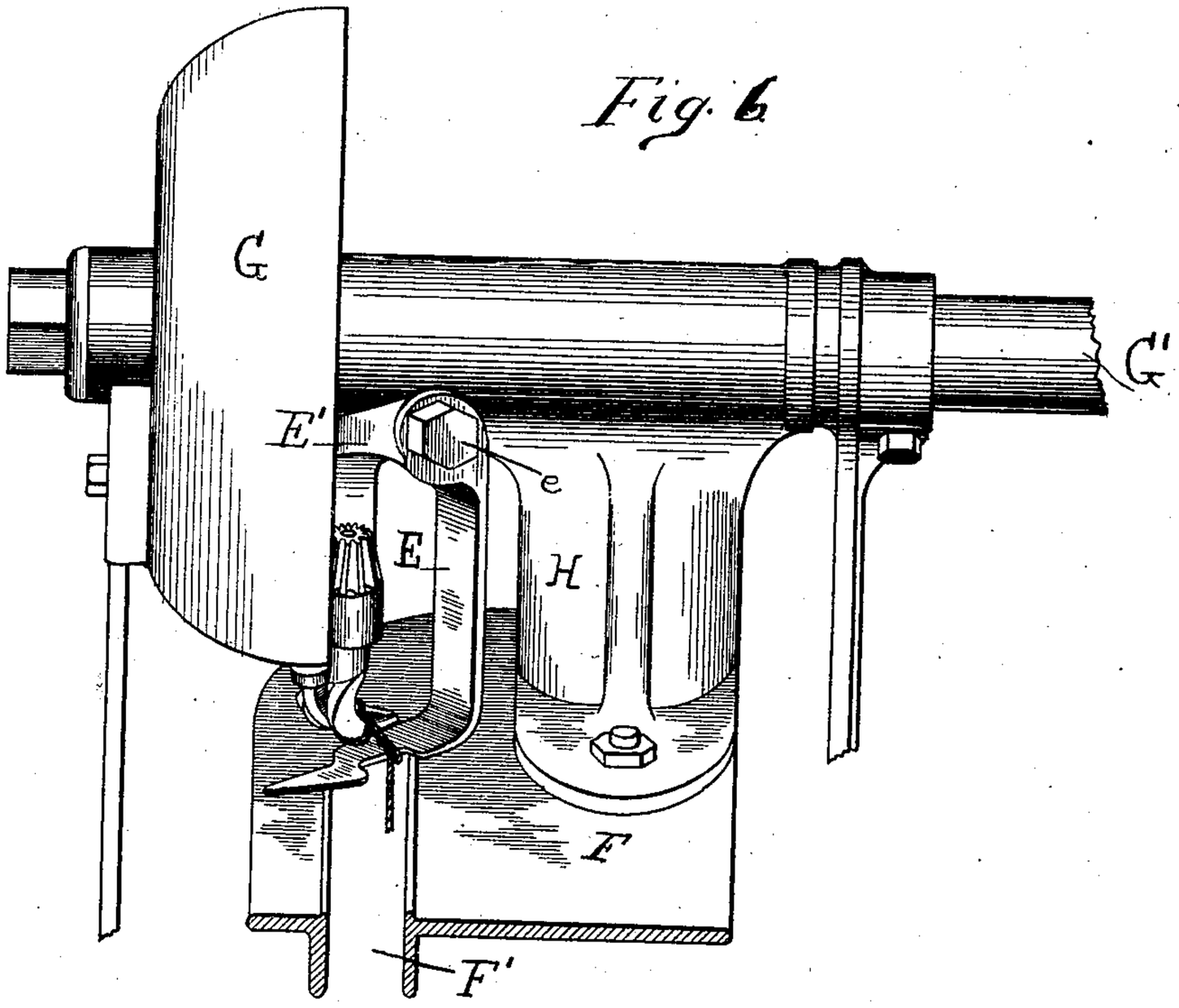
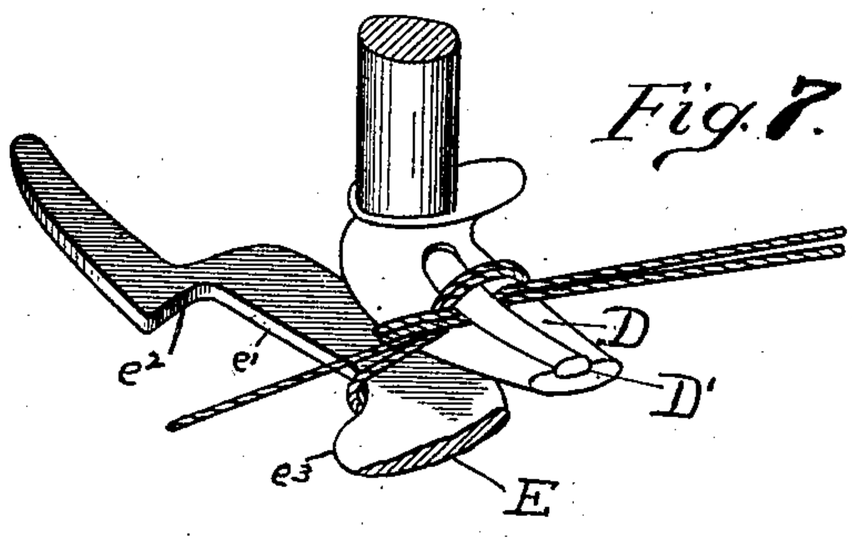


Fig. 7.



WITNESSES:

M. H. Colahan.

Otto Hochelman

INVENTOR

Chas Colahan

No. 755,748. Patented March 29, 1904.

UNITED STATES PATENT OFFICE.

CHARLES COLAHAN, OF CHICAGO, ILLINOIS.

GRAIN-BINDER.

SPECIFICATION forming part of Letters Patent No. 755,748, dated March 29, 1904.

Application filed October 21, 1902. Renewed January 2, 1904. Serial No. 187,543. (No model.)

To all whom it may concern:

Be it known that I, CHARLES COLAHAN, a citizen of the United States, and a resident of Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Grain-Binders, of which the following is a specification, reference being had to the accompanying drawings, forming a part hereof.

The object of my invention is to provide a knotting mechanism that will be more reliable in its action so far as the delivery of the cord and operation of the knotter is concerned than those heretofore known.

The invention consists, primarily, in a cord-holding device of two horizontally-rotating oppositely-located grasping-fingers that alternately seize one end of the cord from the needle-arm, hold it as the needle recedes, and place the cord over the knotter to await the laying of the companion strand as the needle rises to encircle the bundle and lays that strand also over the knotter, which then revolves. In the formation of the loop the slack is taken by one strand from the needle and by the other from the cord-holder in its continued revolution toward the knotter. The crossed strands of the loop are maintained at the upper side of and near the axis of the knotter by means of an obliquely vertically vibrating cord-supporting arm having a supporting extended face parallel with and slightly in advance of the upper side of the knotter, which arm vibrates on an oblique axis and admits the lateral movement of the cord over its extended face in the revolution of the knotter in tying the knot, and thus dispenses with this function heretofore obtained by the angular face of the breastplate, as shown in my former applications. This cord-supporting arm prevents the cord from slipping over the point of the knotter and aids in stripping the loop obliquely outward therefrom.

In the drawings, Figure 1 is a plan view of my invention, showing the knotter in its oblique position as it has completed its operation of tying the knot, one arm of the cord-holder having carried its cord thereto and being at the point of forcing the binder-arm strand against the knife which severs it, while the other arm is approaching said strand to press it against the cord-guide or stop-finger and seize it at this point just before it is severed by the knife. Fig. 2 is a plan view showing the cord-holder in its position after it has passed the cord-guide arm with the cord from the binder-arm, which latter has receded and laid its strand over the knotter and the face of the obliquely-vibrating cord-supporting arm and carried it down into the grain-receptacle to form the outer strand of the band for the succeeding bundle. Fig. 3 is a fragmental plan view showing the cam-wheel and a portion of its shaft and the knotter-supporting frame to illustrate the action of the obliquely-vibrating cord-supporting arm. Fig. 4 is a side elevation of the cord-holder in the position of holding one end of the cord, showing the rotary oscillating grasping-arms, their pivoted hub, one of the cams which are formed integral therewith on the upper surface of said hub, and the adjustable pressure-foot coacting with the cams. Fig. 5 is an elevation of the cord-holder at the moment it advances to take the cord from the needle, showing the cord-guide against which the cord is stopped to be seized by the grasping-jaw of the cord-holder. Fig. 6 is a perspective view looking from the rear, showing the position of the arm E with its cord-supporting face extending parallel with and in advance of the rear or upper side of the knotter as it revolves in forming the loop and permits the horizontal sliding movement of the bundle-cord strands on the supporting-face as they are moved across the same by the knotter carrying the strands from one side of the slot in the breastplate to the other and back as the knotter-shaft revolves, and thus preventing the strain on the bundle strands that are also maintained up at the side of the knotter-jaws, and when stripped therefrom, the bundle strands being supported at the rear side and horizontally above the side of the knotter, will carry the loop over the cord ends held by the knotter-jaws, and thus force the knot toward the bundle and tighten the band to the bundle. Fig. 7 is a detail view in perspective looking to-

ward the front of the knotter as it has completed its revolution, the bundle-strands being supported at the upper side of the knotter.

In the drawings, A is one of the lower arms of the rotary cord-holder, rigidly affixed to the holder-shaft and turned up at its end to provide the grasping-jaw *a*, against which the cord is clamped.

A′ is the corresponding upper oscillating arm, secured to a rocking hub $a^{\times}$, which is pivoted at *d* to the holder-shaft *h*, said arm having a contour corresponding closely with the opposing contour of the lower fixed arm—that is to say, a depressed body parallel with the body of said lower arm—an upstanding lug or abutment $a^{\times\times}$ parallel with and in close proximity to the inner face of the fixed jaw *a* to prevent the strand of cord from slipping down between, and an overhanging jaw *a′*, between which and said fixed jaw the cord is grasped when the oscillating arm is rocked down upon its pivot by the contact of presser-finger a^2, adjustably secured to the cord-holder frame H′, with the corresponding cam a^3 secured to the upper surface of the rocking hub. There are two of these cams formed integral with the hub, one terminating axially above one end of the pivot *d* and the second commencing axially above said end and both extending around to the opposite end of the pivot where the first commences, and the second terminates in the same relation as above. The pressure-finger passes from one cam to the other at the moment the cord is cut to open the jaws holding the old ends and simultaneously close the opposite jaws upon the new end. The recession of the needle-arm is so timed, relating to the rotation of the holder, that it lays the running strand of the cord inside the upstanding lug of the oscillating holder-arm, which has just clamped the new end, thus causing the running strand to be wrapped about said lug in the further rotation of the holder and securing a belaying hold.

C is the cord-guide stop-finger, which intervenes between the holder and the point of the needle and stays the strand stretching from the needle to the knotter in position to enter between the holder-jaws, where it is immediately grasped by the action of the pressure-foot upon the cam on that side of the holder.

c′ is the extended cord-supporting arm of the stop-finger, curved concentrically with the axis of rotation of the holder-jaws, so as to receive the strand laid by the needle and hold it up to a point where it will enter between the open jaws of the holder.

D is the knotter, normally standing, as shown in Fig. 2, with its jaws trending outwardly in the direction of the discharge of the bundle, D′ its vibrating jaw, and E is a cord-supporting and knot-stripping arm above the side of the knotter and between it and the cord-slot F′ in the breastplate F, vibrating upon a pivot *e*, projecting obliquely from the knotter-frame H, so that its cord-supporting face *e′*, being on a line parallel with and slightly in advance of the knotter, will support the bundle strands and maintain the cross strands of the loop at the side of the knotter-jaws on a plane therewith, which prevents the tightening of the loop below the same, and the movement of this arm outwardly from heel to point of the knotter and toward the bundle slips the loop from the knotter over the held ends of the strands and outwardly toward the bundle, thus making a tighter band and a knot that will not slip away from the bundle. At the lower end of the cord-supporting face of arm E, opposite the hook or cord-catch e^2 at the upper end of said face, is a shoulder or cord-stop e^3, trending across the cord-slot to prevent the cord from prematurely slipping over the ends of the knotting-jaws or down said slot. E′ is the actuating heel-piece of said cord supporting and stripping arm, operated by the gear and cam-wheel G, which has the usual cam for the purpose.

The object of making the pressure-finger a^2 adjustable is simply to provide a varying holding pressure upon the cord between the jaws, which may be more or less yielding, as desired.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The combination with the knotter with its jaws normally trending outward in the direction of the discharge of the bundle, the needle-arm, the rotary cord-holder provided with two oppositely-extending arms, devices coöperating with said arms for alternately seizing the cord from the needle by one arm and simultaneously releasing the tied end by the other arm and means for actuating said arms and devices substantially as shown and described.

2. The combination with the knotter with its jaws normally trending outward in the direction of the discharge of the bundle, of a cord supporting and stripping arm having its cord-supporting face over the breastplate-slot in advance of the grainward side of the knotter-jaws, and an oblique pivot for said arm upon which it swings in a plane parallel with the plane of the outwardly-trending jaws and their shaft substantially as and for the purposes specified.

3. The combination to form a cord-holder for grain-binders, of a revolving shaft, two oppositely-extending fixed bars rigidly secured to the foot thereof, upturned at their outer ends and having clamping-faces on top of said upturned ends, overlying counterpart arms having a transverse pivotal connection with the shaft on which they may be rocked in a plane parallel with the shaft, and carrying jaws at their outer ends to coact with the jaws on said bars, and means for alternately rais-

ing and depressing said arms substantially as shown.

4. The combination to form a cord-holder for grain-binders, of a revolving shaft, two oppositely-extending bars rigidly secured to the foot thereof having upturned ends and bearing fixed clamping-jaws at the top thereof, a hub pivoted to said shaft, arms rigid with and partaking of the rocking movement of said hub over the fixed bars and bearing counterpart clamping-jaws at their ends, and means for rocking the hub as the shaft revolves, to depress one of the arms to clamp the new cord and simultaneously raise the other arm to release the old end of the cord.

5. The combination to form a cord-holder for grain-binders, of a revolving shaft, two oppositely-extending bars rigidly secured to the foot thereof having upturned ends and bearing fixed clamping-jaws at the top thereof, a hub pivoted to said shaft, arms secured to the hub, projecting over and corresponding in contour with the opposing contour of the lower fixed arms therebeneath, and having upstanding lugs and overhanging counterpart jaws and means for rocking the hub as the shaft revolves substantially as shown and described.

6. The combination, to form a cord-holder for grain-binders of a revolving shaft, two oppositely-extending bars rigidly secured to the foot thereof having upturned outer ends, and having clamping-jaws thereon, a hub pivotally secured to said shaft on a central transverse axis above said bars, cams formed upon the hub extending therearound from one end of the pivot-pin to the other on both sides of the axis thereof, arms extending from the hub at right angles to said pivot-pin over the fixed bars and having jaws at their outer ends to coact with the jaws upon said bars, and a pressure-finger adjustably secured to the frame to act upon said cams.

7. The combination of a binder-arm with a revoluble cord-holder having a rotary shaft, a bar fixed thereto, and having an upwardly-turned end with a clamping-surface at the top thereof, an arm pivoted to the shaft by a transverse pivot above said bar and partaking of the opposing contour of the latter, with upstanding lug at its outer end forming an abutment for the cord, an overhanging jaw carried by said lug, means for oscillating said pivoted arm to grasp the cord, and means for operating said parts whereby the binder-arm in its retreat lays the cord strand just grasped, inside of said upstanding lug, whereby said strand is wrapped around the lug in the continued revolution of the holder.

8. The combination with the knotter revolving on its axis and normally resting with its jaws trending outwardly in the direction of discharge of the bundle, of the slotted breastplate, the arm E, vibrating upon oblique pivot e and arranged between the breastplate and knotter and having its extended cord-supporting face e' parallel with and slightly in advance of the grainward side of the knotter-jaws, and a shoulder e^3 extending over the cord-slot to support and prevent the escape of the cord substantially as shown and described.

9. The combination with the holder-shaft, its oppositely-projecting fixed clamping-arms, the overlying clamping-arms oscillating on a pivot transverse to the shaft, and means for actuating the oscillating arms, of the curved cord-guide, the cord-stop, the knife opposite said cord-stop, the knotter, and the needle-arm arranged to lay the cord over said guide.

10. In a grain-binder having an open slotted breastplate in combination with the knotter normally resting on one side thereof, with its jaws trending outwardly in the direction of the discharge of the bundle, the arm E vibrating on oblique pivot e on the opposite side of said slot, and having its cord-supporting extended face e' parallel with and slightly in advance of the grainward side of the knotter, and with a shoulder e^3 trending across the slot to prevent the escape of the cord as it is being grasped by the knotter-jaws, and the stripping-hook e^2 at the opposite end to hold the crossed bundle strands up at the side of the knotter as it strips the loop therefrom substantially as shown and described.

11. In a grain-binder having an open slotted breastplate in combination with a knotter, the arm E pivoted to the knotter-frame above said slot and having its cord-supporting extended face e' trending across the slot parallel with and in advance of the side of the knotter and provided with a shoulder e^3 extending over the slot, thus maintaining the cord at the side of the knotter and preventing its escape as it is being grasped by the knotter-jaws, and the stripping-hook e^2 substantially as and for the purposes described.

CHARLES COLAHAN.

Witnesses:
HENRY E. STRASSHEIM,
M. H. COLAHAN.