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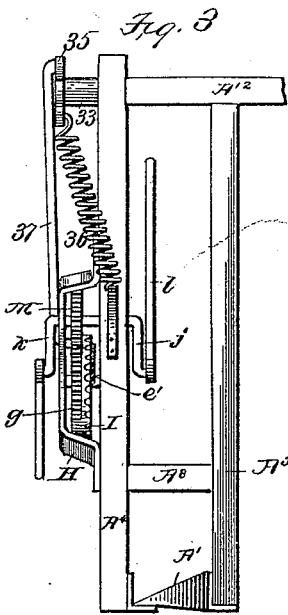
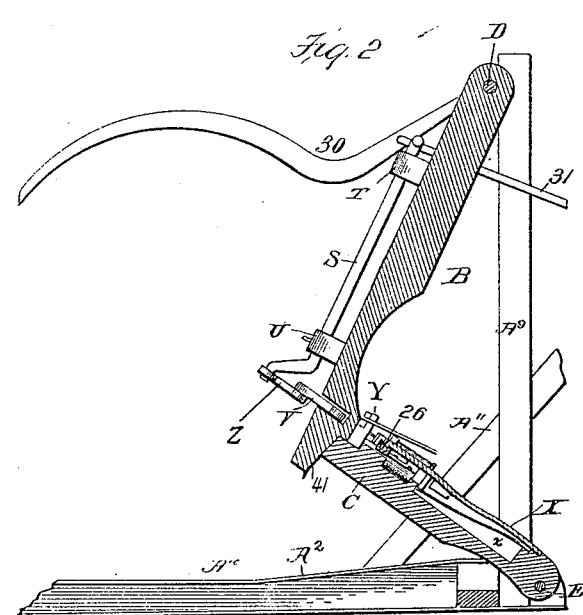
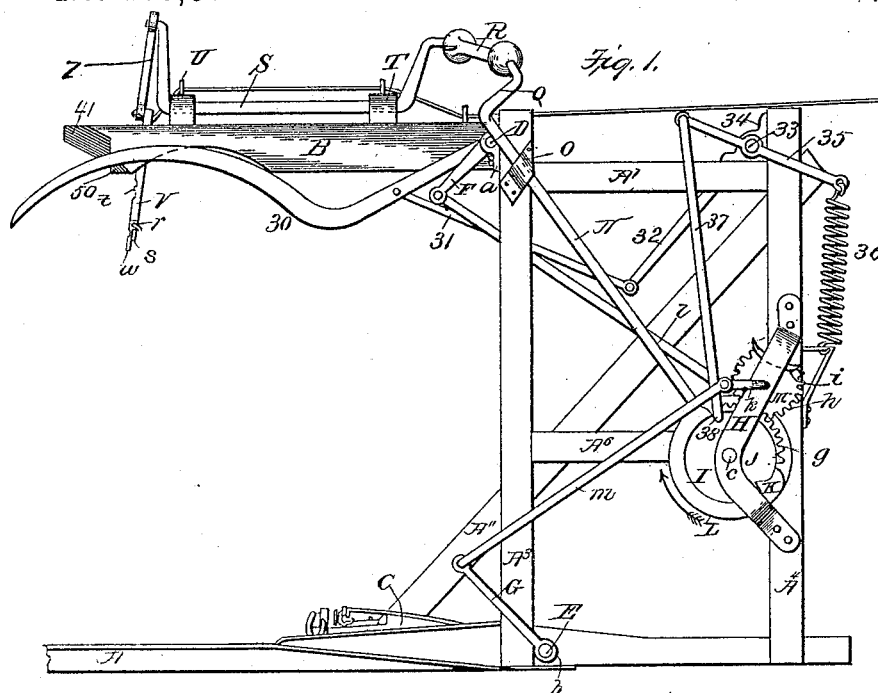
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G. SCHUBERT.

KNOTTING MECHANISM FOR GRAIN BINDERS.

No. 489,096.

Patented Jan. 3, 1893.



Witnesses
J. R. Cornwall
Wm. E. Dye.

Inventor,
George Schubert,
by J. H. Moore.

445-

(Model.)

3 Sheets—Sheet 2.

G. SCHUBERT.

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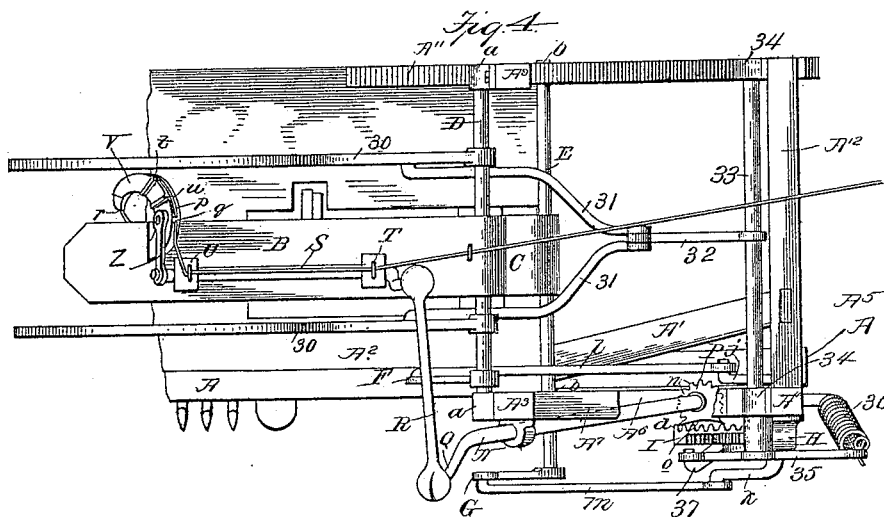
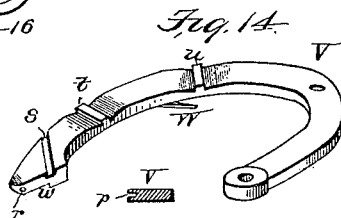
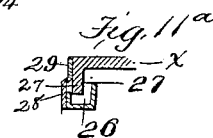
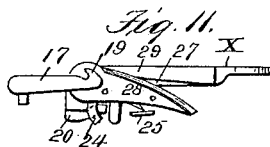
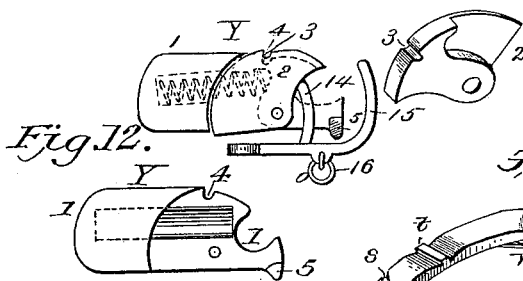
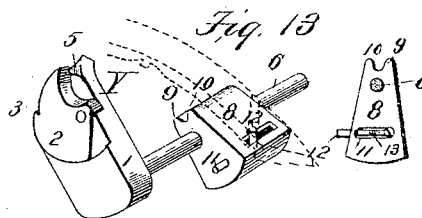
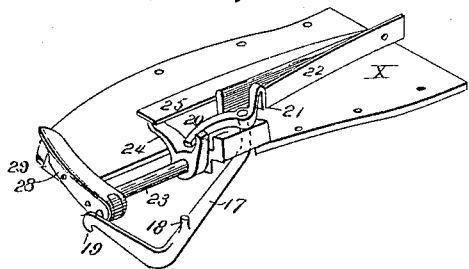
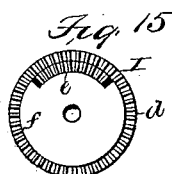


Fig. 10.



Witnesses
H. R. Cornwall
Wm. E. Dyre



Inventor,
George Schubert
 By *Wm. E. Dyre*
 Attorney

445

(Model.)

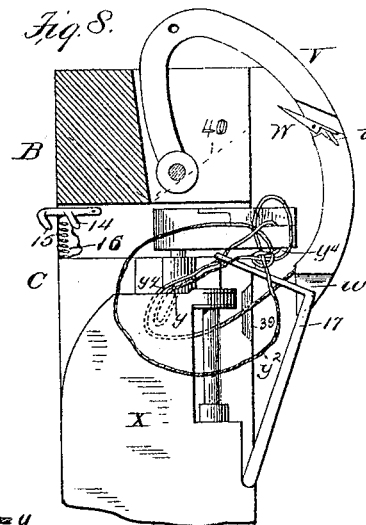
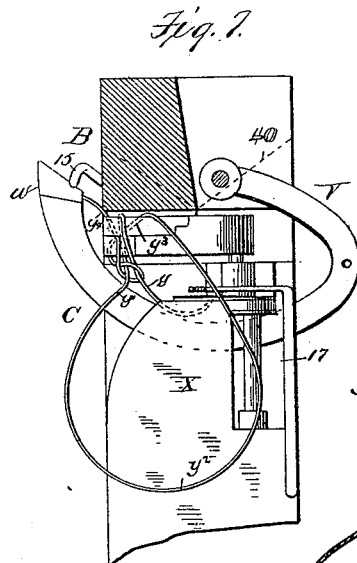
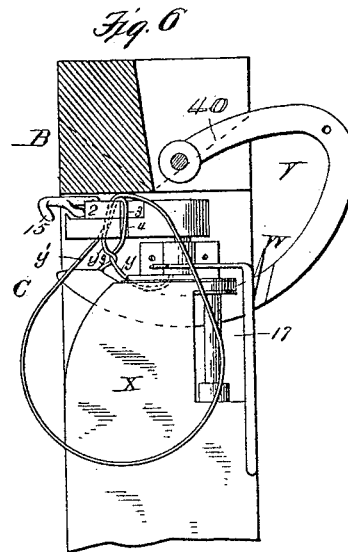
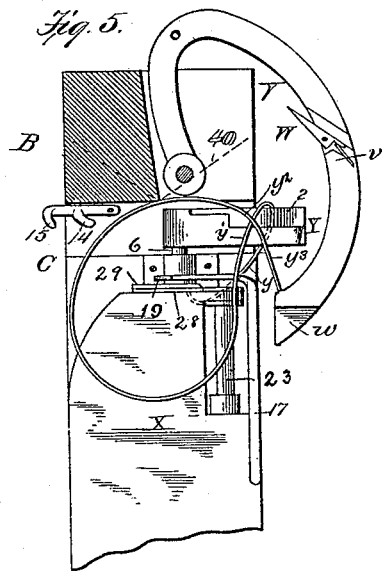
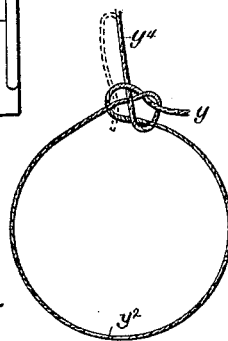
3 Sheets—Sheet 3.

G. SCHUBERT.

KNOTTING MECHANISM FOR GRAIN BINDERS.

No. 489,096.

Patented Jan. 3, 1893.

*Fig. 9.*

Witnesses:
H. M. Cornwall
Wm. E. Dye

Inventor,
George Schubert
 by *Wm. M. Moore*
 Attorney.

UNITED STATES PATENT OFFICE.

GEORGE SCHUBERT, OF WALNUT, TEXAS.

KNOTTING MECHANISM FOR GRAIN-BINDERS.

SPECIFICATION forming part of Letters Patent No. 489,096, dated January 3, 1893.

Application filed June 2, 1890. Serial No. 354,075. (Model.)

To all whom it may concern:

Be it known that I, GEORGE SCHUBERT, a citizen of the United States, residing at Walnut, in the county of Bosque and State of Texas, have invented certain new and useful Improvements in Knotting Mechanism for Grain-Binders; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to a grain binding attachment of the "low down" order, for harvesting machines, and has especial reference to the knotting mechanism constituting part thereof.

The object of said attachment is to automatically and successively gather cut grain into a gavel, to encircle it by a cord, to bind the latter firmly around the grain, to knot the binding cord, to sever it near the knot, and finally to discharge the bound sheaf leaving the machine ready to repeat the operation. The several constituent parts employed for this purpose are a pair of gathering arms, a needle for carrying the binding cord, a knotter, a take-up or tension device, shears and cord clamp for cutting and clamping the cord, and discharging-arms, all designed and arranged to co-operate and deliver grain in bound sheaves without the intervention of an operator.

In the accompanying drawings which form part of this specification: Figure 1, represents a front elevation of the binder attached to the cutter-bar of a harvester. Fig. 2—a central vertical section with the gathering-arms in a closed position. Fig. 3, a fragmentary rear view. Fig. 4, a top plan view. Figs. 5, 6, 7, and 8, sectional views taken on the plane in which the needle moves showing needle, knotter, cord-clamp, take-up, and cord in the various stages of forming a knot. Fig. 9, an enlarged view of the completed knot and binding loop. Fig. 10, an inverted perspective view of the guard-plate with cord-clamp, shears, take-up, and springs for operating them attached. Fig. 11, an end view of the guard showing take-up and shears open. Fig. 12, a side view of the knotter opened, and a perspective of its pivoted jaw. Fig. 13, a perspective view of the knotter and

its shaft and block, with an end view of the latter. Fig. 14, a perspective and sectional view of the needle detached, and Fig. 15, a rear view of the operating or master-wheel.

Reference being had to the drawings and letters and figures thereon A represents the cutter-bar of a harvesting machine, A' a metallic brace or support therefor, and A² a platform attached to the cutter-bar.

A³ A⁴ are vertical standards secured at their lower ends to the cutter-bar A; and A⁵ is a similar standard secured to brace A'.

A⁶ A⁷ are cross-bars framed into the standards A³ A⁴; and A⁸ a brace connecting in like manner standards A⁴ A⁵. A⁹ is also a vertical standard, secured to the rear sill A¹⁰ of platform A².

A¹¹ is an inclined brace framed into sill A¹⁰, standard A⁹, and, at its upper end into a cross-bar A¹², the latter connecting the upper ends of brace A¹¹ and standards A⁴ A⁵. Said standards, cross-bars, braces, cutter-bar, and platform constitute the frame of the binder.

Two gathering arms are provided which serve to compress the gavel to be bound when fed to them by a sweep-rake, a belt, or other well known form of conveyer, one of said arms carrying the needle, and one the knotting mechanism, and as a matter of convenience I term these the needle-bar B, and knotter-bar C. The needle-bar B is attached to a rock-shaft D having its bearings in brackets *a a* secured near the upper ends of standards A³ and A⁵. In a similar manner the knotter bar C is attached to rock-shaft E finding bearings *b b* in cutter-bar A and the inner end of platform-sill A¹⁰.

To the front end of each shaft D and E are rigidly secured arms F G respectively, for operating said shafts as will hereinafter appear, the arm F being the shortest, to move the needle bar through a larger arc of space than that of the knotter bar.

To the face of standard A⁴ is fixed a bracket H which affords a journal bearing for one end of a short shaft *c* the opposite end of which bears in cross-bar A⁶, and keyed thereon is a master-wheel I. The rear face of this wheel is provided with cogs *d* extending entirely around its inner edge, and immediately inside of these a series of cogs *e* forming an arc of a circle the balance of which is flush until the face of

the wheel is at *f*, and at stated intervals serves as a delay surface. The opposite side or front of wheel I is provided with an internal track J having a small inward projection or lug K thereon, while about one half of the outer edge of said track (same being part of the periphery of wheel I) forms a delay surface L and the remainder is devoted to cogs *g*.

Above wheel I is a pinion M provided with teeth *h* and delay shoe *i* secured to a shaft forming a double-crank *j*, *k*, journaled in bracket H and a bearing attached to standard A⁴. The cranks *j* and *k* which communicate with arms F, G through connecting-rods *l*, *m*, respectively, are operated through the medium of wheel I and pinion M; and the crank *j* acts upon the needle-bar B through its intermediate mechanism, slightly before the crank *k* acts in a similar manner upon the knotter-bar C, as will hereinafter appear.

A revolving shaft N is journaled in bearing O near the upper end of standard A³ and at its opposite end is loosely seated in cross-bar A⁶. Just above this point a pinion P is keyed thereon the latter being provided with teeth *n* and a delay-shoe *o* adapted to receive motion from wheel I, said delay shoe *o* being more prominent than the cogs *n*, and the cogs *e* are more prominent than the delay surface *f* on the wheel I, which causes the pinion P to properly engage with the cogs. This arrangement of depressed delay surfaces and raised cog, or prominent shoe and depressed delay-surfaces is old, well understood, and in general use. Shaft N terminates in a crank Q, and connected to this by a ball and socket joint is a rod R, which in turn is joined in like manner to a double crank S loosely secured in brackets T, U, on the back of the needle-bar B.

At the lower end of the needle bar is located a curved needle V, pivoted near its center of curvature, and provided with a circumferential groove *p* to receive the binding cord, also eyelets *q* to retain the cord therein, and an eye *r* through its free end. On its under side is a cam groove *s*, and teeth *t* and *u*; while in its upper surface is set a switch W, controlled by leaf-spring *v*, and its end is recessed or cut away at *w*, as and for a purpose that will hereinafter appear. Needle V receives its motion from the crank S through the medium of connecting-rod Z pivoted loosely to both.

The knotter-bar C is recessed as shown at *x* Fig. 2—which recess is covered by a metallic guard-plate X thus affording protection for certain parts contained therein action of which would otherwise be impeded by an accumulation of chaff or other foreign matter.

The knotter-head Y, as shown by Figs. 12 and 13 consists of a rigid and a pivoted jaw 1 and 2 respectively, the latter being pivoted on the former, and retained normally in a closed position by action of a spring within a pocket formed in part 1. Both jaws are

provided with transverse notches 3, 4 which register only when the jaws are wide open. The bottom of the notch 3 is flush with the adjacent upper surface of the foremost projection formed by the notch 4, thus the cord can be carried forward by the notch 3 as the jaw 2 closes, and the rigid jaw 1 is further provided with a small lug 5 on the outside of its extremity to prevent jaw 2 passing the position illustrated by Fig. 13 when closed.

To knotter-head Y is rigidly secured on a shaft 6 extending rearwardly through a suitable bearing constituting the front end-wall of recess *x*, the opposite end of said shaft being journaled in a similar bearing within the recess.

Fixed to the shaft 6 between its bearings is a block 8 provided with cogs 9, 10, and a bolt 11 having an upwardly projecting pin 12 actuated by the spring 13 and cam groove S and adapted to engage a recess in the rear edge of bearing 7. The spring 13, is short and its only mission is to move the locking bolt 11, far enough to engage the stud 12, with the cam-groove S, as the needle retreats.

Near the front end of the knotter bar C, and at one side of the knotter-head Y is pivoted an upwardly extending stud or finger 14 and integral therewith is a trigger 15, the same being retained normally by tension of a pocketed spring 16 in such position that the stud 14 may be engaged by the under side of pivoted knotter jaw 2 for the purpose of opening the latter as shown by Fig. 12, and disengaged through the medium of trigger 15.

Near the central rear side of guard-plate X is pivoted take-up arm 17 provided with depending stud 18 just beyond which, said arm makes a right angular bend and terminates in a barbed hook 19 overlapping the end of plate X. The rear extremity of arm 17 is provided with a horizontally moving bell-crank lever having arms 20 and 21 the latter being in contact with leaf spring 22 by which said arm is retained in a closed position, though permitted to make a lateral movement when in the operation it becomes necessary as shown by Fig. 10. Still nearer the end and on the rear side of plate X is journaled a rock-shaft 23 carrying a vertically moving bell-crank lever 24 one arm of which engages a stout leaf-spring 25, and the other is adapted to be engaged by arm 20 of the bell-crank 20—21, for the purpose of overcoming the pressure of said spring 25. To the opposite or outer end of shaft 23 are permanently secured the cord-clamping and cutting mechanisms; the former consisting of a trough shaped clamping jaw 26 arranged to inclose a downward projecting flange 27 formed by an angle in the end of guard-plate X; and the latter a knife edge 28 secured to the outer side of clamping jaw 26, which, together with a similar cutting edge 29 located on the outer side of flange 27, constitute a pair of shears. Discharging arms 30 are loosely journaled on shaft D at either side of

the needle-bar B, and a Y shaped connecting rod 31 joins them by hinge joints to a depending arm 32 rigidly secured to a rock-shaft 33 having bearings in brackets 34 near the upper ends of standard A⁴ and brace A¹¹.

To the front end of shaft 33 is attached a lever 35 the long arm of which is operated upon by a spring 36, a counter-weight or other mechanical equivalent, to elevate the discharging arms 30; while the short arm of said lever is provided with an operating rod 37 having a terminal hook 38 riding on internal track J of wheel I, and periodically engaging lug or projection K thereon for the purpose of casting off a bound sheaf of grain, after which said hook frees itself from lug K when the latter in the course of its movement assumes an angle to allow spring 36 to exert its power upon rod 37 for the purpose of returning same to its normal position.

The platform A² is provided with a recess in size about equal to knotter-bar C for the purpose of allowing the latter when at its lowest point to sink nearly flush with its surface. And the side-walls of recess x in the knotter-bar C, are cut away near their outer ends thus allowing the needle to pass freely beneath that end of guard-plate X. The side of such cut-away portion which the needle first enters is beveled as at 39 to facilitate an entrance should the needle and knotter-bars be not firmly seated. However to insure a proper joint between said bars B and C, the latter is provided with a V shaped recess 40 and the former with a corresponding projection 41, by which arrangement the parts are directed and when closed are held in their proper relative positions, while adjacent to projection 41 on the lower front edge of bar B is a beveled or cut away portion 50 for the express purpose of allowing lever 15 to retreat when acted upon by the point of needle V.

The arrangement of parts being substantially as shown and described the operation of my invention is as follows: Binding cord from a reel or receptacle secured in any convenient position is led through eyes on the needle-bar to the needle, and entering circumferential groove p in the latter passes through eyelets q, the eye of the needle r, and from thence to the cord-clamp 26 where the end is held. Wheel I is revolved continuously from left to right by power from the driver wheel of the harvester applied through the agency of cogs d or in any other suitable manner. Delay shoe i of pinion M in the meantime rides upon delay-surface L of wheel I until the adjacent cogs g are reached; when the first of pinion teeth h drops into gear with said cogs g, and power is communicated to the cranks j, k, which, operating through the intervening rods and arms before described, rock shafts D and E in opposite direction; the cranks j, and k, (in the present instance) are constructed in one plane.

In a machine of a high frame, as the one shown in the drawings the cranks j, and k,

can be constructed on one plane, but in a machine of a low frame, and with the arms F, and G long, to attain more power, which would bring their free ends close to each other or even past each other, the planes of the cranks j, and k should be constructed on different planes accordingly, so as to operate the needle bar ahead of that of the knotter bar. Needle V having been withdrawn to the position shown in Figs. 5, and 8, and the knotter being in the position shown in the same views, the needle bar retreats slightly before the knotter bar starts and the needle having thus carried the cord y below the knotter head Y ascends with the needle bar B, and the parts assume the position illustrated by Fig. 1, the cord extending from the cord-clamp out under the knotter and thence to the needle. Grain is now fed to the binder automatically or by hand the effect of which is to lay a continuation of cord y back over the knotter-head as at y'. The needle bar B, descending, moves in advance and the knotter bar C meets the needle bar B at the moment that the crank k, (operating said knotter bar) passes its dead center, thus the grain is finally compressed by the knotter bar; which being operated by the long arm G has ample power for that purpose. Thus the gavel to be bound is gathered, is encircled by a loop of binding cord marked y², and the point of the needle passing below the gavel, and above the knotter-head Y, places the cord again across the knotter as shown at y³ Fig. 5, when the needle and knotter bars are in a closed position. At this point in the operation pinion M, controlling the needle and knotter bars, is delayed by its shoe i engaging the delay surface L of master-wheel I. The pinion P then goes into action being started by the first of its teeth n coming in contact with the first of slightly raised cogs e on the rear of wheel I, and through intermediate connections before described, the needle V is projected forward passing its cord beneath the end y, as shown by Fig. 6. Entering thus below guard-plate X, groove s on under side of needle V throws bolt 11 by engaging its pin 12 and the knotter is unlocked. The cord being formerly drawn by the needle around below the knotter, and pressed back and upward over the knotter by the grain, and drawn firmly around said gavel to be bound will tend to draw or turn the knotter upward to a vertical position from its original or inverted position; the position of the cord on the knotter is always to turn the knotter to a vertical position or to a right angle to its original or inverted position. It is admitted, and well understood that the knotter will not operate without a gavel of grain or kindred article to properly fill the loop y², unless assisted by manual aid, but there is no gain in tying a knot in an empty cord. As the knotter is thus turned upward by the cord, the teeth 9, 10, on the block 8, are engaged with the teeth t on the under side of the needle,

and as the needle advances the knotter is turned over or inverted, and with it the cords y' and y^3 ; thus the position of the knotter is reversed at the first forward movement of the needle, and held in said position by reason of the needle being in contact with the flat side of the block 8. The pivoted jaw 2, engaging the stud 14, is opened as shown in Fig. 12. At this position the cord y is above, resting in the transverse notches 3, 4, and the cords y' and y^3 cross the knotter below. In this position with its jaws ajar, and level with the plane of the needle, it waits for the latter to deliver the cord within its jaws. A slight further movement of the needle causes it to move against the trigger 15, and through it, trips stud 14, allowing the pivoted jaw 2 to close on cord y^4 as seen in Fig. 7. In so closing notch 3 on the jaw 2 serves to carry cord y —which together with cord y' forms a loop around the knotter—forward to a point where said loop readily slips off the knotter, when reversed, over a loop formed by the cord y^4 around the extreme end of the rigid jaw as the needle retreats; the cord from around the sheaf being around beneath the knotter will tend to draw the knotter upward and as the needle retreats the cogs u on the underside of the needle are engaged by the cogs 9, 10, on the block 8, turning the knotter to its original position, and as the point of the needle carrying the cord y^4 passes below the guard, x finally draws the cord y^4 firmly in the cord clamp and shears, as the needle nears its homeward movement as shown in Fig. 8. Switch W then engages stud 18 which is thereby conducted to the back of needle V the cam-like form of which serves to open the take-up-arm 17 as shown in Figs. 8 and 10, and hook 19 having caught cords y and y^4 the loop formed by parts y y' is drawn taut around the loop formed by parts y^4 . A still further movement serves to engage bell-crank lever 24 by arm 20 of bell-crank lever 20—21, rocking the shaft 23 and opening the cord-clamping and cutting mechanisms and withdrawing the end of cord y at the same time cord y^4 is drawn more snugly into the shears. The tooth t throws the knotter over on the advance movement, before the point of the needle reaches the vertical plane of the knotter, and the needle then continues to advance at the same time laying the cord over the rigid jaw, until the point of the needle is considerably past the knotter and until the tooth u also passes the teeth 9 10, on the block 8. This permits the teeth u to throw the knotter back at the beginning of the retreat of the needle so that the cord now passes below the rigid jaw of the knotter. The pin 12, is pressed toward the needle by the spring 13, and thus caused to engage with the groove s , and is then operated upon by groove s in the needle to throw bolt 11 as before, and the knotter is again locked; the stud 18 then reaches switch W of the needle and is freed from engagement therewith and springs 1,

25 exerting their force upon the cutting and clamping mechanism sever cord y^4 , one end thereof being firmly retained, while the other is drawn through the jaws of the knotter leaving the cord as shown by full lines in Fig. 9, and the bound sheaf is then removed by operation of discharging-arms 30 as before described.

Various modifications within the spirit of my invention will readily suggest themselves to the skilled mechanic. Therefore I by no means confine myself to the precise construction and arrangement of parts herein set forth, but

Having fully described the invention, what I claim is as follows:

1. In a binding attachment for harvesters, the combination with a frame, of upper and lower rock-shafts provided with operating levers of unequal length, oppositely moving gathering arms secured to said shafts, oscillatory discharging arms journaled on said upper shaft, a binding mechanism carried by the gathering arms, and a master wheel with intermediate connections for operating the gathering and discharging arms.
2. In a binding attachment for harvesters, the combination with oppositely arranged pivoted gathering arms, of a binding mechanism carried by the gathering arms, oscillatory discharging arms, a rock-shaft having a dependent arm connected with the discharging arms, a lever secured to said shaft, an operating rod attached to the lever having a hooked lower end, a master wheel having an internal track obstructed by a lug adapted to be periodically engaged by the hooked rod, and a spring for returning the gathering arms to their normal position.
3. In a binding attachment for harvesters, the combination of a knotting mechanism, a hooked take-up-arm having a depending lug, a needle having a switch normally projecting at an angle to its edge and adapted to engage the lug on said take-up for the purpose of opening it, a spring for returning the latter to its normal position, and suitable means for operating the needle.
4. In a knotting mechanism for grain binders, the combination with a frame, of oppositely moving gathering needle and knotter bars, one carrying a pivoted needle, and the other a knotter, upper and lower rock-shafts to which said needle and knotter bars respectively are secured, upper and lower operating levers of unequal length, connected to the rock-shafts, the former being the shorter, rods connected to the levers, a double crank shaft the arms of which are connected with said rods, a pinion mounted upon the latter shaft, and a master-wheel with which the pinion periodically engages whereby the gathering needle and knotter bars are operated, all arranged to place the movement of the needle-bar ahead of the movement of the knotter bar, a knotter journaled in the knotter bar, with its free end above the plane of the nee-

dle when the needle bar and knotter bars are closed and the knotter in its normal position, and a cord carrying needle pivoted on the needle bar, said cord being clamped on the knotter bar and taken out beneath the knotter substantially as described.

5. In a knotting mechanism for grain binders the combination with a frame, of oppositely moving gathering needle and knotter bars, one carrying a pivoted needle, and the other a knotter, upper and lower rock-shafts to which said needle and knotter bars respectively are secured upper and lower operating levers of unequal length, connected to the rock-shafts, the former being the shorter, rods connected to the levers a double crank-shaft arms of which are connected with said rods, a pinion mounted upon the latter shaft, and a master-wheel with which the pinion periodically engages, whereby the gathering needle and knotter bars are operated, all arranged to place the movement of the needle bar, ahead of the movement of the knotter bar, a cord receiving shearing and clamping mechanism on said knotter bar a knotter journaled in said knotter bar, with its free end above the plane of the needle when the needle bar and the knotter bar are closed and the knotter in its normal position a needle to deliver a cord to said knotter bar and carry said cord out below the knotter, and means to operate said needle as described.

6. In a knotting mechanism for grain binders, the combination with a frame, of oppositely moving gathering needle and knotter bars, a cord clamping and cutting mechanism on said knotter bar, and a knotter journaled in said knotter bar a needle journaled on the needle bar, having its pivot arranged transverse to the axes of its supporting needle bar, and adapted to carry a cord and to operate on the knotter, and operating mechanism to operate the needle, and oscillate the needle, and knotter bars substantially as shown and described.

7. In a knotting mechanism for grain binders, the combination with a frame, of oppositely moving gathering needle and knotter bars, upper and lower rock-shafts to which said needle and knotter bars respectively are secured, a guard plate carried by said knotter bar, projecting with its free end over the knotter shaft to near the knotter, a cord clamp and shears on the free end of said guard plate, a knotter journaled in said knotter bar, and a needle journaled on the needle bar, having its pivot arranged transverse to the axis of its supporting bar and adapted to carry a cord, and to operate on the knotter and cord clamp operating mechanism substantially as described.

8. In a knotting mechanism for grain binders, the combination with a frame, of oppositely moving gathering needle and knotter bars, upper and lower rock-shafts to which said needle and knotter bars respectively are secured a guard X on the knotter bar pro-

jecting with its free end over the knotter shaft to near the knotter, a cord clamp and shears on the free end of said guard, a knotter journaled in said knotter bar, a cord carrying needle journaled on the needle bar, having its pivots arranged transverse to the axes of its supporting arm, and adapted to operate in a plane parallel to one side of the sheaf, to operate on the knotter, and means to operate said needle substantially as described.

9. In a knotting mechanism for grain binders, the combination with a knotter journaled in a knotter bar, a guard plate on said knotter bar, a cord clamp on said guard plate, a needle pivoted near the center of its curvature on a supporting needle bar, having its pivot arranged transverse to the axis of its supporting arm, and adapted to operate the knotter, and means for operating said needle as described.

10. In a knotting mechanism for grain binders, the combination with, a knotter journaled in a knotter bar, a guard plate on said knotter bar, projecting with its free end to near the knotter, a downward projection 27 on said guard plate X, a rock shaft 23 journaled in said guard plate clamping jaws secured to said rock shaft, a bell-crank 24 on said rock shaft engaging a bell-crank on the pivot of the take up; a spring 25 to close the cord clamp, a needle pivoted on the needle bar to operate the knotter and take up, and means to operate the needle, as and for the purpose described.

11. In a knotting mechanism for grain binders, the combination with a knotter journaled on a knotter bar, guard plate X on said knotter bar, projecting with its free end to near the knotter, a downward projection 27 on said guard plate X, a rock shaft 23 journaled in said guard plate clamping jaws secured to said rock shaft, a bell-crank 24 on said rock shaft engaging a bell-crank on the pivot of the take up, shears secured on said cord clamp having one blade secured to the pivoted jaw 26 with the other blade secured to the end of the guard plate X, springs to close said cord clamp and shears, a needle pivoted on the needle bar, to operate the knotter and take up, and means to operate the needle, as and for the purpose described.

12. In a knotting mechanism for grain binders, the combination with a knotter having a shaft journaled in the knotter bar, a block 8, on said shaft, having two flat sides, cogs 9, 10, on the narrower edge, a guard plate X projecting over said block 8, a locking bolt in said block, having a stud projecting therefrom, a needle pivoted on the needle bar teeth t, and u on said needle to operate said block 8 a switch to operate the locking bolt, and means to operate the needle as described.

13. In a knotting mechanism for grain binders, the combination with a knotter secured on a shaft, journaled in the knotter bar, a block 8, on said shaft, having two flat sides, cogs 9, 10, on the narrower edge, a guard plate

X projecting over said block 8, a locking bolt in said block having a stud projecting therefrom, a spring 13 to move said stud into the cam groove *s* of the needle for the purpose 5 described, a needle pivoted on the needle bar teeth *t* and *u* on said needle, cam groove *s* in the needle to operate on the stud of the locking bolt 11 and means to operate the needle, as described.

10 14. In a knotting mechanism for grain binders the combination with a knotter shaft journaled in the knotter bar, a block on said shaft, a knotter secured to the free and projecting end of said knotter shaft, pivoted jaw on said 15 knotter, normally closed by a spring, the pivot of said pivoted jaw being arranged parallel with the pivot of the knotter, a stud interposed in the path of the pivoted jaw to be engaged by said jaw, for the purpose of opening 20 said jaw, a cord carrying needle pivoted on a needle bar having its pivot arranged transverse to the pivot of the knotter, to operate said knotter, and means to operate said needle, as described.

25 15. In a knotting mechanism for grain binders, the combination with a knotter journaled in the knotter bar the pivoted jaws on said knotter having its pivot parallel with that of the knotter, said pivoted jaw being normally 30 closed by a spring, a pivoted stud 14, interposed in the path of the pivoted jaw to be engaged by said jaw, for the purpose of opening said jaw, a trigger 15 to trip said stud, a spring to return said stud to its normal position, a cord carrying needle pivoted on a 35 needle bar, having its pivot arranged transverse to the pivot of the knotter, to operate said knotter and means to operate the needle as described.

40 16. In a knotting mechanism for grain binders, the combination, with a knotter journaled in the knotter bar, a jaw on said knotter with its pivot arranged parallel with the knotter shaft, a stud 14 to engage with said jaw 45 as the knotter is inverted, means to disengage said stud from said jaw, a guard plate projecting over the knotter shaft, a cord clamp

pivoted in said guard plate said cord clamp projecting downward with its free end, a cord carrying needle pivoted on the needle bar, and 50 means to operate said needle, as described.

17. In a knotting mechanism for grain binders, the combination with a knotter journaled in the knotter bar, a jaw on said knotter with its pivot arranged parallel with the knotter 55 shaft, a stud 14 to engage with said jaw; as the knotter is inverted, means to disengage said stud, from said jaw, a guard plate projecting over the knotter shaft, a cord clamp pivoted in said guard plate, said cord clamp 60 projecting downward when opened and partly closing the passage-way between the free end of the guard plate and knotter bar, a cord carrying needle pivoted on the needle bar, and means to operate said needle, as described. 65

18. In a knotting mechanism for grain binders, the combination with a block on the knotter shaft a needle pivoted near the center of its curvature to the needle bar, having its pivot arranged transverse to the axis of its 70 needle bar, depressed teeth *t*, and *u*, and a cam groove or switch *s* on said needle to operate on the locking bolt 11, in the block and teeth 9, 10 on the block and engaging teeth *t* and *u* to operate the knotter for the purpose 75 described.

19. In a grain binder the combination of a knotter having a rigid jaw adapted to be closed by a spring and opened by a stud interposed in the path of the pivoted jaw 2, said knotter 80 being provided with a notch 4 on the rigid jaw 1, to hold the cord, a notch 3, on the pivoted jaw 2 in position to register with the notch 4 when the jaws are open, the lower surface of the notch 3 being flush with the 85 upper surface of the notch 4 to carry the cord out of the notch 4 as the pivoted jaw 2 is being closed, for the purposes described.

In testimony whereof I have affixed my signature in presence of two witnesses.

GEORGE SCHUBERT.

Witnesses:

D. H. MAGGARD,
C. E. PESTEBIEDE.