

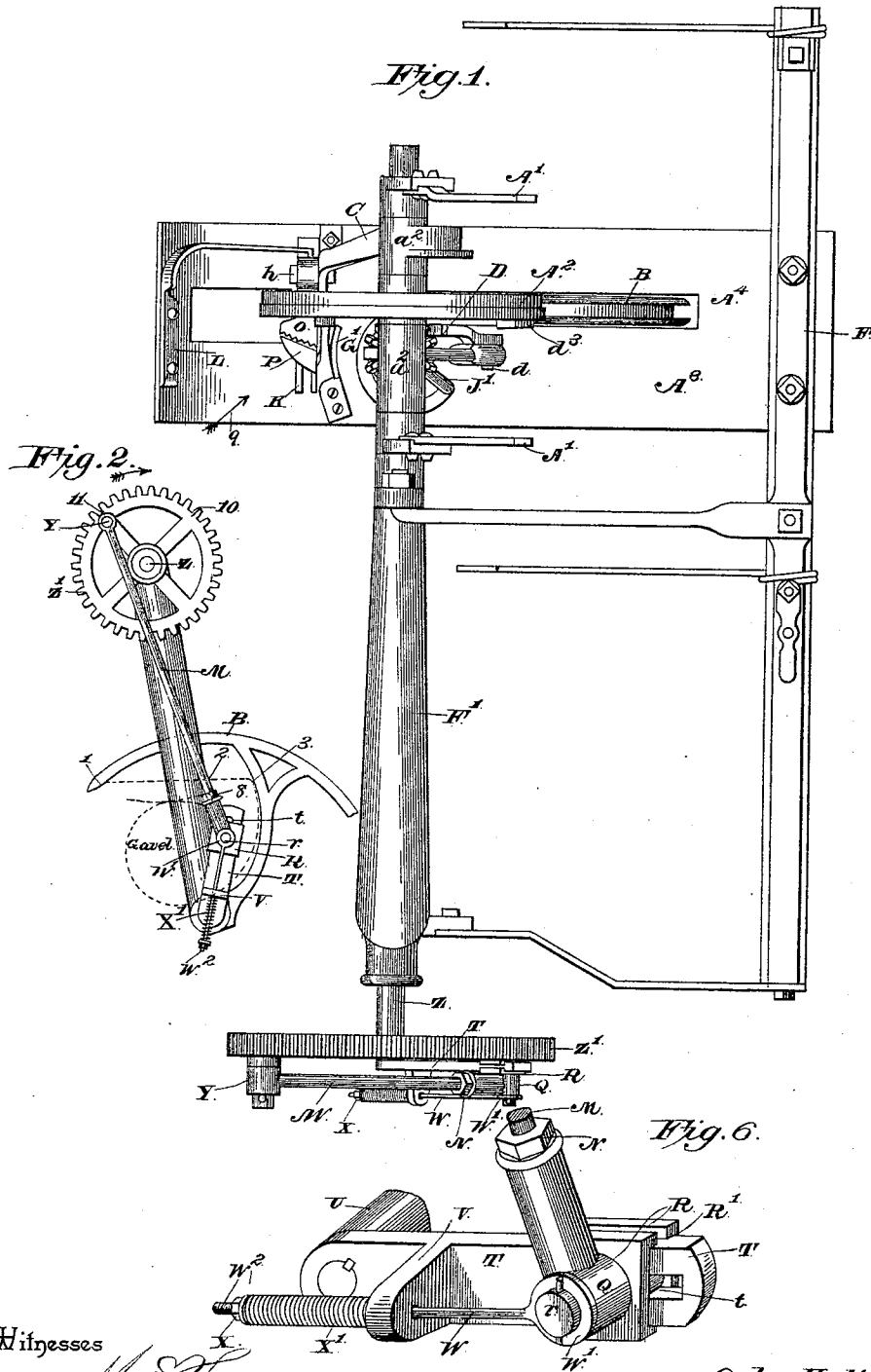
(No Model.)

4 Sheets—Sheet 1.

O. H. WATKINS.
KNOTTER FOR GRAIN BINDERS.

No. 460,610.

Patented Oct. 6, 1891.



Witnesses

M. S. Fowler
N. J. Collamer

By his Attorneys,

C. A. Snow & Co.

Inventor
Orla H. Watkins

(No Model.)

4 Sheets—Sheet 2.

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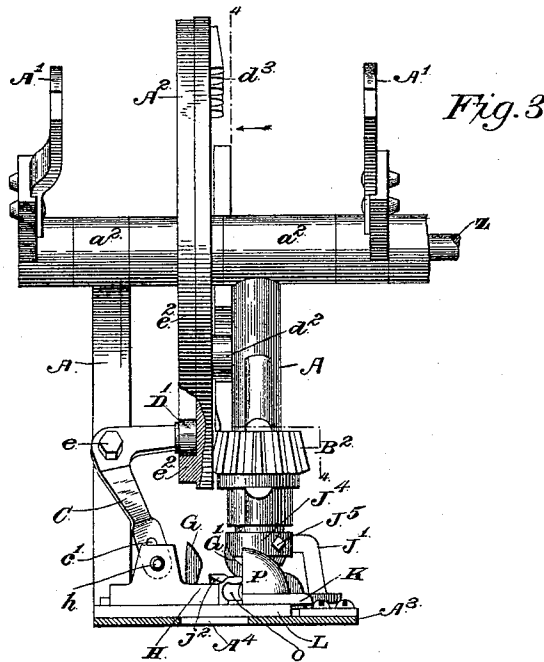


Fig. 3

Fig. 4.

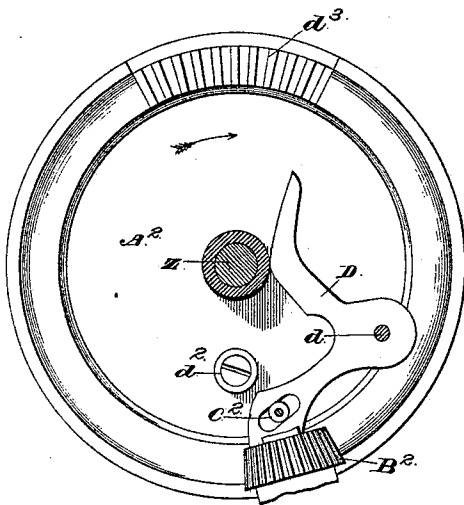
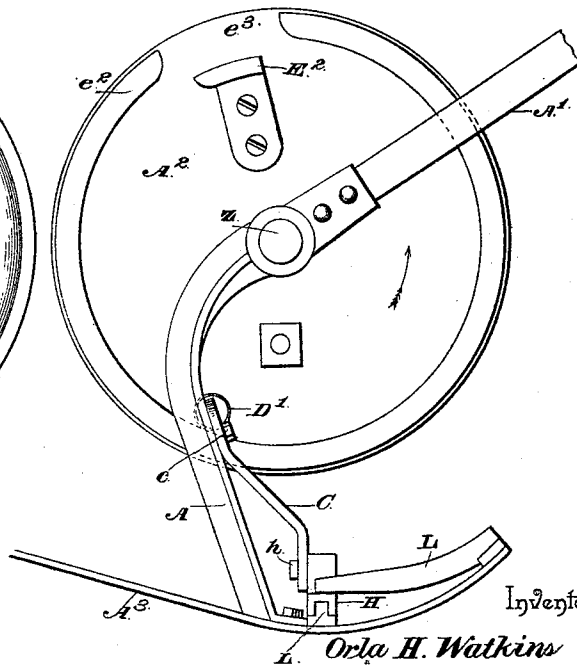


Fig. 5.



Witnesses

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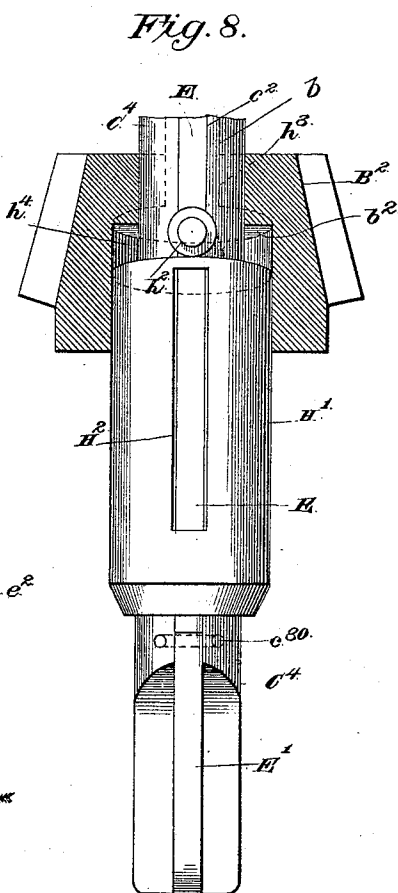
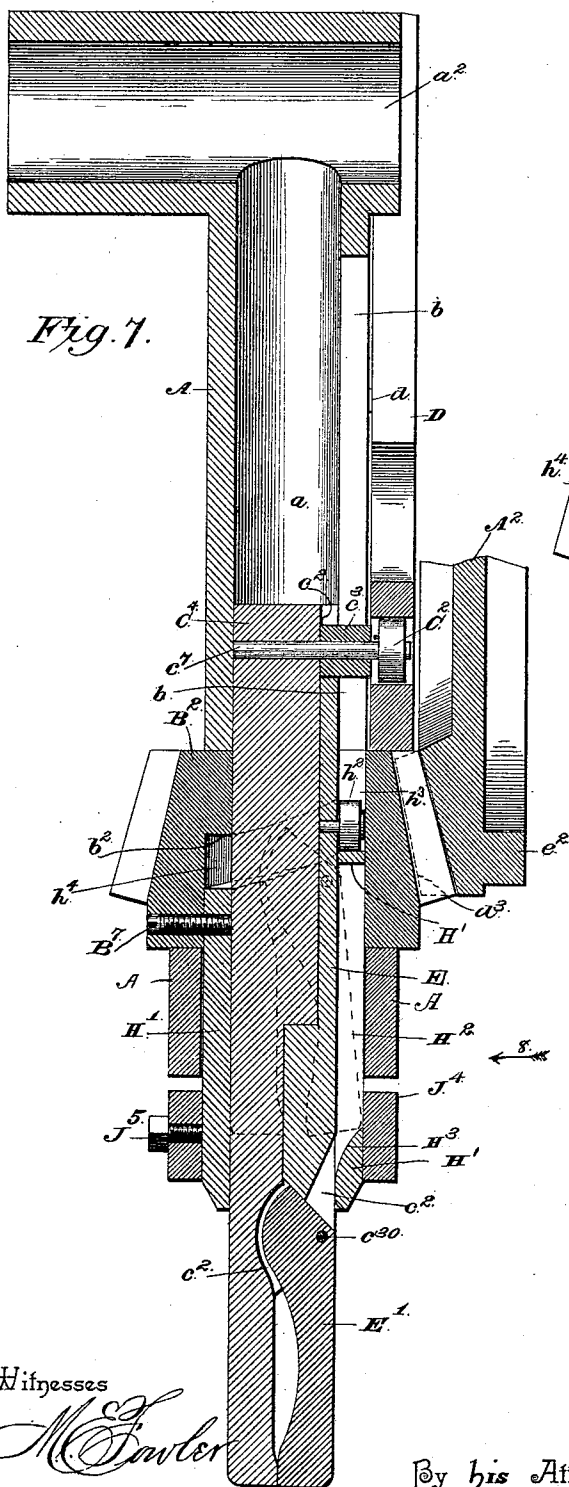
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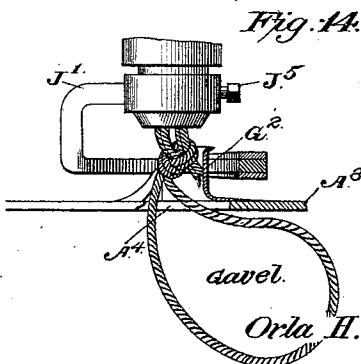
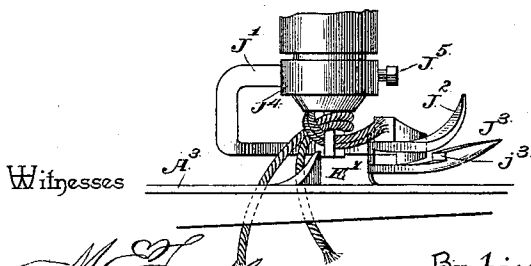
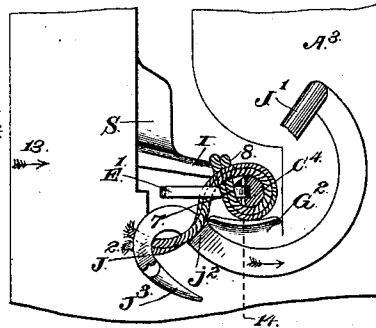
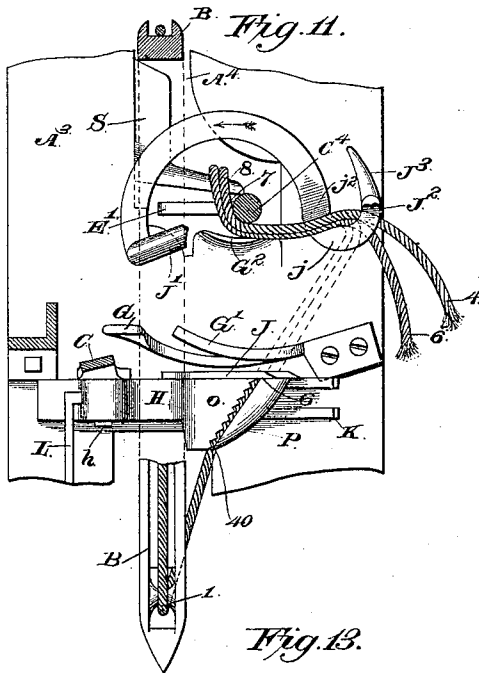
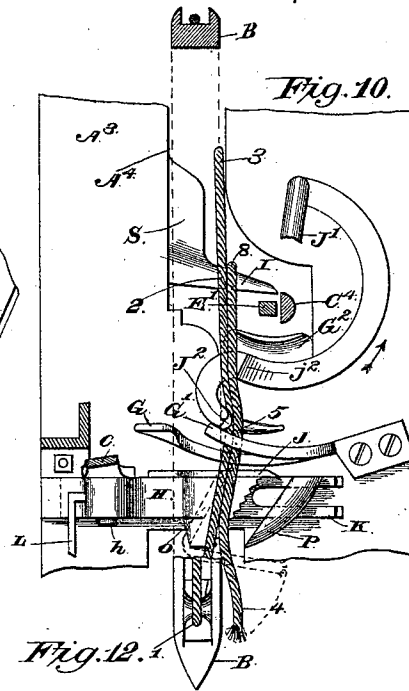
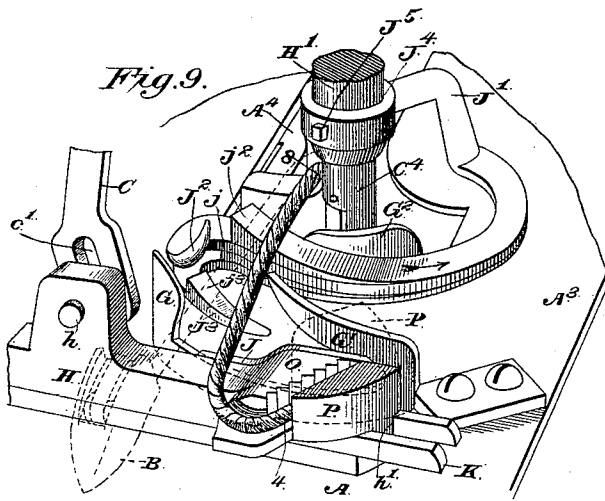
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KNOTTER FOR GRAIN BINDERS.

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UNITED STATES PATENT OFFICE.

ORLA H. WATKINS, OF ELDORA, IOWA, ASSIGNOR OF ONE-HALF TO JAMES F. HARDIN AND CHARLES E. ALBROOK, OF SAME PLACE.

KNOTTER FOR GRAIN-BINDERS.

SPECIFICATION forming part of Letters Patent No. 460,610, dated October 6, 1891.

Application filed May 14, 1891. Serial No. 392,721. (No model.)

To all whom it may concern:

Be it known that I, ORLA H. WATKINS, a citizen of the United States, residing at Eldora, in the county of Hardin and State of Iowa, have invented a new and useful Knotter for Grain-Binders, of which the following is a specification.

This invention relates to harvesters, and more especially to the knotters used in self-binders; and the object of the same is to produce certain improvements in devices of this character.

To this end the invention consists in the details of construction hereinafter more fully described and claimed, and as illustrated on the four sheets of drawings, wherein—

Figure 1 is a general plan view of this machine. Fig. 2 is a right end elevation. Fig. 3 is a front elevation of the knotting and holding mechanism. Fig. 4 is a section on the line 4 4 of Fig. 3. Fig. 5 is a side elevation of Fig. 3, viewed in the opposite direction from Fig. 4, more especially illustrating the positive movement for the knife-lever. Fig. 6 is an enlarged perspective detail of the sliding connection between the driving pitman and the crank on the needle-shaft. Fig. 7 is a central vertical section through the knotting mechanism. Fig. 8 is a side elevation of the lower portion of Fig. 7, viewed in the direction of the arrow 8, with the hub of the bevel-gear in section. The remaining figures illustrate the operation of the machine. Fig. 9 is a perspective view taken in the direction of the arrow 9 in Fig. 1 and showing the parts in their initial position. Fig. 10 is a plan view of Fig. 9, showing the needle raised, the holder open, and the fingers about grasping the ends of the gavel-loop. Fig. 11 is a similar view showing the needle a little farther forward, the holder closed, the second strand of the gavel-loop cut, the fingers moved a quarter-revolution from the position shown in Fig. 10, and the pivoted jaw raised beneath the strands of the gavel-loop. Fig. 12 is a plan view of the knotter, only showing the fingers moved a little over a half-revolution around the spindle from the position shown in Fig. 11, the strands of the gavel-loop drawn over themselves and under the pivoted jaw, and the ends of these strands nearly slipped out from between the fingers. Fig. 13 is a side

elevation of Fig. 12, viewed in the direction of the arrow 13 thereon, showing the fingers as having progressed slightly farther to release the ends of the strands and showing the spindle as commencing to rise with the pivoted jaw closed over the strands. Fig. 14 is a similar elevation, except that the fingers are broken away on the line 14 of Fig. 12, the spindle having raised completely and the knot formed to complete the gavel-loop, the parts in this position being again in their initial position, except that the spindle is raised.

Referring to the said drawings, the letter F designates the frame-work of this improved machine, which carries the usual breast-plate A³, and in a tubular portion F' of the frame-work is journaled a main shaft Z, driven by any suitable power, as a gear-wheel Z', and carrying the discharge-arms A'. Upon the right-hand end of this shaft is fixed a disk A², having upon one face an annular radially-projecting flange e², broken away at one point e³, Fig. 5, and adjacent this point a cam E². At each revolution of the disk this cam engages a roller D' at the upper end of a bell-crank lever C, the latter being pivoted at c to the frame A and having a slot c' at its lower end, this lever serving as the "knife-lever" hereinafter described.

The letter D designates a bell-crank lever pivoted at its angle at d to the frame A on the other side of the disk A², slotted at the end of its lower arm, Figs. 4 and 7, to engage an anti-friction roller C², and the end of its upper arm being extended vertically, Fig. 4, in the initial position of the knotter and adapted to engage against an anti-friction roller or stud d² on the disk A² and on the face thereof opposite the cam E². The said disk also carries a segment of gear-teeth d³ at its periphery on this face, which at the proper time engages a bevel gear-wheel B², for a purpose to be hereinafter set forth. The shaft Z is secured through the center of this disk A², and a frame A has sleeves a² at its upper end forming bearings for this shaft and is connected at its lower end to the breast-plate A³ each side of a needle-slot A⁴ therein.

The letter H designates a bar having a pin h at one end engaging the slot c' in the lever C, and secured to the breast-plate A³ is a

spring L, pressing this bar normally inward. The other end of the bar is bifurcated, as at K, where its arms pass through recesses h' in the opposite sides of a projection P, rising from the base of the frame A. At the inner end of the bifurcation of the bar H the latter is provided with an enlargement O, normally borne by the spring L into contact with the projection P, and the faces of these contacting members are inclined to a transverse line through the bar H, the enlargement being preferably toothed, as seen in Fig. 1.

J is a knife secured to the bar H and adapted to pass across the inner corner of the projection P to cut the band, as hereinafter described.

The frame A is formed with a circular bore a , extending from one of the sleeves a^2 down to its lower end, and is also slotted, as shown at b , to permit of the vertical reciprocation of a guide-lug c^3 on the knotter-spindle C^4 within said bore, the spindle carrying on an axle c^7 at its upper end the above mentioned anti-friction roller C^2 , moving within the slot in the lower end of the bell-crank lever D, and by the movements of the latter the spindle is caused to reciprocate vertically within the bore a . The spindle is grooved, as at c^2 , to receive a longitudinally-reciprocating rod E, whose lower end impinges against the head of a jaw E' , this jaw being pivoted, as at c^{30} , in the lower end of the groove c^2 .

H' is a rotating sleeve, Figs. 7 and 8, having its upper end formed as shown, and extending upwardly within the hollow portion of the hub of the bevel gear-wheel B^2 , where it is secured by screws B^7 . The inner portion of said hub has a face b^2 , corresponding to that of the upper end of the sleeve H' , thereby providing a sinuous causeway or channel h^1 , in which travels an anti-friction roller h^2 , carried by the upper end of the rod E, an opening h^3 being made in the upper end of the hub to permit the roller h^2 to pass out of the causeway and the rod E to be moved vertically when desired. The sleeve H' has a slot H^2 in one side at a proper point to permit the jaw E' to swing outwardly a trifle into the slot, for a purpose hereinafter to be described, the lower end of the slot being rounded or beveled, as shown at H^3 , to cause the jaw to close as the spindle moves vertically.

J^4 is a collar adjustably secured upon the lower end of the sleeve H' by a set-screw J^5 , and projecting from this collar is a radially-extending arm J^7 , whose outer end is bent downwardly, as best seen in Fig. 9, and then curves around to the rear in the direction of rotation of the sleeve, its end being bent outwardly and its extremity upwardly to form the upper grasping-finger J^2 . Riveted or otherwise secured beneath this finger is the lower grasping-finger J^3 , which follows approximately the curvature of the upper finger, except that its extremity stands about in a horizontal plane. On the upper side of the upper finger is se-

cured or may be cast an inclined lug j^3 , facing outwardly. On the upper side of the lower finger near its extremity is a catch j^3 , facing inwardly and not of sufficient height to come in contact with the lower face of the upper finger, and between the two fingers inside of the point where they commence to curve outwardly is a stop j , all these parts being for a purpose hereinafter more fully described.

In the needle-slot A^4 of the breast-plate A^3 is located an inclined guide I, whose body S forms a stop for the needle, as hereinafter described, and the upwardly-inclined tip I of this guide stands in contact with the lower end of the spindle C^4 when the latter is lowered, as seen in Fig. 12.

The letter G designates what I shall call the "finger-guide," because it guides the band into the fingers at the proper time, and G' is the "knife-guide," because it serves the same purpose for the knife.

G^2 is a knot-guide, secured at the position shown within the slot in the breast-plate, as best seen in Fig. 14.

On the gear-wheel Z' or on the main shaft Z is a crank-pin Y, to which is pivoted a pitman-rod M, adjustable in its length by means of the nut N in Fig. 6. The other end of this pitman has a sleeve Q, which is pivotally mounted on a stub-shaft r , that passes through a pair of blocks R and intermediately through a slot t in the outer end of a crank T, the blocks sliding against the sides of said crank and having inturned lips R' sliding over the edges thereof. This crank is keyed at its inner end upon a shaft U, which extends through suitable boxes and carries the needle B.

Upon the crank is an ear V, through a hole in the outer end of which passes a rod W, having an eye W' at one end loosely embracing the stub-shaft r , adjacent the sleeve Q, and having its other end threaded, as at W^2 . A nut X turns on this threaded end and compresses an expansive spring X' against the other side of the ear V to draw the sleeve Q and with it the stub-shaft r normally inward in the slot t .

With the above construction of parts the operation is as follows: The band, leading from a spool or ball, passes over the back of the needle and out the point of the same at 1, whence it leads above the inclined guide I at the point 2 against the inner face of the needle at the point 3, being pressed against said face by the expansive force of the gavel around which it next passes. After completing the gavel-loop it passes upwardly through the slot A^4 in the breast-plate, around and closely over the inclined guide I at the point 8, around the end of the enlargement O, and is clamped between this enlargement and the projection P at the point 4. In this position of parts it will be understood that the further ascent of the needle simultaneously compresses the gavel and draws the band around

it, as shown in Fig. 10. As the needle finishes its upward movement the band at the point 5 is drawn over the beveled inner face of the finger-guide G, whereby it is guided in front of the approaching fingers and is drawn over the bar H with considerable tension. The gear-segment d^3 , next engaging the beveled gear B², turns the sleeve H', and the fingers being thereby moved in the direction of the arrow grasp the two strands, as in Fig. 10, and these strands pass between the extremities of the fingers over the catch j^3 and against the stop j as the fingers continue to move. The cam E² is so located on the disk A² that just as the fingers are at the position shown in Fig. 10 the cam engages the roller D' and moves the knife-lever C. This retracts the bar H against the force of the spring L and draws the enlargement O out of contact with the projection P, thereby releasing the end 4, which flies around to the position shown in Fig. 10, and the continued movement of the fingers draws both strands under the knife-guide G' and down into the space between the then retracted knife and the corner of the projection P, the tension exerted by the beveled lower face of the knife-guide bending the strands tightly over the corner of the stop j and preventing the expansive force of the gavel from drawing these strands out of the fingers at this time, which would be undesirable, and the body of the needle also assisting. The bar H being next moved by the disengagement of the cam E² with the roller D' and the positive movement of the knife-lever C by the flange e^2 on said roller, (as well as by the force of the spring L when it is used, although it will be obvious that it is not essential,) the edge of the knife J is driven across the corner of the projection P, thus severing the feeding-strand of the band at the point 6 and permitting it to fly out, as shown in Fig. 11, from beneath the knife-guide G', while the end in rear of where the cut was made is clamped between the enlargement O and the projection P at the point 40 and becomes the end 4 of the next gavel-loop. At this position of parts or about this time the sinuous causeway h^4 , above described, and shown in Fig. 8, causes the rod E to descend, and thereby raises the pivoted jaw E', which it will be understood comes up beneath the two strands of the gavel-loop being formed at the point 7, although these strands have been drawn up the inclined face of the guide I at the point 8, so as to be wrapped around the spindle above the pivoted jaw, and the latter is therefore not subjected to the strain which would be caused by raising them. The fingers next turn to the position shown in Fig. 12, thereby completing their revolution around the spindle, where they remain until the knot is tied and the needle has descended to receive another gavel, and the movement of the fingers to this position draws the strands over themselves at the point 8, where they rested on the inclined guide and beneath

the jaw E', the lug j^2 preventing the ends of the strands slipping too quickly over the fingers, so that they might fly from beneath the jaw E' and not be caught thereby. If desired, this lug may be made high enough to sustain the tip of the pivoted jaw as it passes beneath the same, thereby causing the jaw to positively engage the ends of the strands when said jaw descends. The stop j and the catch j^3 also prevent the ends from flying out too quickly. At this point the stud d^2 on the disk A² engages the upper vertical arm of the bell-crank lever D and turns the same about its pivot d , so that its lower end rises, thereby drawing the knotter-spindle C⁴ partly up into the sleeve H', as in Fig. 13, and with it the rod E, whose roller h^2 passes through the then registering-opening h^3 in the hub of the gear-wheel B². This upward movement of the spindle and rod draws the pivoted jaw E' also partly up into the sleeve H' and at its back against the lower end thereof, which is slightly rounded, as at H³ in Fig. 7, thereby causing the face of the jaw to close upon the strands of the gavel-loop, as seen in Fig. 13.

In Fig. 14 the spindle is shown drawn completely up into the sleeve H', which, it will be understood, is caused by the further movement of the bell-crank lever D, and the strands which were wrapped around the spindle have slipped off the same to form the knot K'. At this point the crank-pin Y on the driving-wheel Z' in Fig. 2 has reached the point 10 and the stub-shaft r is at the inner end of the slot t in the crank T. The continued revolution of the drive-wheel Z' then causes the crank T to descend and the needle B to recede, as will be clear. I may here state that the stub-shaft r is retained by the spring X' at the inner end of the slot t in the crank T throughout the balance of the revolution of the drive-wheel and crank and until the crank-pin Y reaches the point 11, when the needle is raised, as illustrated in Fig. 2. At this time the needle is held against the gavel and against the stop S, as seen in Fig. 10, while the crank-pin Y is moving to the point 10, and during such movement the knot is tied in the manner above described, while the compression of the spring X' allows the stub-shaft r to slide outwardly in the slot t in the crank as may be necessary to permit the crank-pin Y to move over its highest point without operating the crank T. As the needle recedes from contact with the gavel the expansion of the latter draws upon the loop around the same, and at this time the discharge-arms A' strike the bundle to throw it off the machine, and by these means a tension is imparted to the gavel-loop; but the spindle having ascended and drawn the ends of the loop up into the same, thereby permitting the strands to slip around the end of the guide I as soon as the spindle draws out of contact therewith, these ends are held therein momentarily beneath the pivoted jaw and against the

tension on the gavel-loop. The upper end of the loop is thus drawn with considerable force beneath the knot-guide G^2 , as seen in Fig. 14, and the knot K is thereby prevented from catching on the sharp edge of the slot A^4 in the breast-plate, the tension on the loop resulting in drawing the knot K' very tight. When the spindle rises to its highest point, the jaw E' swings outwardly slightly within the slot H^2 in the sleeve H' , as seen in dotted lines in Fig. 7, and by this means the ends of the tied gavel-loop are released and allowed to drop out of the spindle as the bundle is discharged from the machine, when the parts are in condition for renewed and continued operation. The stud d^2 stands in the angle of the bell-crank lever D to hold the spindle raised, and as the disk A^2 revolves this stud passes over the lower arm of this lever at the proper time and causes the spindle to descend with the pivoted jaw closed. The mechanism above described then raises the needle B , and the parts stand again at the initial position shown in Fig. 9, after which the formation of the next loop takes place in the same manner.

What is claimed as new is—

1. In a knotter for harvesters, the combination, with a sleeve having a slot in one side extending nearly to the lower end of the sleeve and the latter being there rounded, of a vertically-moving spindle within said sleeve, having a groove registering with said slot, and a jaw pivoted in said groove and adapted to swing into said slot, as and for the purpose set forth.

2. In a knotter for harvesters, the combination, with the knotting, holding, and cutting mechanisms, of a needle mounted on a transverse shaft, a crank on said shaft, having a slot near its outer end, blocks on each side of and sliding upon the crank, a stub-shaft passing through said blocks and through the slot, a sleeve on said stub-shaft, a pitman connecting the sleeve with a crank-pin on the driving-wheel, a perforated ear on the crank, a rod passing through said ear and having an eye at one end embracing the stub-shaft adjacent the collar and its other end threaded, a nut on the threaded end, and an expansive spring between the nut and ear, as and for the purpose set forth.

3. In a cutter and holder for harvesters, the combination, with a projection rising from the frame and having recesses in its sides near its base, of a longitudinally-reciprocating bar having one end bifurcated and engaging said recesses, an enlargement on said bar adapted to strike the face of the projection, and a knife secured to the edge of the bar and adapted to pass over the corner of the projection, substantially as described.

4. In a cutter and holder for harvesters, the combination, with a projection rising from the frame, a longitudinally-reciprocating bar having an enlargement adapted to strike the face of the projection, and a knife secured to said enlargement and adapted to pass over

the corner of the projection, of an upwardly-curving knife-guide adjacent the projection, and grasping-fingers for drawing the band beneath said guide, as and for the purpose set forth.

5. In a cutter and holder for harvesters, the combination, with a stationary projection, a longitudinally-reciprocating bar having an enlargement abutting against said projection, and a knife, of a needle moving across and above said bar, a finger-guide directing the band from the needle properly onto the bar, and grasping-fingers timed to engage the band at this point, substantially as described.

6. In a knotter for harvesters, the combination, with the knotter-spindle and the needle, of outwardly-curved fingers turning about said spindle and having divergent and pointed extremities, a stop between said fingers, and an inwardly-facing catch on the upper side of the lower finger, substantially as described.

7. In a knotter for harvesters, the combination, with the needle, the knotter-spindle, outwardly-curved fingers turning about said spindle and having divergent extremities, and an outwardly-facing stop between said fingers, of a holder, a knife, and a knife-guide, substantially as specified.

8. In a knotter for harvesters, the combination, with the needle, the knotter-spindle, outwardly-curved fingers turning about said spindle and having divergent extremities, an outwardly-facing stop between the fingers, and an outwardly-facing lug upon the upper finger, of a holder and a knife, substantially as described.

9. In a knotter for harvesters, the combination, with the needle, the knotter-spindle, outwardly-curved fingers turning about said spindle and having divergent extremities, an outwardly-facing stop between the fingers, an inwardly-facing catch on the lower finger, and an outwardly-facing lug on the upper finger, of a holder and a knife, substantially as described.

10. In a knotter for harvesters, the combination, with the vertically-reciprocating spindle and a jaw pivoted thereto, of the curved grasping-fingers moving around said spindle, a beveled lug on the upper finger moving under said pivoted jaw when the latter is raised, and a needle, as and for the purpose set forth.

11. In a knotter for harvesters, the combination, with the breast-plate having a slot, a curved plate mounted on the breast-plate adjacent said slot and serving as a knot-guide, and a vertically-moving spindle, of the grasping-fingers and the needle, substantially as described.

12. In a knotter for harvesters, the combination, with the vertically-reciprocating spindle, a jaw pivoted thereto, and an inclined guide whose tip touches the spindle when the latter is lowered and whose upper face rises above the jaw, of the rotating grasping-fingers and the needle, substantially as described.

13. In a knotter for harvesters, the combina-

tion, with the breast-plate having a needle-slot, a stop secured therein, and an inclined guide projecting from said stop, of the vertically-reciprocating spindle contacting with
5 said guide when it is lowered, the needle moving through said slot into contact with said stop, and yielding connections for raising said needle, substantially as described.

10 14. In a knotter for harvesters, the combination, with the breast-plate having a needle-slot, a stop secured therein, and the knotting mechanism proper, of a needle-shaft, the

needle mounted thereon and moving through said slot, a crank on said shaft, and yielding connections between said crank and the driving-wheel, substantially as hereinbefore described.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in presence of two witnesses.

O. H. WATKINS.

Witnesses:

N. L. COLLAMER,

J. H. SIGGERS.