(No Model.) 4 Sheets—Sheet 1.

L. J. FELLAY.

BAND SECURING MECHANISM FOR GRAIN BINDERS.

No. 554,588. Patented Feb. 11, 1896.

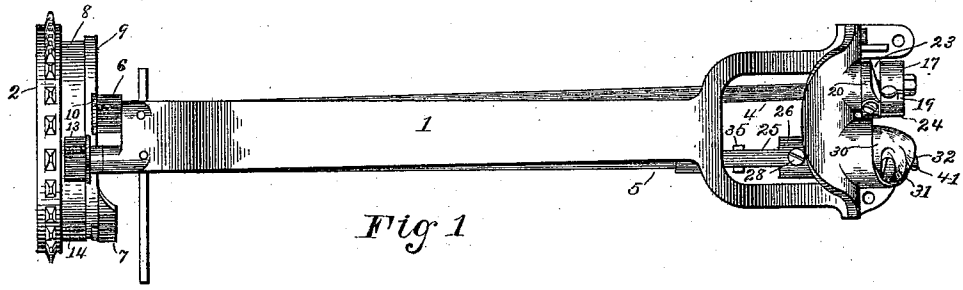

Fig 1

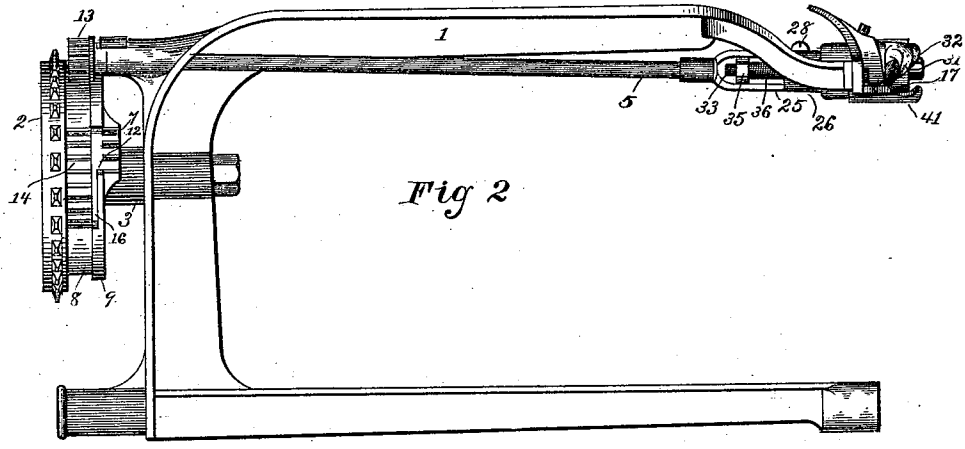

Fig 2

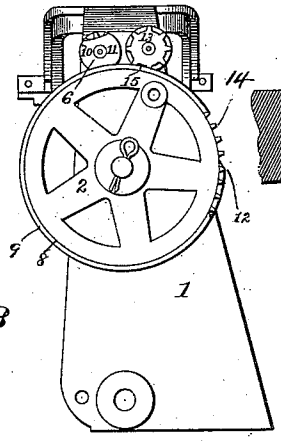

Fig. 3

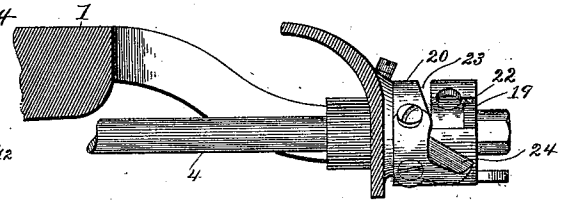

Fig. 6

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BAND SECURING MECHANISM FOR GRAIN BINDERS.

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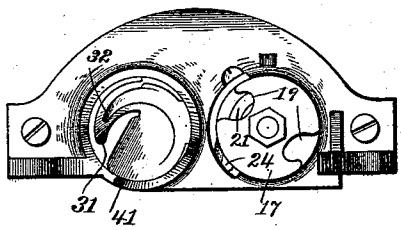

Fig. 4

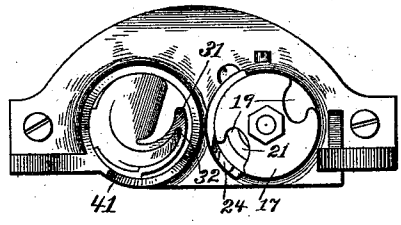

Fig. 5.

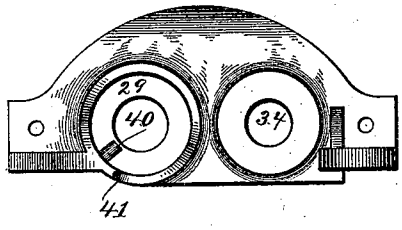

Fig. 8

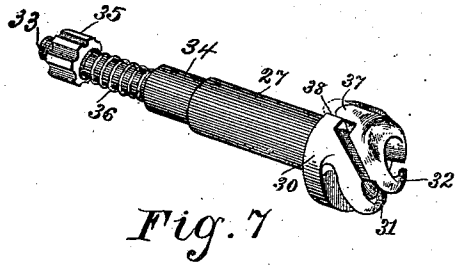

Fig. 7

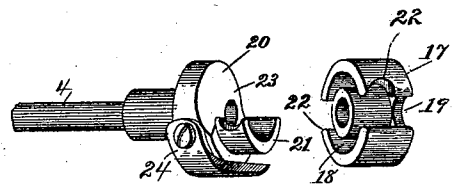

Fig 9

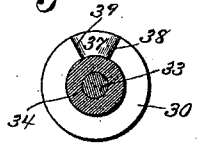

Fig 10

Witnesses

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BAND SECURING MECHANISM FOR GRAIN BINDERS.

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Fig. 11.

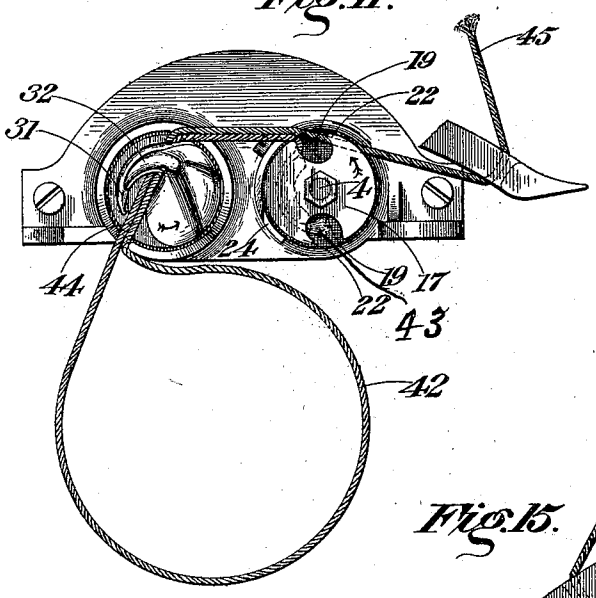


Fig. 15.

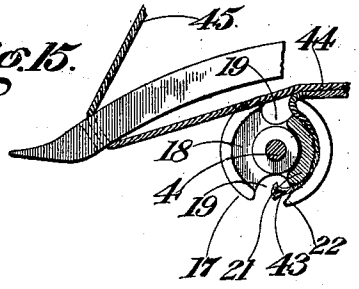


Fig. 12.

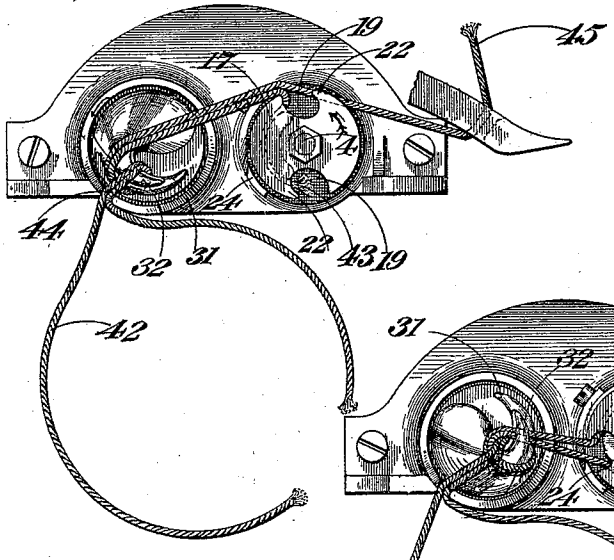
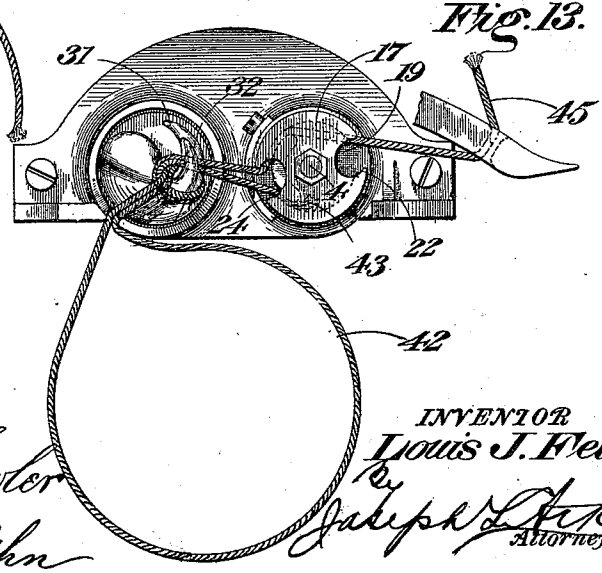


Fig. 13.



WITNESSES

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(No Model.) 4 Sheets—Sheet 4.

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BAND SECURING MECHANISM FOR GRAIN BINDERS.

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Fig. 14.

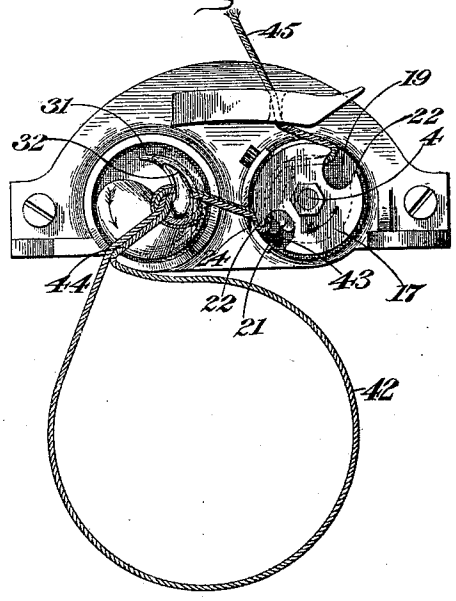


Fig. 17.

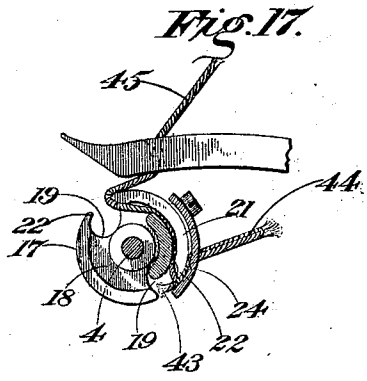


Fig. 16.

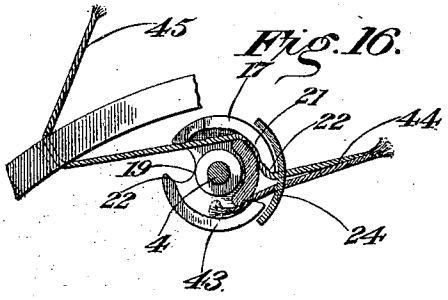
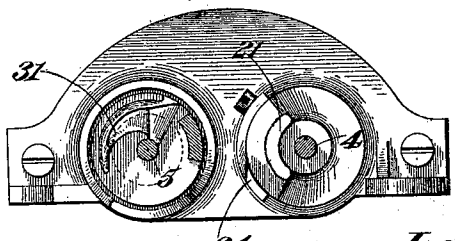


Fig. 18.



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Attorney

UNITED STATES PATENT OFFICE.

LOUIS J. FELLAY, OF MADISON, KANSAS, ASSIGNOR OF ONE-HALF TO E. D. MARTINDALE, OF SAME PLACE.

BAND-SECURING MECHANISM FOR GRAIN-BINDERS.

SPECIFICATION forming part of Letters Patent No. 554,588, dated February 11, 1896.

Application filed November 15, 1893. Serial No. 491,067. (No model.)

To all whom it may concern:

Be it known that I, LOUIS J. FELLAY, of Madison, county of Greenwood, State of Kansas, have invented certain new and useful Improvements in Band-Securing Mechanism for Grain-Binders, of which the following is a specification, reference being had to the accompanying drawings.

My invention relates to improvements in band-securing mechanism, including devices for knotting, clamping, and cutting the binding material applicable to grain-binders of that class in which rotary tying-bills having fixed and pivoted jaws are employed, and also includes mechanism for driving the knotting, clamping, and cutting mechanism.

In the accompanying drawings I illustrate only those parts of a grain-binder that are necessary to convey a proper understanding of my invention.

Figure 1 is a plan view of the knotting, clamping, and cutting mechanisms, their frame and driving mechanism. Fig. 2 is a side elevation of the same. Fig. 3 is an end view of the driving mechanism with the sprocket-rim cut away. Fig. 4 is an end view looking at the machine from the opposite end, the mechanism being in the normal position, or in that position in which it is at rest before beginning the operation of knotting, clamping, and cutting the binding material. Fig. 5 shows the mechanism when it is advanced almost to the cutting stage of the operation and is nearly ready to discharge the knotted and cut binding material. Fig. 6 is a longitudinal section of a portion of the device through the bill-head and clamping and cutting-head. Fig. 7 is a view of the bill-head detached, showing the movable bill elevated. Fig. 8 is an end view of the bill-head socket with the bill-head removed. Fig. 9 is a view of the parts of the clamping and cutting head separated and grouped to show the relations thereof. Fig. 10 is a transverse section of the sleeve. Fig. 11 is an end view looking toward the bill-head and clamper, showing their relative positions in the commencement of the knotting operation. Fig. 12 is a similar view showing their relative positions when the bill has made a quarter-revolution. Fig. 13 shows their relative positions when the bill has made a half-revolution. Fig. 14 shows their relative positions when the bill has made almost a complete revolution and has reached the point at which the cord is severed. Fig. 15 is a reverse sectional view of the clamper in the position shown in Fig. 11. Fig. 16 is a reverse sectional view of the clamper in the position shown in Fig. 13. Fig. 17 is a reverse sectional view of the holder in the final position illustrated in Fig. 14. Fig. 18 is a view corresponding to Fig. 8, with the holder-head in position.

Referring to the figures on the drawings, 1 indicates a frame. It is designed to be carried upon a grain-binder which communicates, through its appropriate mechanism, driving power to a sprocket-wheel 2 revolubly carried upon a stud 3.

4 indicates a clamper and cutter-shaft carried in suitable bearings in the frame, and 5 a knotter-shaft carried in like manner parallel thereto, the bearings in the outer end of the frame being formed in the breast-plate of the frame and contiguous to each other, for a purpose hereinafter indicated. Upon the end of the shaft 4 is fixed a pinion 6, which is in practice actuated by gear-teeth 7 carried on the inner flange 8 of the wheel 2. The flange 8 carries an annular rim 9, which in practice revolves in the path of the smooth boss 10 of the pinion 6. The boss 10 is cut away on opposite sides, (indicated at 11.) The rim 9 is cut away next to the teeth 7, as indicated at 12. The number of teeth 7 is such as to impart a half-rotation to the pinion 6. When it has completed that degree of rotation, one of its flat sides 11 will be presented to the rim 9, so that the pinion will be immovably held in the position in which it is left by the teeth 7 until the teeth again engage with it, when it will be rotated and the other flat side 11 will be presented to the rim 9. The shaft 5 carries on its end, next to the wheel 2, a pinion 13 secured to it and adapted to engage with gear-teeth 14 carried on the flange 8 beyond the rim 9. The number of teeth 14 is such as to impart one complete rotation to the pinion 13. The pinion 13 is provided with a flat side 15, which is presented to the rim 9 each time it has been caused by the teeth 14 to make a rotation. When the

flat side 15 is in contact with the rim 9, the pinion 13 is rendered immovable. The rim 9 is cut away, as indicated at 16, in proximity to the teeth 14, so that the pinion 13 is free to revolve when actuated by the teeth 14.

Upon the end of the shaft 4, opposite the pinion 6, a clamping-cap 17 is secured. This cap has an internal annular groove 18, and is provided upon opposite sides with recesses 19, which cut through the outer flange of the annular groove, thus constituting a plurality of segmental flanges.

20 indicates a clamping-socket secured to the frame 1, and provided with a clamping-flange 21, that is concentric with the annular groove 18 and whose outer surface is in close proximity to the inner surface of the outer wall of that groove. By each half-rotation of the pinion 6 one of the clamping edges 22 in the outer wall of the groove 18 is presented against the edge of the clamping-flange 21, and they operate to clamp or hold the binding material. For this purpose they are recessed, as illustrated, for the purpose of better holding binding material. The clamping-socket 20 on the side opposite the clamping-flange 21 is cut away, as shown at 23, to afford a guide-groove for the binding material.

24 indicates a knife secured to the periphery of the clamping-socket, and projecting across, and in close proximity to, the outer wall of the groove 18. Consequently when the binding material, which is clamped between one of the clamping edges 22 and the clamping-flange 21, is brought around to the knife it is completely severed thereby. Upon the end of the shaft 5, opposite the pinion 13, is secured a knotter. This knotter is preferably composed of a stirrup-carrier 25 firmly secured at one end to the shaft 5 and having an annulus 26 at the other end, through which is inserted a sleeve 27 that is secured to the annulus, as by a set-screw 28. The sleeve extends through the bearings in the frame 1, and carries, with a knotter-socket 29, a flange or disk head 30. Upon the top of the disk head is firmly fixed, preferably by being made integral with it, a bill 31.

32 indicates a movable bill carried on a pin 33 which extends longitudinally through a central bearing 34 in the sleeve and projects beyond the end of the sleeve. The projecting end of the pin is screw-threaded, as illustrated, and carries a nut 35. A spiral spring 36 surrounds the pin and is seated at one end against the end of the sleeve and at the other against the nut 35. This spring tends to hold the movable bill yieldingly upon top of the fixed bill, the tension with which it is held in that position being controllable by means of the nut 35.

Upon one side the movable bill carries a projection 37 that moves in a bearing 38 in the side of the disk head. The sides of the projection 37 are preferably beveled, as indicated at 39.

40 indicates a stud projecting radially from the side of the socket 29 and in the path of the projection 37. As the knotter is rotated, the projection 37 is brought into contact with the stud 40. The movable bill is thereupon raised against the tension of the spring 36 and is quickly restored to its normal position as soon as the projection 37 is released by the stud 40.

The knotter-socket 29 is provided on one side with a guide-lip 41 for guiding the binding material to the knotter.

The operation of the machine is as follows: Let it be assumed that the "cord" 42 (which term I shall use to designate any preferred form of binding material) is set in the machine, as illustrated in Fig. 11 of the drawings, in which the loose end 43 is firmly held in the clamper, the double strands, as illustrated at 44, passing underneath the bill 31 and the other end of the cord 45 communicating in the usual manner well understood in the art with the spool. (Not illustrated.) The loop of the cord represents the manner in which the bundle, which is to be bound, is in practice held. In this position, the machine being in operation, the shaft 5 rotating in the direction of the arrow in Fig. 11, drives the bill 31 under the double strands 44 of the cord and wraps both strands around the bill 31 and the movable bill 32, as illustrated in Fig. 12 of the drawings. During the first quarter-revolution of the bill, as will appear by comparison of Figs. 11 and 12, the clamper remains fixed, securely holding the end 43 of the cord, and in the first quarter-revolution the bill takes up the slack of the cord around the bundle, thereby gathering the bundle closely and firmly and securing sufficient length of cord to partially form the knot. During the rotation of the bill from the end of the first quarter-revolution to the half-revolution (compare Figs. 12 and 13) the movable bill 32 is raised by the stud 40, so that both strands of the cord are during that period of rotation caught and held between the movable bill 32 and the bill 31. (See Fig. 13.) During the same time the shaft 4 imparts a quarter-revolution to the cap 17. (Compare Figs. 12 and 13.) The spool end of the cord lying in the cut-away part 23 of the socket 20 is by this movement of the cap 17 caught between the clamping edge 22 and the end of the clamping-flange 21 and is confined and securely held between the outer wall of the clamping-flange 21 and the inner surface of one of the segmental flanges of the clamping-cap 17, as is clearly illustrated in Fig. 13. At the same time rotary movement of the cap 17 tends to release, but does not completely release, the end 43 of the cord by reason of the movement of the segmental flange opposite the one which is now operated to clamp the needle end of the cord. This operation will be understood by reference to Fig. 13, it being clear that the segmental flange clamping the loose end against the clamping-flange 21 will pass out

of juxtaposition with said clamping-flange and thereby release the loose end before the clamping edge 22 carries the needle or spool end of the cord against the knife. By the location of the clamping-flange opposite to the field of rotation of the bill, (illustrated,) the rotation of the cap 17 from the starting-point (shown in Figs. 11 and 12) to the position shown in Fig. 13 and the rotation of the bill materially diminish the distance between the parts which hold the ends of the cord and the bill, (compare Figs. 12 and 13,) thus paying out cord to the bill without in any wise slackening the loop of the spool end of the cord, but utilizing exclusively that portion of the cord properly set apart and appropriated to the forming of the knot. This may be better understood by observing that the clamping edges 22 of the cap 17 approach, in passing from the position shown in Fig. 12 to that shown in Fig. 13, nearer to the bill, while during its rotation from the former to the latter position it is releasing its hold upon the end 43 of the cord. During that portion of the rotation of the cap 17 and of the bill illustrated in Fig. 14 in comparison with Fig. 13, the cord is first forced snugly in place between the bills 31 and 32. Then the end 43 of the cord is entirely released, while the spool strand of the cord is pressed against the edge of the knife 24 and is severed.

The operation which severs the cord completes the re-engagement of the unsevered spool end of the cord between the wall of the cap 17 and the clamping-flange 21, so that it is firmly held thereby ready for a repetition of the process hereinbefore just described. Let it be observed that in my machine only one strand of the cord is severed by the knife, which is a valuable and distinctive feature of my invention, and which obviates the cutting off of a fag end of binding material that might clog and choke the clamper.

In passing from the position illustrated in Fig. 14 back to that shown in Fig. 11, the tied bundle is separated from the bill, and in being separated the knot is secured in the usual manner well understood in the art. In each succeeding revolution of the cap 17 the two sections of the outer wall of the groove 18, defined by the recesses 19, come alternately into play.

What I claim is—

1. The combination with a rotatory knotter, of a rotatory clamping-cap provided with diametrically-opposite recesses and a stationary segmental flange within the cap and upon the side nearest the knotter, the spool end and loose end of the binding material passing from the knotter into the same recess and the one adjacent to the knotter and said ends passing thence around the segmental flange in opposite directions whereby the rotation of the clamper yields the loose end by retiring longitudinally upon it and takes up the slack of the spool end by forcing it around the segmental flange and whereby the necessity for doubling the loose end upon itself around a section of the clamper is avoided, substantially as specified.

2. In band-securing mechanism for grain-binders, the combination with a rotatory knotter, of a clamping-cap provided with diametrically-opposite recesses and a stationary segmental flange within the cap and upon the side adjacent to the knotter, a stationary knife between the knotter and clamper and nearly in the same horizontal plane as the lower end of the segmental flange, the recesses in the clamping-cap being in the same vertical plane in their normal position, the bills of the knotter springing from its upper edge in its normal position, the loose end of the binding material being retained unyieldingly between the segmental flange and the clamping-cap and passing through the upper recess of the clamper to the upper side of the knotter under the bills, around the gavel, thence back under the bills of the knotter and thence to the needle, the needle end being out of engagement with the clamper, but in a position to be engaged by said clamper upon its rotation, and mechanism for actuating the knotter and clamper so timed that the clamper will remain stationary until the knotter has rotated a sufficient distance to accumulate binding material from the needle to tie the knot and will then be rotated to pay the loose end toward the knotter and to firmly clamp and take up the slack of the needle end between the knotter and clamper by causing the upper recess to travel toward the knotter while the beak of the knotter is traveling toward the clamper and finally releasing the loose end by passing out of engagement with the segmental flange before the needle end is severed by the knife, substantially as specified.

3. In band-securing mechanism for grain-binders, the combination with a knotter, of a clamping-cap revolubly mounted upon a shaft to one side of the knotter and provided with diametrically-opposite recesses, and an immovable segmental flange within the clamper and located between the shaft of the clamper and the knotter, and a knife between the clamper and knotter, the spool end and loose end of the cord passing from the knotter through the adjacent recess in the clamping-cap and around the segmental flange between it and the clamping-cap in opposite directions whereby the rotation of the clamping-cap takes up the slack of the spool end, releases the loose end and thereafter presses the spool end of the cord against the knife to sever it, substantially as specified.

In testimony of all which I have hereunto subscribed my name.

LOUIS J. FELLAY.

Witnesses:
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