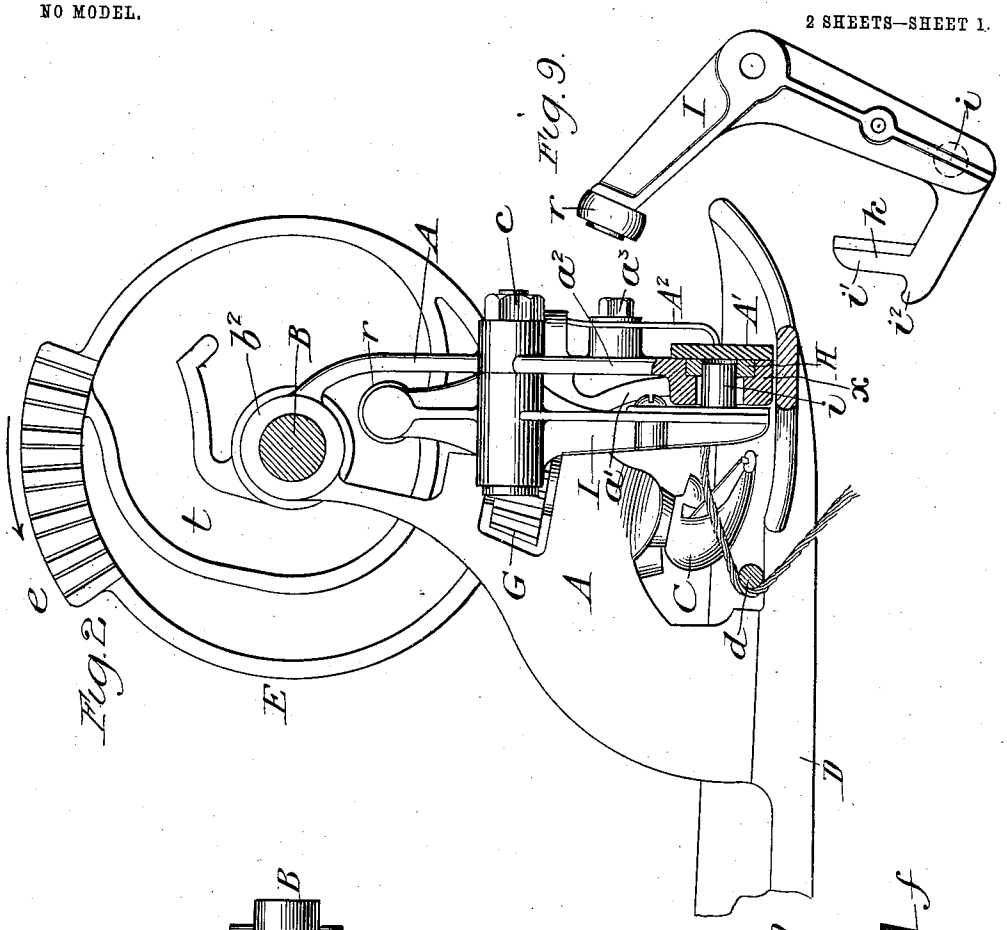
No. 740,139. PATENTED SEPT. 29, 1903.

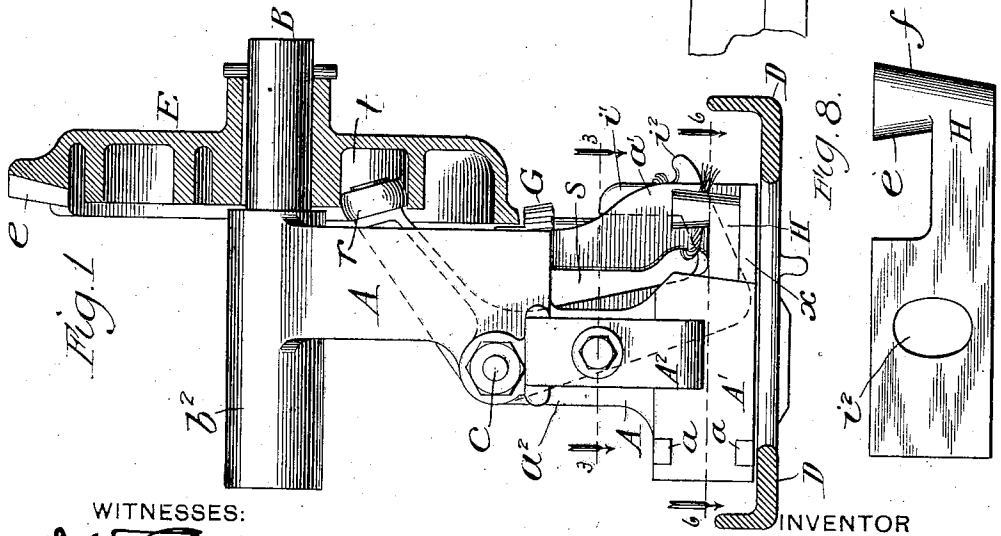
E. A. JOHNSTON.

CORD KNOTTER FOR GRAIN BINDERS.

APPLICATION FILED JUNE 4, 1901.

NO MODEL. 2 SHEETS—SHEET 1.





WITNESSES:

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NO MODEL. 2 SHEETS—SHEET 2.

Fig. 3

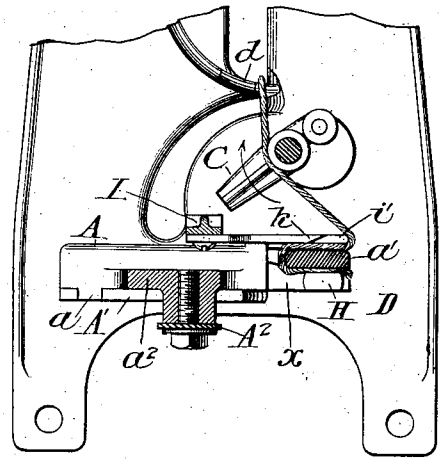


Fig. 4

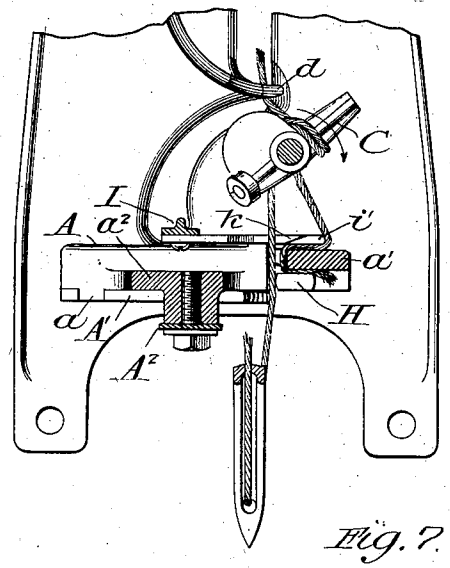


Fig. 5.

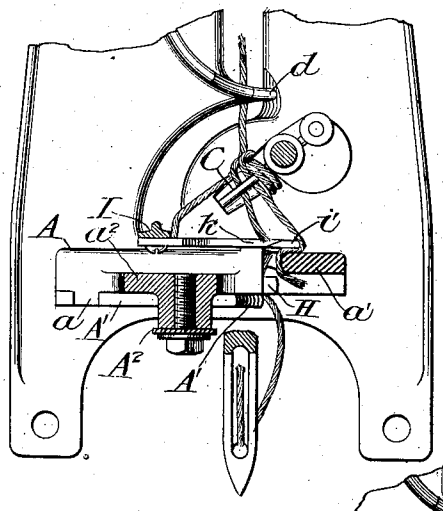
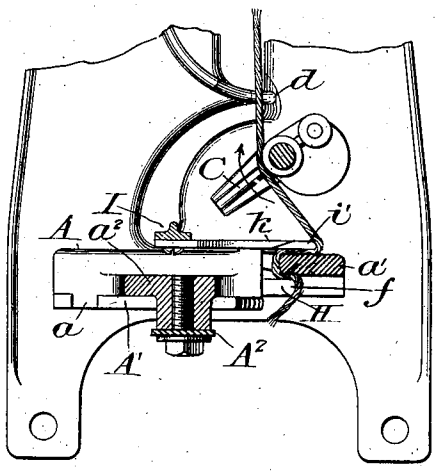


Fig. 7



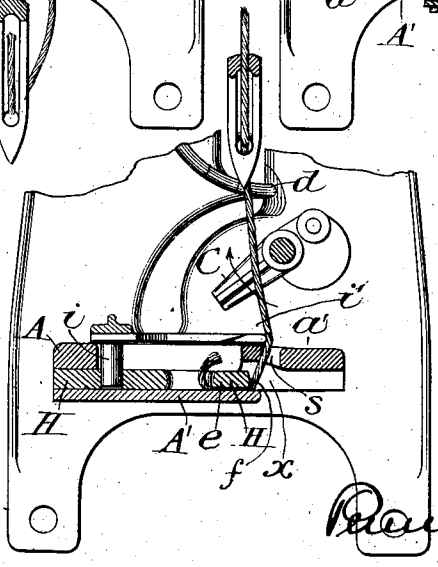


Fig. 6.

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No. 740,139. Patented September 29, 1903.

UNITED STATES PATENT OFFICE.

EDWARD A. JOHNSTON, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE McCORMICK HARVESTING MACHINE COMPANY, OF CHICAGO, ILLINOIS.

CORD-KNOTTER FOR GRAIN-BINDERS.

SPECIFICATION forming part of Letters Patent No. 740,139, dated September 29, 1903.

Application filed June 4, 1901. Serial No. 63,149. (No model.)

To all whom it may concern:

Be it known that I, EDWARD A. JOHNSTON, a citizen of the United States, residing at Chicago, county of Cook, State of Illinois, have invented certain new and useful Improvements in Cord-Knotters 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.

The invention relates to that part of the knotting mechanism of self-binders for grain-harvesters, corn-harvesters, and the like which holds the end of the cord while the knotter is forming the loop and completing the knot.

In the rotary type of cord-holder, which is most commonly employed nowadays, the strand of cord leading around the inner side of the bundle is laid by the needle between the same gripping jaws or surfaces that hold the opposite end of the band, with the result that if either portion of the cord is larger than the other the smaller will not be gripped with sufficient force to hold it when the strain comes on the band or if the holder-jaws are adjusted to the size of the smaller strand the larger one will be gripped so tightly that the free working of the device is interfered with. Another difficulty with these holders lies in the fact that they either do not yield cord at all to the knotter as slack is required in the formation of the loop or they allow the cord to pull out from between the holder-jaws too freely, in either of which cases it is extremely difficult, if not impossible, to adjust the spring-grip of the jaws at just the right tension to hold the end of the band when the strain comes on it and yet allow it to yield up slack as required by the knotter. Minor difficulties with this type of holder are the wearing of grooves in the gripping-jaws, due to the excessive grip between them necessary to provide for inequalities in the size of different portions of the band, and the wrapping or winding of the fibers of the cord and the waste ends around the holder-shaft.

The present invention has been designed, primarily, to overcome these difficulties, and it is characteristic of the invention that the two portions of the cord are not at any time held between the same gripping-surfaces of the holder-jaw and that provision is made for taking up an amount of the held end of the band in excess of that required by the holder for the purpose of yielding it up to the knotter as slack is required in the formation of the loop. Advantages incident to this general arrangement are that no particular care is required in the adjustment of the holder-spring, as it is simply set up tight in the first instance and no further attention is necessary; also, that the knife has to cut only one portion of the cord, the held end not being cut at all. Furthermore, the slack is not obtained by pulling the end through the holder, and the wearing of grooves in its jaws is therefore obviated, and as there are no waste cut ends the holder-jaws are self-cleaning and there is nothing to clog the opposing parts, and the jaws work without undue friction.

The invention is illustrated in the accompanying drawings, wherein—

Figure 1 is an outer side view of a complete knotter mechanism, showing the parts in the position they occupy when the needle has descended to encircle the gavel. Fig. 2 is a side view of Fig. 1, the parts being in the same position. Figs. 3, 4, 5, and 7 are horizontal sections of Fig. 1 on the line 3 3, the position of the parts in Fig. 3 being the same as in Figs. 1 and 2 and the fourth, fifth, and seventh figures showing them in different stages of the knot-forming operation. Fig. 6 is a horizontal section of Fig. 1 on the line 6 6, the needle appearing in the act of raising and laying the free end of the band in the holder and the knotter being about to start. Fig. 8 is a detail of the movable jaw of the cord-holder, and Fig. 9 is a detail of the knife-carrying arm.

Referring first to Figs. 1 and 2, A denotes the usual knotter-frame, that is mounted in the ordinary manner on the overhead knotter-operating shaft B. C indicates the knotter-bill, across whose jaws the needle lays the cord in the usual manner and which forms the loop and completes the knot, as usual. This knotter is of the type that makes but one revolution for each knot and stops with its jaws trending in the direction of the out-

going bundle; but I wish it expressly understood that the invention is not limited to the employment of any particular type of knotter. A portion of the usual breastplate is shown at D, and the knotter-pinion is denoted by G. The frame A has an arm a^2, that extends down from the tubular part b^2, by means of which the frame is carried on the shaft, and on the stud c in this arm a^2 is mounted the knife-arm I, angular in form, as usual, and having an antifriction-roller r at its upper end which runs in a cam-track t on the knotter-operating wheel E, that is secured, as usual, to the shaft B and has the ordinary gear-segment e for driving the knotter-pinion G.

As shown in all the figures of the drawings, the arm a^2 of the knotter-frame stands on one side of the plane in which the needle works, and, as is also shown in all the figures, the frame has a similar arm a', depending from the upper portion on the opposite side of the needle plane and extending down to the breastplate, as does also the arm a^2, where the two arms are united by a foot or cross piece x, leaving the opening s between them for the needle to pass through in laying the cord into the holder. One of these arms—viz., a'—stands slightly nearer the knotter than the other, and the outer face of the latter, a^2, is provided with a horizontal rabbet, in which slides the movable jaw H of the holder, which is reciprocated across the slot s by a stud i on the lower end of the knife-arm engaging a vertically-elongated opening i^2 in the jaw, as best shown in Fig. 2. The arm a' forms one of the fixed jaws of the holder, and a plate A', that is held against the outer face of the other arm by means of an adjustable spring A^2, as best shown in Figs. 1 and 2, forms the other fixed jaw. The movable jaw plays between these two fixed jaws, coöperating with the jaw a' to grip the end of that portion of the band which passes around the outer side of the bundle and hold it while the knotter is revolving and coöperating with the fixed jaw A' to temporarily grip that portion leading from the needle and hold it until the needle falls and clears the way for the incoming bundle.

The plate A' is held against the thrust of the movable jaw H by lugs $a\ a$ on the knotting-frame, fitting into jogs in the upper and lower edges of the plate, and the plate is held elastically against the outer face of the arm a^2 and the movable jaw H by the spring A^2, that is jogged into the upper portion of the arm a^2 and is made adjustable by means of the nut a^3 to regulate the grip of the jaws H and A' on the cord.

The knife-arm I carries, as usual, at its lower end an upstanding knife or cutter k, which plays across the slot s and cuts the cord at the appropriate point in the knotting operation to sever the band from the portion leading to the needle and permits the discharge of the bundle. This point is indicated in Fig. 5, where it will be seen that the knotter-jaws have just closed on the two strands of the cord. From this point the knife continues its movement until the position indicated in Fig. 6 is reached, where the bundle has been discharged and the needle started on its receding movement. The rear edge e of the jaw H of the holder moves slightly in advance of the cutting edge of the knife, so that the strand leading to the needle is gripped between the inner surface of the plate A' and the outer surface of the jaw H before it is cut. The recession of the needle then lays the strand around the front edge f of the holder-jaw, over the knotter-jaws, and upon the supporting-finger d, as clearly illustrated in Figs. 2 and 6, and it remains held in this manner until the needle has cleared the way for a new bundle to pass into the binder, when the holder-jaw immediately moves over into the position indicated in Fig. 7 and a new grip is taken on the end of the cord between the inner surface of the jaw H and the outer surface of the fixed jaw a', in which position it is held until the completion of the knot.

As before described, the knife K stands vertically and plays back and forth across the opening s and the line of the cords. I prefer to make the blade separate from the arm I and screw or bolt it to the outer side thereof, so as to move close to the inner side of the fixed jaw a', and I provide it with a rounded rear edge i', which I utilize for the purpose of taking up an amount of the cord in excess of that required by the holder. This action is clearly indicated in Fig. 3, where it will be seen that the jaw H and the knife have moved farther over from the position indicated in Fig. 7, thereby deflecting the cord laterally across the shank of the knotter and bending it around the inner edge of the fixed holding-jaw a'. The parts remain in this position until the needle rises and the knotter has started to form the loop, when at about or immediately preceding the juncture (indicated in Fig. 4) the knife moves back slightly, so that the take-up yields slack to the knotter. In this reverse movement of the knife the jaw H goes with it; but owing to the extent of holding-surface between the jaws a' and H the grip of the holder on the cord is not relaxed until the opposite strand has been caught between the opposite edge e of the jaw H and the plate A'.

The above-described movements of the holder-jaw and the slack-take-up device are effected by the cam-track t on the wheel E through the intermediacy of the knife-arm I, and it is to be noted in respect of this method of operation that although the holder is intermittent in action—that is to say, grips first one part of the cord and then the other—there is no time when either portion is not securely held so as to withstand all the strains imposed upon it without being gripped so tightly as to interfere with the ease and freedom of action of the holder parts.

In Fig. 9 the slack take-up i is shown provided with a finger or ledge i^2, that projects horizontally. The purpose of this detail is to provide against the needle portion of the cord getting under the arm that carries the knife, which, of course, would result in the arm passing over the cord when it should deflect it and form the loop to give up slack.

In respect to the spring-held plate A′, which forms one of the fixed jaws of the holder, it is to be noted that inasmuch as the spring A^2 is on the outside of the plate and the fixed jaw a' is on the opposite and inner side both grips on the cord are elastic and there is no danger of cutting the cord between the edges of the holder-jaws.

Such being the construction and method of operation of my invention, it is believed that no further explanation of the conjoint action of the parts is required. It may be well to state, however, with particular reference to the knife, that as the needle recedes it lays what is called the "held end" of the cord—that is to say, the end of that part going around the outside of the bundle—behind the knife, whereas when the needle rises it lays the part going around the inner side of the bundle in front of the knife, so that the blunt back edge of the knife operates to store up slack when the knife-arm moves in one direction and the cutting edge operates to sever the completed knot from the main strand when the arm moves in the opposite direction.

Having thus described my invention, what I claim is—

1. In a knotting mechanism, the combination of a reciprocating holder, oppositely-disposed gripping-jaws against one of which the holder grips the held end of the cord, and against the other of which it grips the opposite end, and a device coöperating with one of said jaws between the holder and the knotter to take up a surplus amount of cord and yield it to the knotter as slack is required.

2. In a knotting mechanism, the combination of a reciprocating holder, stationary, oppositely-disposed gripping-jaws against one of which the holder grips the held end of the cord and against the other of which it grips the opposite end, and a device coöperating with one of the jaws between the holder and the knotter to take up the held end of the cord in excess of what is required by the holder and yield it to the knotter as slack is required.

3. In a knotting mechanism, the combination of a reciprocating holder, oppositely-disposed gripping-jaws against one of which the holder grips the held end of the cord and against the other of which it grips the opposite end, a device located between the knotter and the holder and coöperating with one of said jaws to take up a surplus amount of cord and yield it to the knotter as slack is required, and a cutting edge coöperating with one of said jaws to sever the free end of the cord.

4. In a knotting mechanism, the combination of a reciprocating holder, oppositely-disposed gripping-jaws against one of which the holder grips the held end of the cord, and against the other of which it grips the opposite end, a cutter moving across the space between the jaws, and means for operating said cutter so that the held end of the cord may be laid behind it and the free end before it.

5. In a knotting mechanism, the combination of a reciprocating holder, oppositely-disposed gripping-jaws against one of which the holder grips the held end of the cord, and against the other of which it grips the opposite end, and a cutter moving across the space between the jaws, the back of the cutter coöperating with one of the jaws to take up the held end of the cord in excess of what is required by the holder, and the cutting edge of the cutter coöperating with the other jaw to sever the free end of the cord.

6. In a knotting mechanism, the combination with the needle and the holder, of a cutter and means for moving it across the line of the cords, and causing it when moving in one direction to form a loop in the held end of the cord to supply slack for the knotter, and to sever the free end of the cord when moving in the opposite direction.

7. In a knotting mechanism, the combination of a holder, a needle, a cutter, and means for moving the cutter across the line of the cord so that the cord will be laid behind the cutter as the needle recedes and in front of the cutter as the needle advances.

8. In a knotting mechanism, the combination with the knotter and holder, of an arm located between the knotter and holder and pivoted to swing transversely to the direction of the cord, and means for operating said arm to deflect the cord laterally and horizontally over on to the shank of the knotter and simultaneously to form a loop to provide slack for the knotter.

9. In a knotting mechanism, the combination of a knotter, a sliding holder, and an arm pivoted to vibrate between the knotter and holder across the line of the cord, and means for moving said arm against the cord so as to carry the cord on to the shank of the knotter, and continuing the movement past the knotter to form a loop in the cord to give up slack to the knotter.

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

EDWARD A. JOHNSTON.

Witnesses:
WM. H. FERGUSON,
CHAS. W. ALLEN.