(No Model.) 4 Sheets—Sheet 1.

M. E. BENEDICT.

GRAIN BINDER.

No. 480,226. Patented Aug. 2, 1892.

Fig. 1.

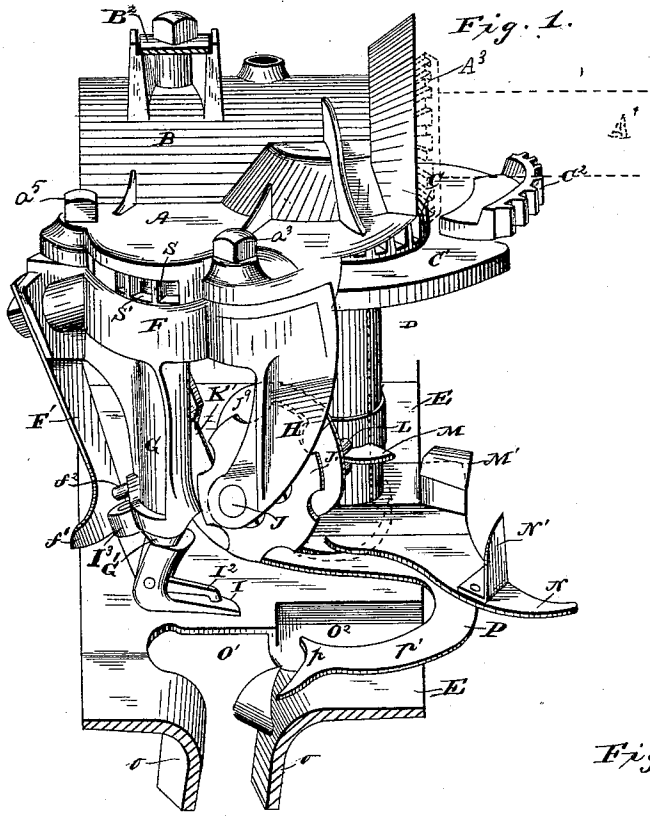

Fig. 3.

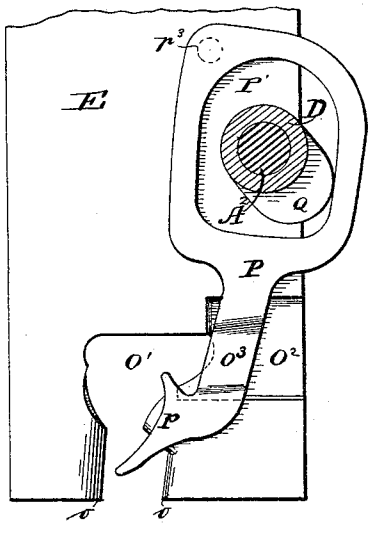

Fig. 2.

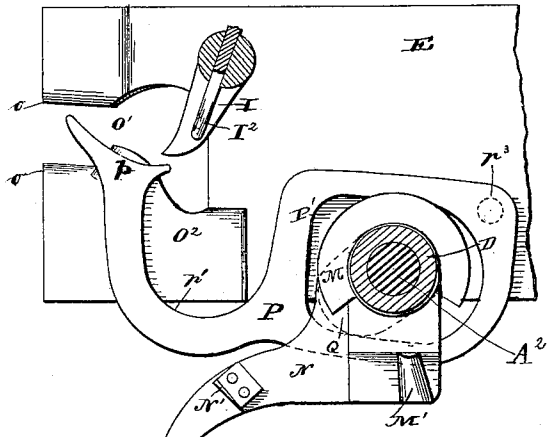

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Fig. 4.

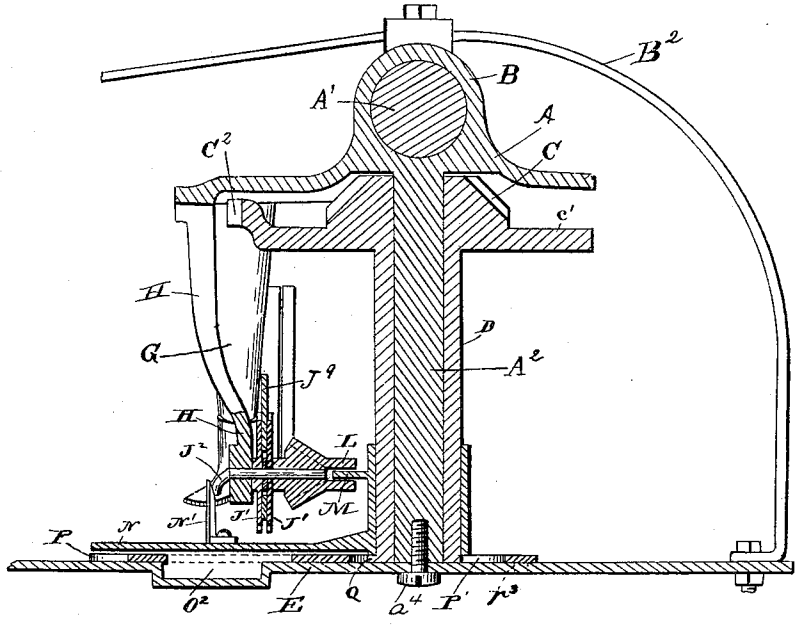

Fig. 5.

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GRAIN BINDER.

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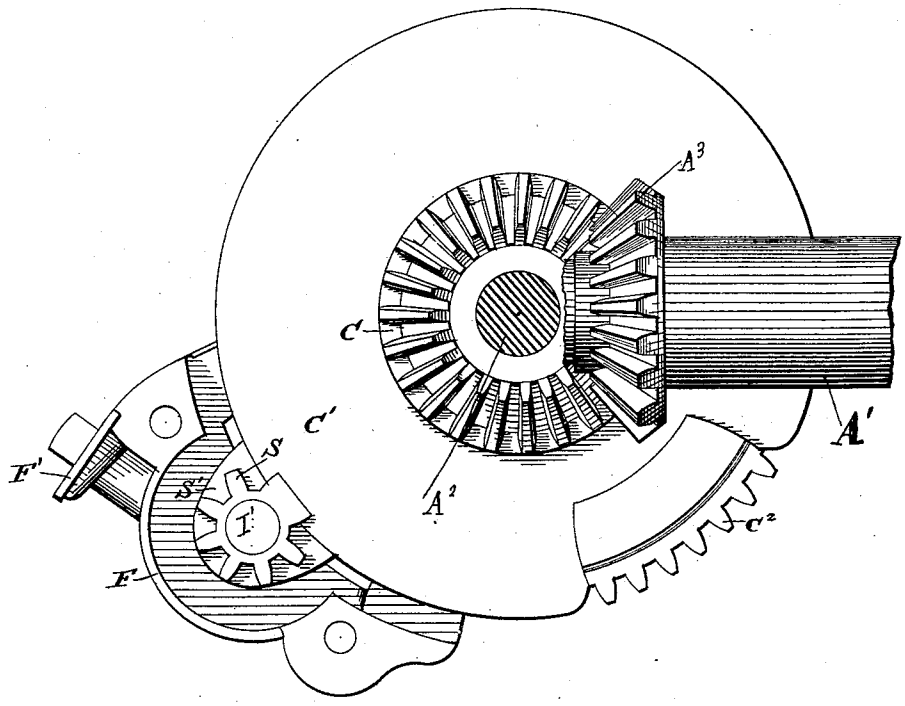
Fig. 6.



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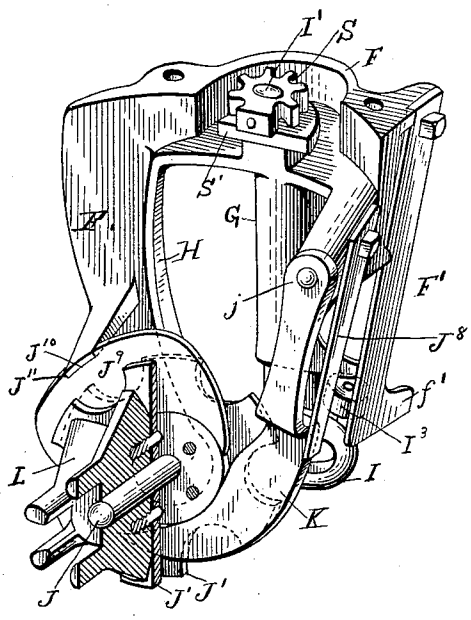
GRAIN BINDER.

No. 480,226. Patented Aug. 2, 1892.

Fig. 7.



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UNITED STATES PATENT OFFICE.

MILTON E. BENEDICT, OF PERRY, NEW YORK, ASSIGNOR OF ONE-HALF TO RICHARD T. TUTTLE, OF SAME PLACE.

GRAIN-BINDER.

SPECIFICATION forming part of Letters Patent No. 480,226, dated August 2, 1892.

Application filed February 4, 1888. Serial No. 263,030. (No model.)

To all whom it may concern:

Be it known that I, MILTON E. BENEDICT, of Perry, in the county of Wyoming and State of New York, have invented certain new and useful Improvements in Grain-Binders; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification, and to the letters of reference marked thereon.

My invention relates to improvements in the knotting mechanism of grain-binders, and particularly in the tucker thereof and the means for operating the same; and it consists in a certain improved construction of device, which I will now proceed to describe, the particular points of novelty being pointed out in the claims at the end of this specification.

In the drawings, Figure 1 is a perspective view of a portion of the knotting mechanism of a binder; Fig. 2, a sectional view taken just above the tucker and stripper; Fig. 3, a view of a modified form of tucker; Fig. 4, a sectional view through the cord-clamping device. Fig. 5 is a side elevation of the form of tucker shown in Fig. 3; Fig. 6, a top plan view of the main gear and the knotter-bill shaft; Fig. 7, a perspective view showing the construction of the cord-clamp.

Similar letters of reference in the several figures denote similar parts.

The drawings show the knotting mechanism of a binder to which my invention is applied, E representing the breast-plate, provided with the ordinary cord-opening O′ and in the present instance with depending lips or flanges *o o*.

A represents an upper main casting provided with a housing B, in which the main shaft A′ of the knotting mechanism operates, said casting being further provided with a depending pintle or stud A^2, connected to the breast-plate by a small bolt a^4, as shown. The shaft A′ is supported from the binder-frame, and this in turn forms in part the support for the knotting mechanism, the main casting being connected to the breast-plate, as described, the latter being supported at the forward end in any suitable manner, and a brace B^2, connected to the rear of the breast-plate, the top of the casting A, and forward to the main frame (this latter connection not being shown) for the purpose of steadying the parts.

Surrounding the stud A^2 is a sleeve D, preferably formed with a bevel-gear C, at one end meshing with the gear A^3 on the shaft A′, and just below this with a disk C′, having a gear-segment C^2 on one side thereof, adapted to operate the knotter-bill at proper times when the sleeve is rotated.

F represents a casting secured to the under side of casting A by means of bolts a^3 a^5 and having depending portions G and H, the former being of tubular form, constituting a bearing for a vertical shaft I′, carrying the knotting-bill I on its lower end and the latter H having secured to it a pin J, on which is journaled a bevel-pinion L, to which are connected the disks J′ J′, constituting a portion of a well-known form of cord-holding device. The other portion of the cord-holder is formed by a downwardly-projecting arm or plate K, having its lower end flattened and curved and projecting between the disks, as shown in Fig. 7, said arm being pivoted upon a pin *j* on casting F and held pressed in between the disks by a spring J^8, bolted to the casting. Also projecting between the plates J′ J′ is a plate J^9, prevented from movement by a projection J^{10} on the leg H of the casting F, entering a recess J^{11} therein, said plate having the lower point near the pin J and gradually inclined outward, serving to remove the small piece of binding-cord cut off and held between plates J′ J′ and arm K when pinion and plates are rotated.

The knotting-bill consists of the stationary jaw and hook portion I, formed on the lower end of the shaft I′, and the movable jaw I^2, pivoted in a slot, having on its outer end a friction-roller I^3, adapted to co-operate with a cam-surface G′ on the lower portion of leg G, and a cam F′, composed of a piece of spring metal secured at its upper end to casting F, with its lower end *f′* bent out to form a surface, against which the roller strikes to close the jaws when the bill-shaft is rotated. The upper end of this knotting-bill shaft is pro-

vided with a pinion S, which is engaged by segment C^2, and just below said gear is a collar S′, having a cut-away portion, into which the periphery of the disk C′ projects when the shaft is in normal position to prevent accidental rotation.

The teeth of the pinion L are rearwardly extended somewhat and serve as stops to prevent accidental rotation by reason of the segmental collar or fin M, mounted on and secured to the sleeve D and adapted to pass through between the tooth extensions during the rotation of the gear at all times, save when the tooth M′, located on the stripping-arm N, secured to the lower portion of sleeve D, (in the present instance a sleeve on the arm forming the connection between the arm and sleeve,) engages the bevel-pinion L to rotate it. This stripping-arm N is adapted to rotate with the sleeve and is provided on its upper surface with a knife N′, which operates to sever the cord between the cord-holder and knotter-bill just before the stripper removes the loop from the latter.

P represents the tucker, which, together with the devices for operating it, constitutes my present invention. It consists, preferably, of a flat plate having the ordinary forked end *p*, the curved neck *p′*, and the enlarged opening P′, while it is provided with a pin or stud p^3 at one corner of its rear end, adapted to enter a perforation or recess in the breast-plate, forming a pivot on which the plate vibrates. By the formation of the tucker with the curved neck there is left a space between the fork on the end operating on the cord and the recessed portion upon which the operating part (the cam hereinafter described) operates for the passage of the ends of the cord, as will be described.

On the lower side of the sleeve D, below the stripper, is secured a cam Q, so arranged relative to the other devices on the sleeve that it will engage with the inner side of the opening P′ and move the tucker on its pivot, causing the outer end to pass beneath the knotter-hook, placing both strands of the cord in position to be operated upon by the knotter-bill just before the segment C^2 on the gear engages the knotter-bill pinion, and when the stripper has reached a position beyond the tucker on its outer movement said cam will operate on the outer side of the opening and turn the tucker outward, as in Fig. 1, leaving the opening in the breast-plate free, so that the binder-arm may again carry the cord over into the cord-clamping device, as usual.

The manner of attaching the tucker and its construction I regard as novel and a decided improvement on prior devices. It will be noticed that the plate rests upon the breast-plate, that its pivotal stud passes through a perforation in said plate, and the cam or projection on the sleeve is simply placed within the opening, and when the parts are drawn together by the bolt fastening the end of the pintle or stud A^2 to the breast-plate the tucker is held in position. The pivot described as being formed on the tucker-plate could, if desired, be transferred to the breast-plate, and instead of resting upon the latter a washer might be placed between them. It will be noted that as the stripper moves close to the breast-plate there is a recess O^2 formed in the latter on the side of the cord-opening toward which the stripper moves, and this is for the purpose of accommodating the end of the cord slipping over the stripper-arm and between the arm and breast-plate and preventing its being clamped or caught between the said arm and the plate when the former is operated, and the curving of the neck of the tucker outward also prevents its being clamped between the tucker and stripper.

The operation of the parts will now be apparent to one skilled in the art. The end of the cord is held in the cord-clamp, passing up through the breast-plate and over the knotting-bill. Then the binder-arm passes the cord around the grain and projects between the depending arms G and H, causing the portion of the cord passing from it to enter one of the notches in plates J′ J′. Then the gear and sleeve rotating, the cam Q strikes the inner side of the opening in the tucker and moves it inward, catching the two strands of cord in its fork and moving them toward the knotting-bill, so that no matter what size of bundle is being formed the cord will be arranged in position to be engaged by the bill when rotated. The tooth M′ on the stripper now strikes the pinion of the cord-clamp and moves the gear L and cord-clamping disks around, causing the strand of cord carried by the arm to be carried down between the disks and arm K and clamped, and the segment C^2 engages the pinion S and rotates the bill, the cam F′ keeping the movable jaws I^2 closed when the bill makes the first part of its rotation, the cam G′ opening it to grasp the two strands extending from the cord-holder and the cam F′ closing it on its second rotation with these strands inside it when the stripper-arm moves beneath, stripping the loop thus formed from the bill, tying the knot after the manner of the ordinary Appleby knotter, and the cutter on the stripper then severs the ends of the cord and permits the bundle to be dropped or ejected in any manner. The tucker remains in the same position over the opening in the breast-plate, the outwardly-curved neck *p′* allowing the passage of the knot and the ends of the strands on the bundle; but when the stripper has passed a short distance outside the cam Q engages the outer side of the opening P′ and turns the tucker on its pivot out of the way, as indicated in Fig. 1, so that the binder-arm can place the cord around the bundle and in the cord-clamp, as before.

The operation of the binding mechanism is controlled from a tripping device, as usual, on the grain-table, and the various parts are timed to cause the operations, as described.

Instead of providing the tucker with the outward-extended curved neck p', as shown in Fig. 2, a slightly-depressed portion O^3, corresponding to some extent with recess O^2 in the breast-plate, might be formed in it and the neck made straight, as shown in Fig. 3, and this would perform the same object as the form presented in the other figures, as it would permit the stripping of the loop without liability of catching the cord.

I do not wish to be understood as claiming the construction or arrangement of the knotting-bill, cord-clamp, stripper, or cutting-knife, except in so far as they combine with my improved tucker.

I claim as my invention—

1. In a knotting mechanism, the combination, with the cord-clamp and knotter-bill, of the gear-segment, the stripper and cam mounted on the same axis and moving with the gear-segment, and the tucker pivoted on an axis parallel with the stripper-axis and adapted to be operated by the cam, substantially as described.

2. In a knotting mechanism, the combination, with the cord-clamp and knotter-bill, of the gear-segment arranged on an axis parallel with the bill-shaft and adapted to operate the latter, a stripper and cam mounted on the same axis and moving with the gear-segment, and the tucker pivoted on an axis parallel with that of the segment and operated by the cam on the segment, substantially as described.

3. In a knotting mechanism, the combination, with a cord-clamp and knotter-bill, of the gear-segment operating the bill, arranged on an axis parallel with the bill-shaft, a stripper and a cam mounted on the same axis and moving with the segment, and the tucker pivoted on an axis parallel with that of the segment, having the outwardly-extended neck and operated by the cam, substantially as described.

4. In a knotting mechanism, the combination, with the breast-plate having the cord-opening, of the rotating knotter-bill, the gear-segment operating the bill-shaft, the cam and stripper-arm both mounted on the same axis and moving with the segment, and the pivoted swinging tucker operated by the cam and having the forked end and the extended neck curved in the line of movement of the stripper, substantially as described.

5. In a knotting mechanism, the combination, with the breast-plate having the cord-opening, of the rotating knotter-bill, the gear-segment operating the bill, the cam and stripper, both mounted on the same axis and moving with the segment, and the swinging tucker pivoted on the breast-plate having the opening with which the cam co-operates, the forked outer end, and the extended neck curved in the line of movement of the stripper, substantially as described.

6. In a knotting mechanism, the combination, with the breast-plate having the cord-opening, of the rotating bill, the gear-segment operating the knotter, the stripper-arm mounted on the same axis as and moving with the segment, the cam below said stripper on the same axis as and moving with the segment, and the swinging tucker pivoted to and resting upon the breast-plate and operated by said cam, substantially as described.

7. In a knotting mechanism, the combination, with the breast-plate, the knotting-bill, the cord-clamp, the cutter, and the stripper, of a vibrating tucker located below said stripper, having the extended neck curved in the line of movement of said stripper for permitting the passage of the cord when the loop is removed from the bill, as set forth.

8. In a knotting mechanism, the combination, with the breast-plate, of the knotting-bill, the cord-clamp, the cutter, and the stripper, a gear for operating the latter, and a tucker pivoted upon the breast-plate and operated by a cam moving with the stripper-operating gear, substantially as described.

9. The combination, with the knotter-hook and the stripper operating to remove the knot-loop therefrom to form the knot, of the breast-plate having the opening for the cord and the recess or depression in its upper surface at the side of the cord-opening and in line with the movement of the stripper for the accommodation of the cord ends, substantially as described.

10. In a knotting mechanism, the combination, with the cord-clamp and knotter-bill, of the gear-segment for operating the bill, the cam mounted on the same axis as and moving with the segment, and the tucker pivoted on an axis parallel with that of the segment and adapted to be operated by the cam, substantially as described.

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