(No Model.)

H. STOFFEL.

GRAIN BINDER.

No. 441,599. Patented Nov. 25, 1890.

Fig. 1.

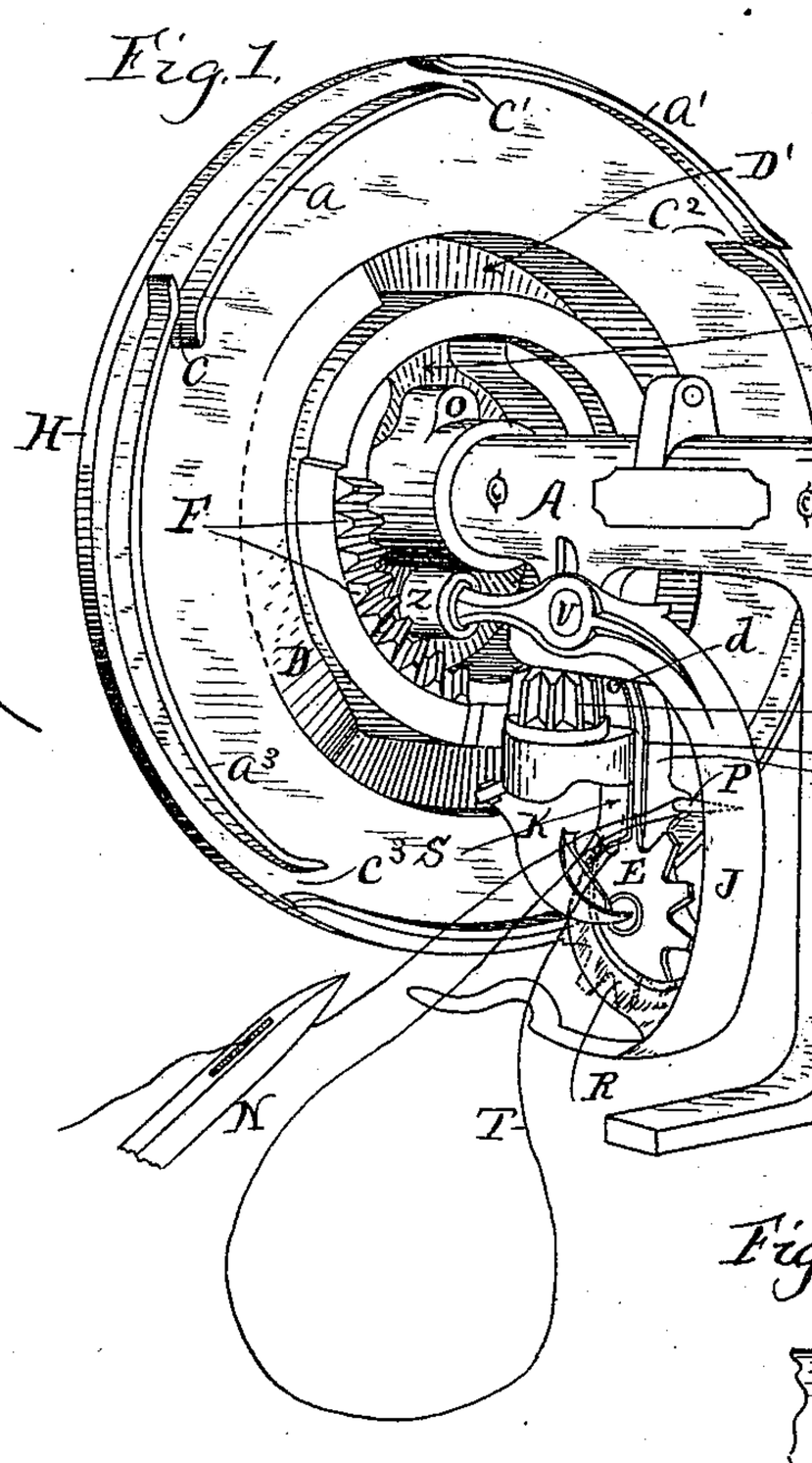


Fig. 3.

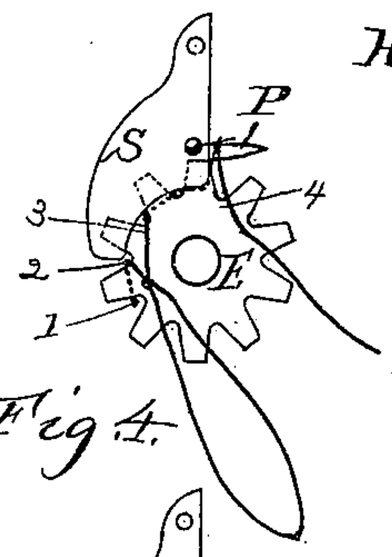


Fig. 4.

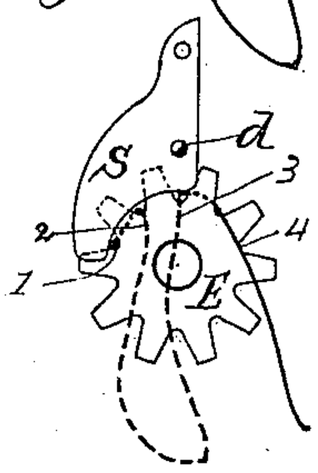


Fig. 5.

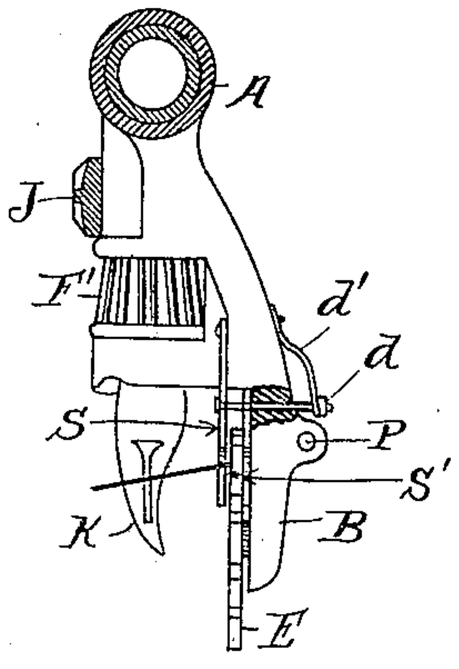
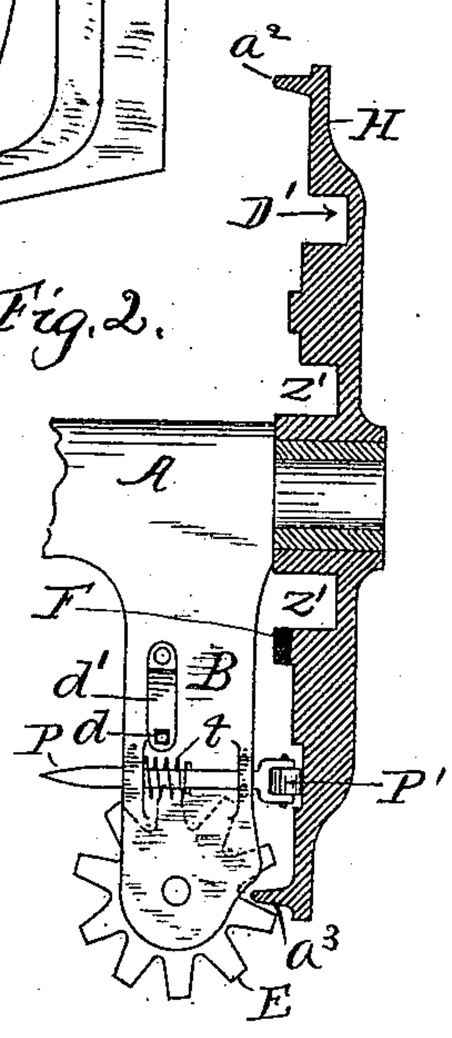


Fig. 2.



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UNITED STATES PATENT OFFICE.

HENRY STOFFEL, OF ST. MARK, KANSAS.

GRAIN-BINDER.

SPECIFICATION forming part of Letters Patent No. 441,599, dated November 25, 1890.

Application filed September 13, 1889. Serial No. 323,813. (No model.)

To all whom it may concern:

Be it known that I, HENRY STOFFEL, a citizen of the United States of America, residing at St. Mark, in the county of Sedgwick and State of Kansas, have invented certain new and useful Improvements in Grain-Binders, of which the following is a specification, reference being had therein to the accompanying drawings, and the letters and figures of reference thereon, forming a part of this specification, in which—

Figure 1 is a perspective view of a knotting mechanism of a grain-binder having my invention applied thereto. Fig. 2 is a rear side view showing a portion of the same and a cross-sectional view of the knotter-operating wheel thereof. Figs. 3 and 4 are detail plan views of the twine-holder thereof; and Fig. 5 is a view taken on line 1, Fig. 2, showing the knotter-standard in cross-section and an edge view of the twine-holder.

This invention relates to certain improvements in the twine-holding mechanism for grain-binders; and it consists in the particular construction and arrangement of parts hereinafter described and claimed.

Referring to the drawings, A represents the knotter-supporting standard of an ordinary binder for grain-harvesting machines, and B represents the bracket-arm depending therefrom at its inwardly-extending end, and has boxed thereto in the ordinary manner the ordinary knotter K with its pinion F′, and has pivoted thereto at *v* the ordinary knife-arm J, having the wrist-roller Z at its upper end and the knife R at its lower part.

H represents the knotter-operating wheel secured to a shaft leading through standard A in the usual manner, which shaft will at stated intervals, by means of its connection with the operating mechanism of the binder, common in harvesters, rotate the knotter-wheel for the purpose hereinafter stated. The said knotter-wheel is provided with the toothed segment F, of ordinary construction, for operating the knotter-pinion and mechanism for tying a knot in the manner common in binders, and is also provided with the cam-channel Z′, in which the roller Z operates, which cam-channel is located adjacent the hub of wheel H and within the curve of the toothed segment F of the wheel H, and by reason of the waned portion of said channel the knife-arm is caused to move at the proper time during the revolution of the wheel H to cause the knife R to cut the twine between the knotter and holder at the conclusion of the tying of each bundle, so that the bundle may be ejected from the binder.

a, *a′*, a^2, and a^3 are cam-flanges of wheel H, arranged near the periphery of the wheel H on its side adjacent the knotter and twine-holder mechanism, and these cam-flanges are for the purpose of engaging the teeth of the twine-holder disk E for rotating said disk, and are eccentric at their junctions *c*, *c′*, c^2, and c^3, causing them to act upon the holder-disk in the manner of a worm-gear by rotating the said disk and changing a tooth at each junction. The twine-holding disk E is pivotally secured to the lower part of bracket-arm B, with its plane at right angles to wheel H, and rotates adjacent to a plate S′ at its upper part, and is clamped at its side opposite plate S′ by the plate S, which is rendered yielding by means of spring *d′* through the medium of bolt *d*, which bolt is arranged connecting said plate and spring, as shown more clearly in Fig. 5.

P is a pin for holding the binding-twine during a portion of the time the holding-disk is being operated for the purpose hereinafter explained, and is arranged in a horizontal position in the two bearings shown, at the side of arm B, opposite disk E, at a height about equal with the upper portion of said disk, with one end extending toward the knotter-wheel and its opposite end extending beyond the inner side of the arm B, and is provided on its end adjacent the knotter-wheel with a track-roller P′, which roller is arranged to bear against the camway D D of the knotter-wheel, which camway is located adjacent the outer curve of the toothed segment F. A coil-spring *t* is sleeved on pin P between its bearings and arranged to bear at one end against the inner pin-bearing, and at its opposite end against a transverse pin of said pin P, and by means of this spring the roller P′ is yieldingly held against the camway D D′ of the knotter-wheel. The said camway is divided into the two sections indi-

cated by the letters D and D′, which sections are of different planes and are provided at one junction with an inclined approach from one plane to the other, and at the opposite junction with an abrupt offset. Cam-section D′ is of a plane farther from arm B than its fellow section D, and while the roll P′ of the pin P is bearing against said section D′ of the camway the opposite end of pin P will be held by its spring *t*, withdrawn within its bearing, so that it will not extend beyond arm B; but when the knotter-wheel rotates to bring the inclined approach of the camway to the point the roller P′ is bearing, it will cause the said roller to ride upon the cam-section D, and thereby compress spring *t* and force the pin P forward at its proper time and hold it during the time said cam-section is passing under the roller, and when the end of said section D is reached the wheel recedes quickly off its abrupt offset, and thus enters the cam-channel section D′, permitting the spring *t* to withdraw the pin P and remain withdrawn until the roller again reaches section D.

N represents a portion of the binder-needle sufficient to illustrate its position, and when it is brought up to bring the twine T about a bundle (which will be supposed to be within the depending loop of the twine shown) it pays out the twine in a position over the knotter and holding-disk and immediately under the pin P, the needle itself above the pin, and when in such position the pin is advanced to enter between the needle and twine, and as the needle recedes the twine is left deposited on said pin, as shown in Fig. 1, with the under strand thereof in position across the knotter, together with the formerly detained end portion and resting in a notch between a pair of teeth in disk E, ready to be drawn about between plates S S′, and thus held by the yielding grip, as described, as the disk is again partially rotated by passing the junction C^3. (See Fig. 1.) It will be observed that three of the cam-flange junctions are constructed to advance the rotation of disk E, as shown at C, C^2, and C^3, and that junction C′ is reverse, to reverse the disk one tooth. Thus in one rotation of the wheel H the disk is rotated three teeth or notches forward and one backward, equivalent to two complete forward. It will also be brought to mind that when the needle is brought up to lay the twine about a bundle and deliver it to the knotter a strand is brought up and deposited in the proper notch of the holding-disk E, and when the needle recedes it pays out a second strand, which is in its proper order deposited in the next succeeding notch of said holder, and thus the two complete forward actions of the cam-flanges are utilized.

In starting the binder the twine is drawn from the needle and deposited in a notch of disk E. The machine is then started, when the said deposited end is drawn in between the tension-plates S S′. The grain is then delivered to the binder, and when a bundle has accumulated the needle is thrown into action in the usual manner and the twine T is delivered about the bundle to the knotter and the next succeeding notch in disk E, thence to pin P, as described, and the twine delivered about said pin to be held ready for deposit in the next succeeding disk-notch.

By reference to Figs. 3 and 4 it will be observed that I have numbered the portions of the twine at each respective disk-notch in consecutive order to more distinctly explain the exact manner of holding and cutting the twine. After the machine has been operating and the twine in deposit, as when in action, the positions are shown in said figures. However, before describing the exact holding of the twine, I will state that but a single twine is cut at each discharge of a bundle of grain, and hence there can be no last piece of twine.

1 represents the end of the twine resting in a disk-notch as it appears after being cut loose from the previous bundle. In Fig. 4 it is represented held by plate S, and leading back about the next advancing tooth of the disk to the twine portion 2, which portion leads down and about the bundle.

Portion 3 represents that portion of the twine brought up with the needle about the bundle and deposited in the next succeeding disk-notch. Now, when such deposit is made, the knotter is brought into action in the usual manner and the twine is tied into a knot, as shown at 2 and 3, Fig. 3. During such action twine-section 4 is held by pin P, so as not to be deposited in a notch, and the disk is given its third partial rotation to advance portions 1 and 2 far enough to be released from plates S S′, as shown in Fig. 3, so that end will not need to be cut, but the cutting confined to the single twine 3, and the knife R is at such time thrown into action to thus cut said twine portion 3, adjacent the disk E and between the disk and knotter, and thus permit the finished bundle to be discharged from the binder in the usual manner. After such cutting and discharging, the disk-teeth engage the reversing-junction of the cam-flanges, and are reversed or turned back to be in position to receive twine portion 4 in its notch succeeding that holding the portion 3 as said portion 4 is released from pin P, so that but a short portion will be in rear of the tooth between 3 and 4. At each bundle the like action takes place, wherein the disk advances three teeth, the third as a means of releasing end 1 2, and recedes one tooth as a means of bringing the notches between the teeth in position to receive the next twine deposit in consecutive order with the former deposits.

Having thus described my invention, what I claim as new and useful, and desire to secure by Letters Patent, is as follows:

1. The combination, in a grain-binding machine, of the knotter-wheel provided with a cam-channel for operating the knife-arm, with a toothed segment for engaging and operating the knotter-pinion, with the camway D

and D′ for operating a twine-holding pin, and with the cam-flanges a, a', a^2, and a^3 for operating the twine-holding disk, the toothed holding-disk E, the spring-plate S thereof, the horizontally-operating twine-holding pin P, and the pivoted knife-arm provided with a knife operating between the knotter and holding disk, substantially as and for the purpose set forth.

2. The combination, in a grain-binding machine, with the rotary tying device and pinion thereof, of the notched or toothed twine-holding disk E and the yielding clamping-plates thereof, and the knotter-wheel H, provided with the toothed segment for driving the pinion, and also with the cam-flange sections a, a', a^2, and a^3 for operating the twine-holding disk, three of which cam-flanges respectively operate to advance said disk forward three consecutive notches, and one of which flanges operates to reverse the said disk one notch at each rotation of the knotter-wheel, substantially as and for the purpose specified.

3. The combination, in a grain-binding machine, with the knotter and twine-holding mechanism, of the twine-holding pin P, arranged in bearings in a horizontal position in line with the path of the binder-needle, the coil-spring t, sleeved on said pin between its bearings for yieldingly holding the pin from the path of the said needle, and the knotter-wheel H, provided with the camway D D′, against which one end of the pin bears for operating the pin to cause it to advance at stated intervals to extend across the path of the needle, substantially as and for the purpose set forth.

4. In a grain-binder, the combination of the toothed rotary disk E, the yielding clamp-plate S, engaging the teeth of said disk, the rotary knotter-operating wheel H, having the camway D D′ and sectional cam-flanges a, a', a^2, and a^3, engaging in their consecutive order the teeth of said disk, and the twine-holding pin P, wherein the said disk and clamp-plate are adapted to hold the binder-twine, and the disk is adapted to be rotated in advance three consecutive notches by means of the similar spiral form of three consecutive sections of the cam-flanges and to recede one notch by means of the reverse spiral form of the fourth section of the cam-flanges at each rotation of knotter-operating wheel H, the third forward action releasing the twine end from grip, and the reverse action for bringing the disk notches into position for the next deposit of twine to be in consecutive order with the succeeding deposits, substantially as and for the purpose specified.

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Witnesses:
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