W. H. PAYNE.
Grain-Binder.

No. 219,304. **Patented Sept. 2, 1879.**

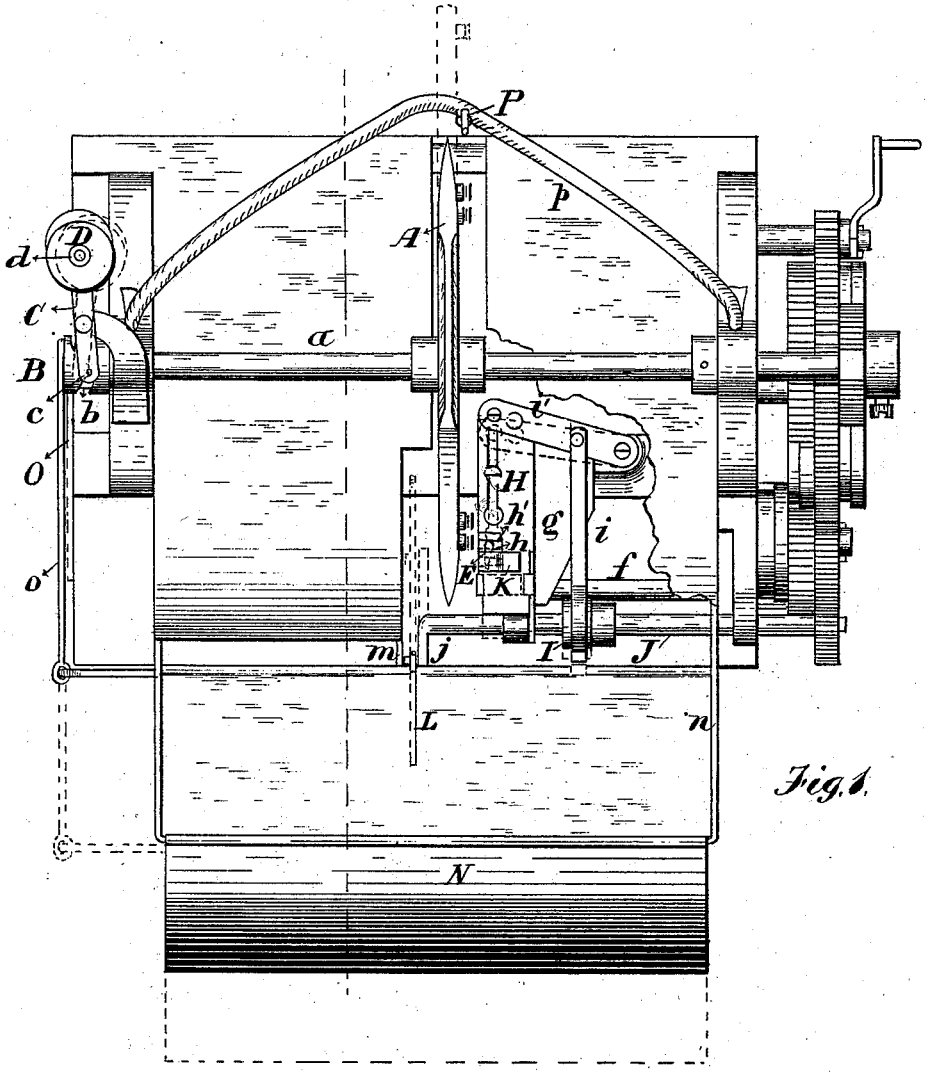

Fig. 1.

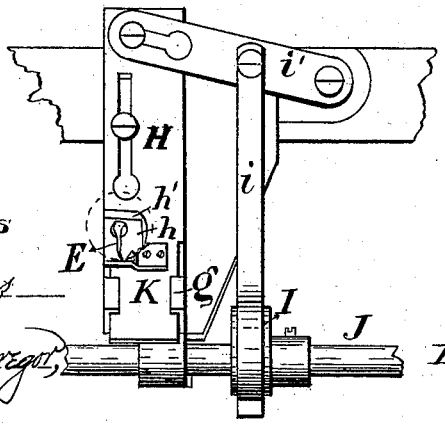

Fig. 2.

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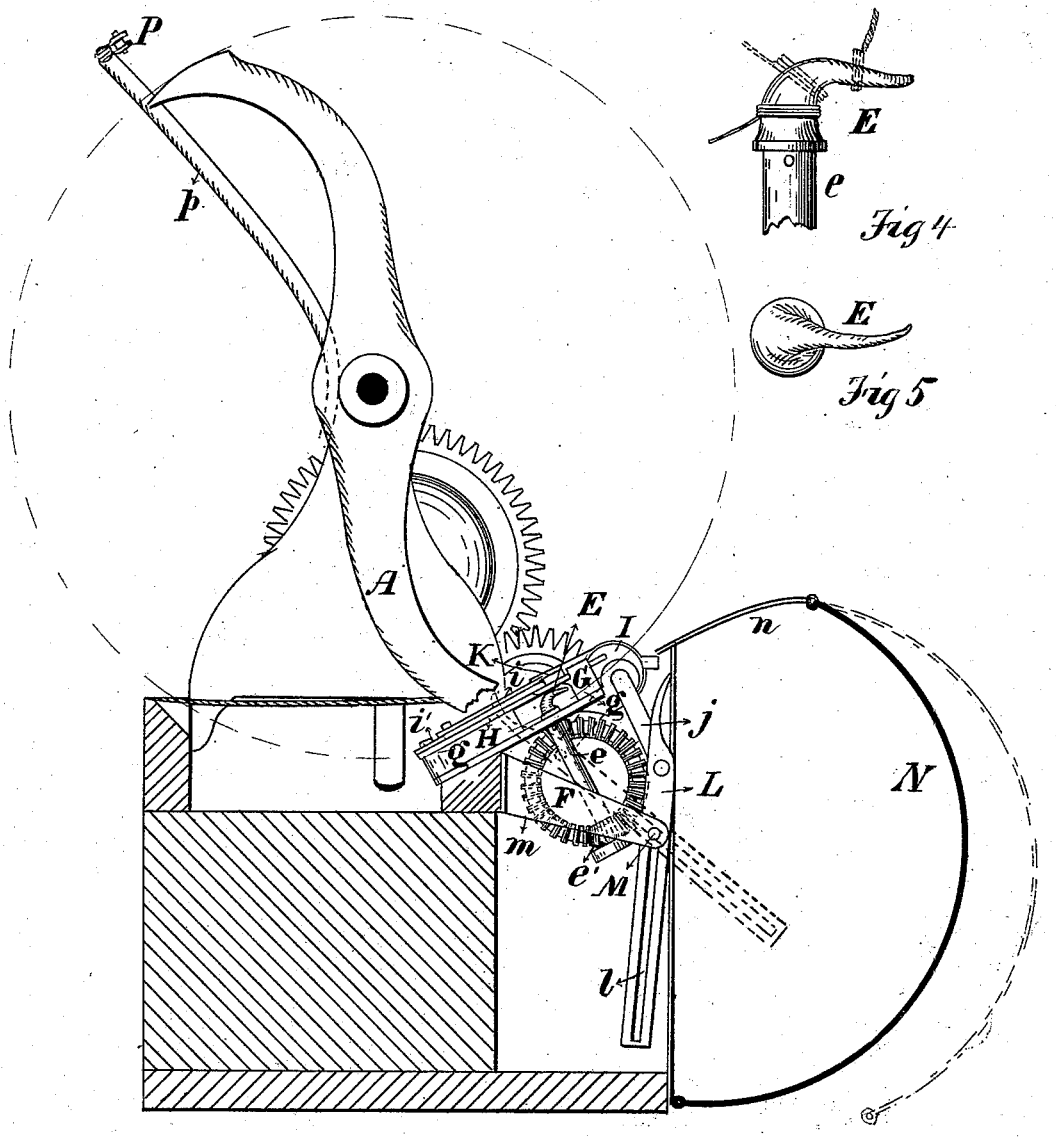

Fig. 3.

Fig 4

Fig 5

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WILLIAM H. PAYNE, OF SANDWICH, ILLINOIS.

IMPROVEMENT IN GRAIN-BINDERS.

Specification forming part of Letters Patent No. **219,304**, dated September 2, 1879; application filed January 30, 1878.

To all whom it may concern:

Be it known that I, WILLIAM H. PAYNE, of Sandwich, in the county of De Kalb and State of Illinois, have invented a new and useful Improvement in Grain-Binders, which is fully set forth in the following specification, reference being had to the accompanying drawings, in which—

Figure 1 represents a plan view of a grain-binder containing my improvements; Fig. 2, a detail plan view of the twisting-hook, wire-cutter and connecting mechanism; Fig. 3, a vertical section taken on the line *x x*, Fig. 1; Fig. 4, a side elevation of the twisting-hook on an enlarged scale, and Fig. 5 a plan view of the same.

My invention relates to mechanism for binding the grain automatically upon the machine; and the object of the invention is to adapt a hook-twister to the machine heretofore patented by me, No. 191,776, dated June 12, 1877; also, to provide means for discharging the bundle after it is bound, and for taking up the slack in the band-wire.

The invention consists in the special combination of the twister-hook with its driving mechanism, whereby it is caused to stop always with its point in line with the forward movement of the wire-cutter.

It also consists in the combination of the twister-hook and a movable cutter, whereby the refuse coil of wire on the twister-hook is pushed forward to the point thereof by the movement of the cutter.

It also consists in a movable support or stop, which supports the band while it is twisted, and is then moved away while the wire is being cut.

It also consists in a special arrangement of device for discharging the bundle after it is bound.

It also consists in various special combinations of devices, all of which will be hereinafter more fully set forth.

In the drawings only the binding attachment is illustrated, as the general construction of harvesting-machines is well known, and the application of this attachment to any such machine will be readily understood.

The binder, in many of its general features of construction, is substantially like that described and shown in my prior patent mentioned above. The grain-receiver and driving-gearing are about the same, and a revolving gathering and binding arm, A, is used, operating very much like that therein shown, although different in some features of construction. These parts, therefore, will not be particularly described here.

The revolving binding-arm A is mounted upon a shaft, *a*, on the end of which, opposite to the driving-gear, is a grooved cam, B, around which is cut a zigzag groove or channel, *b*.

An arm, C, is pivoted to a suitable support on the carrying-frame, and is provided with a pin, *c*, at one end, which is arranged to enter the groove in the cam B. The spool D of band-wire is mounted upon the other end of this arm, which is provided with a post, *d*, for this purpose, and the arm is constructed and arranged so as to locate the spool in any desired position.

Now, it is evident from the above description that as the binding-arm shaft is rotated the spool-carrying arm will be vibrated back and forth by the action of the cam-groove, the spool on the outer end being thereby reciprocated back and forth.

The arrangement of these devices is such that as the binding-arm is carried around and takes wire the spool is moved inward toward the arm, as shown in dotted lines in Fig. 1 of the drawings; and when the head of this arm has passed the point of greatest tension, and is nearing the twisting mechanism, the spool is moved in the opposite direction to a position shown in full lines in Fig. 1 of the drawings, when the binding-arm finally stops; and the degree of this movement of the spool is regulated so that the slack-wire between the spool and the head of the binding-arm will be taken up thereby.

The counter reciprocation is simply a return movement when the machine is in practical operation binding grain; but if it is operated when there is no delivery of grain this return movement will give just enough wire to permit the head of the binding-arm to pass the point of greatest tension without running off wire from the spool, and the same amount will

be taken up by the movement of the spool in the opposite direction, so that the spool-vibration will give and take wire sufficient to permit the rotation of the binding-arm without drawing off wire from the spool-supply.

The twisting-hook E is on the upper end of the shaft *e*, placed, in this machine, at such an inclination as to bring the hook into proper relation to the binding-arm. The hook is rotated by means of a bevel-pinion, *e'*, on the lower end of the shaft, which meshes with a bevel-gear, F, on the inner end of a horizontal shaft, *f*, driven by the main gearing at the proper intervals for twisting the band. This driving mechanism is so arranged and timed that when the hook stops after the twist has been formed it will always stand with its end projecting forward, and in this instance about parallel with the path of the binding-head in its forward movement, as shown in Figs. 1 and 2 of the drawings.

The twister-hook is adapted to operate mainly like others now well known, in which the wire is coiled upon the shank of the hook while the twist is being formed, thereby providing a fastening for the free end of the wire after the wire is cut at the completion of the twist.

In twisters of this kind a refuse coil of wire is left upon the hook each time a twist is formed and the wire cut, and I have constructed and arranged my twister with special reference to shedding these coils with facility.

The hook has two special bends, the first of which is in the body or horizontal position, and is outward or away from the binding-arm. Supposing the twister to stand in relation thereto as shown in Fig. 1 of the drawings, the second is at the point, and a slight turn downward. These bends are fully shown in Figs. 4 and 5 of the drawings, the hook being also tapering toward its point, as is usual.

The bend in the body of the hook is for the purpose of facilitating the catching and holding of the wire at the commencement of the revolution of the hook to form the twist. The turn downward at the point is to facilitate the shedding of the refuse coils of wire.

A stationary cutter or knife, G, is fixed upon a suitable support, *g*, in which also the upper end of the twister-shaft is journaled. This knife is arranged just over and in front of the twister, so that the point of the latter just passes under it when rotated.

A movable knife-plate, H, is also mounted upon the support *g*, and is secured thereto so as to be free to slide back and forth. The inner edge of this knife-plate is cut away to form a recess, *h*, which, when the plate is drawn back, is just above the twister-hook, so that the wire is drawn into it when twisted. The edge of the plate *h'* at the rear of the recess is constructed in the form of a knife or cutter for severing the wire. This knife-plate is arranged just above the twister-hook, and is reciprocated by means of an eccentric, I, on a shaft, J, to which is fitted a connecting-rod, *i*, the other end of which is pivoted to an arm, *i'*, pivoted at one end to the frame, and at the other connected by a slot and pin to the rear end of the plate, as shown in Fig. 2 of the drawings.

A short strip or stop, K, is attached to the plate H, and projects inward over the front portion of the recess therein, in front of the stationary cutter G. This is the position of the strip when the knife-plate is retracted; but when it is moved forward for the purpose of severing the wire, it is evident that the stop will also move forward with the plate, thereby uncovering the cutting-edge of the stationary knife.

When the parts are brought into the proper relation for twisting the band, the rotation of the twister is started at the proper moment, the wire on the binding-head is caught by the hook, carried into the recess in the plate H, and twisted in the usual way, the metal strip K forming a support for the strands of wire above the hook. Now, when the twisting is completed and the hook stops in the position heretofore stated, the mechanism for reciprocating the plate H comes into operation, and the latter is moved forward, thereby carrying the support K away from the twist, so that it can be forced up against the stationary cutter without bending, as is the case with stationary supports. The knife *h'* moves up to the stationary knife G, carrying the wire before it, which is severed just above the hook, and at the same time, owing to the peculiar position of the hook, as the knife *h'* moves forward just above it, it will push forward the refuse coil of wire, which has, during or before the twisting, been drawn up upon the body of the hook, as shown in Fig. 4 of the drawings, and will leave it at the extreme end of the latter, so that as soon as the twister commences to rotate again the coil will fall off on account of the bend downward at the extreme point of the hook.

The shaft J is geared to the general driving mechanism, so as to be rotated at the proper intervals, and at its inner end, which is carried a little past the twisting mechanism, is a crank, *j*. A rod or bar, L, is pivoted near its upper end to this crank-arm, the lower portion thereof having a long longitudinal slot, *l*, in it, within which is fitted a pin, M, on a stationary support, *m*, attached to the frame, as shown in Fig. 3 of the drawings. The upper end of the bar L, above its connection with the crank, is curved slightly and tapered, and the parts are so arranged that the revolution of the crank carries this end of the arm in behind the bundle, as shown in dotted lines in Fig. 3, and then upward and forward, thereby discharging the bundle, the movement being timed so as to commence just after the twisting is completed and to push the bound bundle forward just after the wire is severed.

When the bundle is discharged the further movement of the crank depresses the discharg-

ing-arm, as shown in full lines of Fig. 3 of the drawings, in which position it rests.

A curved receptacle, N, is arranged just in front of the binding mechanism, being hinged at its upper edge to suitable supports *n* extending out from the frame. This receptacle falls in front of and below the bundle-discharger, so as to catch the bound bundles and carry them along until a sufficient number for a shock is obtained, when they may be dumped together by means of a lever, O, and rod *o*, connecting the lever with the lower edge of the receiver.

The supports of the bundle-carrier may be made removable, if desired, so that the receptacle can be detached from the machine in case it is preferred to discharge the bundles directly upon the ground as they are unbound.

The wire in this machine is carried up from the spool over a pulley, P, and support *p*, arranged so as to bring the wire into proper position to be taken by the binding-arm. This is necessary, however, only in my machine and others like it, and the take-up attachment may be adapted to other classes of binders by mere mechanical changes in construction and arrangement. The discharging device and operation of the movable cutter in connection with the hook may also be applied to other binders by such mechanical changes as will adapt them to their new location and the particular devices in connection with which they are to operate.

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

1. In a grain-binder, a rotating twister-hook, in combination with driving mechanism operating at intervals, and arranged to stop the hook with its point projecting forward in line with the forward movement of a reciprocating wire-cutter, substantially as described.

2. The twister-hook E, arranged to stop during its intervals of rest in the position described, in combination with a movable knife-plate, H, operating in connection with said hook, substantially as set forth.

3. A movable wire-support, K, in combination with mechanism adapted to hold the support in a stationary position while the wire is twisted against it, and then to remove said support from the path of the twist as it is pushed against the cutter, substantially as described.

4. The reciprocating cutter-plate H, in combination with the stop K attached thereto, the stationary knife G, and the twister-hook E, substantially as described.

5. The bundle-discharger L, arranged to operate in the opening in the receiver in which the binding-arm moves, substantially as set forth.

6. The slotted grain-receiver, in combination with the slotted arm L, arranged to project through the binding-arm slot in the receiver, the crank-shaft J, and stationary pin N, all constructed and operating substantially as described.

7. A shaft, J, in combination with a bundle-discharger, a vibrating wire-cutter, and devices connecting both directly to said shaft, whereby the discharger and cutter are both operated directly by the same shaft and in the same time, substantially as described.

8. The hinged bundle-carrier N, mounted upon removable sliding arms, substantially as and for the purpose set forth.

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