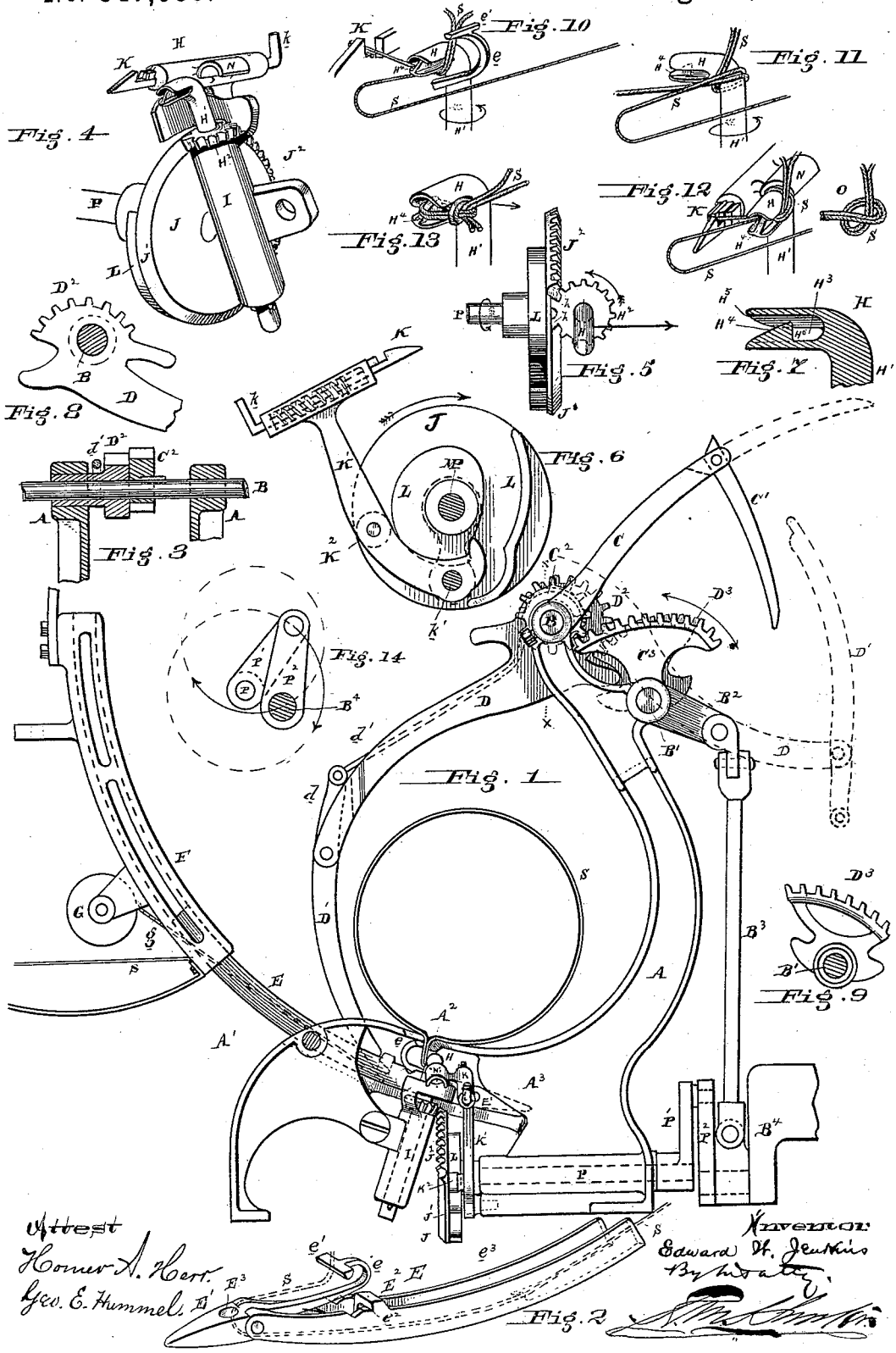
(No Model.)

E. W. JENKINS.

GRAIN BINDER.

No. 347,938. Patented Aug. 24, 1886.



UNITED STATES PATENT OFFICE.

EDWARD W. JENKINS, OF NORRISTOWN, PENNSYLVANIA.

GRAIN-BINDER.

SPECIFICATION forming part of Letters Patent No. 347,938, dated August 24, 1886.

Application filed July 31, 1884. Serial No. 139,243. (No model.)

To all whom it may concern:

Be it known that I, EDWARD W. JENKINS, of Norristown, Montgomery county, Pennsylvania, have invented a new and useful Improvement in Grain-Binders, of which the following is a specification.

My invention has reference to grain-binders for harvesting-machines; and it consists in certain improvements particularly relating to the class of binders shown in Letters Patent granted to me on July 3, 1883, and numbered 280,481, all of which is fully set forth in the following specification and shown in the accompanying drawings, which form part thereof.

The object of my invention is to simplify the construction of grain-binding apparatus generally, and make it perform its function in a perfect manner.

In the drawings, Figure 1 is a side elevation of a grain-binder embodying my improvements. Fig. 2 is a perspective view of the needle. Fig. 3 is a sectional elevation of the bearings and gears for operating the discharging-arms and binder-arm, taken on line *x x* of Fig. 1. Fig. 4 is a perspective view of the knotter proper. Fig. 5 is a plan view of same. Fig. 6 is an elevation of the cord clamp and cutter and its operating mechanism. Fig. 7 is a sectional elevation of the knotting-bill. Fig. 8 is a side elevation of the cam-gear on the binder-arm hub. Fig. 9 is a side elevation of the eccentric gear for operating the said binder-arm. Figs. 10 to 13 are perspective views showing the operations of the knotting-bill in the act of tying a knot, and Fig. 14 is a diagram illustrating the arrangement and mode of operation of the cranks which operate the binder-arm mechanism and the knot-tying mechanism.

A is the central frame, and is provided at its upper end with bearings for carrying two shafts, B and B′, to the former of which are secured the bundle-discharging fingers C, having the hinged ends C′, and to the latter of which are secured the eccentric gears C^3 D^3 and crank B^2. The crank is actuated by a rod, B^3, in turn reciprocated by a crank, B^4. The eccentric gear C^3 meshes with the eccentric gear or pinion C^2, which is secured upon the shaft B, and is so shaped that as the shaft B′ is rocked with a uniform speed the shaft B is rotated first quickly, then more slowly, and finally quickly again, the object of which is to cause it to swing its arms down quickly, then catch the bundle carefully, and as they raise it increase their velocity of movement to discharge it quickly. After discharging the bundle the said arms C are drawn back, and the ends C′ double in to pass freely to the rear, and once again assume the position shown in Fig. 1. The shaft B should make about one revolution alternately in each direction. The binder-arm D is journaled upon shaft B, (see Fig. 3,) and is provided with the segmental eccentric gear D^2, which meshes with the eccentric gear D^3, secured to the rock-shaft B′, the object of which eccentric gears is to cause the binder-arm to move from the dotted position, Fig. 1, to that shown in solid lines, first quickly and then slowly, the leverage toward the latter part of the movement increasing to insure the needle E being driven through the grain and home to its seat into the knotter, as shown. This binder or needle actuating arm D may be made in one piece, or have its end D′ hinged and its rear end, *d*, connected by a rod, *d′*, to the frame A in the rear of the shaft B, the object of this jointing of the binder-arm being to cause the end D′ to fold up, as shown in dotted lines, so as to clear the traction-wheel or framing of the harvester.

F is the guide for the needle E, into which it is drawn by chain *g* and spring-sheave G.

A′ is the passage from the platform for the grain, and is located between the guide F and frame A.

The needle E is provided with a hinged point, E′, which extends rearward and is bent over, as at *e*, and terminates in the piece *e′*, the object of which is to raise the cord, as shown in Fig. 10, so that the tying-bill shall pass around it. It is further provided with a longitudinal groove, e^3, and an abutment, E^2, having a hole or recess, e^2, into which the end of the arm D′ passes to push the needle down through the grain into the knotter.

A^3 is a cam-face on the frame A, against which the point of the needle strikes, and by which it is turned down, as shown in Figs. 1 and 2, the dotted lines indicating the position assumed by the point with reference to the needle before the cam-face A^3 depresses it into the position shown in solid lines, Fig. 1, and also in perspective, Fig. 2. The binding-cord

S, as shown, passes from the holder K under the bill H, around the bundle, back under the bill H, then through the hole E^3 in the needle, and up through guide F to the spool. The knotting or tying bill H is curved at right angles to its axis H′, which is journaled in a bearing, I, and provided with a bevel-pinion, H^2. The bill is slotted horizontally, as at H^3, the two rigid jaws inclosing it above and below, and have their edges curved, as at H^5. The upper jaw is preferably curved inward, and the lower jaw is provided with the tooth H^6, the inner edge of which is perpendicular, but the outer edge made inclined, as at H^4, and the point extends up into the curved part of the upper jaw. From this it is perceived that there is nothing to become deranged or get out of order, and the device is extremely simple and cheap to construct. This bill H is rotated by bevel gear-wheel J, having a segment of teeth, J^2, and a smooth part, J′, arranged about its periphery. This wheel is rotated by a shaft, P, which has its motion imparted to it by a crank, P′, and link P^2, which latter is pivoted to the crank B^4, hereinbefore referred to. By the cranks B^4 and P′ having different centers, as shown in Figs. 1 and 14, the shaft P is caused to rotate slowly, except when the teeth J^2 are meshing with the pinion H^2 or when the knot is being tied, at which time it rotates quickly, and which movement moves the knotter with the slowest movement in starting and stopping and greatest velocity at the middle of its rotation, thereby insuring the knotter properly acting upon the cord at the start, and greatly improving the action of the parts, stopping all excessive jarring and lengthening the working life of the parts. This movement is produced owing to the fact that the crank B^4 revolves at a uniform velocity, and its crank-pin in its revolution passes about the shaft P at unequal distances; hence in passing through the lower parts of its orbit it acts upon the crank P′ at such an angle that the leverage is greatly shortened, whereby a small movement to crank B^4 causes a great movement to crank P′; but when the former gets to the upper part of its orbit the leverage of crank P′ is full, and the shaft P then travels at a less velocity than the crank B^4. The pinion H^2 has two flat teeth, *h*, (see Fig. 5,) which are adapted to run the smooth part J′ and prevent the bill from rotating.

K is the cord holder and cutter, and is carried to and from the tying-bill by an arm, K′, pivoted at *k*′ and provided with a roller, K^2, which works in the camway L upon the back of the wheel J.

The holder and cutter are operated by the extension *k*, which strikes the frame A and holds the knife and clamp-jaw while the arm K′ moves on. Any other form of holder may be used. The arm or lever K′ also carries a curved throw-off, N, which is adapted to pass closely over the tying-bill and push the knot off the same.

The operation is as follows: The binder-arm being raised to the position shown in dotted lines, the needle E in its guide or shield F, and the cord passing from the holder K under the bill to the needle across the entrance A′, the positions assumed after discharging a bound bundle, the crank B^4 is rotated sufficiently to cause the binder-arm D D′ to descend to a distance just sufficient to reach the needle E, and the discharge-arms C C′ to hang down in about a line drawn vertically through the shaft B. As the grain is packed through the entrance A′, the cord is drawn through the needle, and when the bundle is of the proper size the crank B^4 is started, causing the arm D D′ to force the needle E down through the grain, making a division therein and forcing the needle under the bill H, as shown in Fig. 1, and as the end E′ of the needle E strikes the cam-face A^3 the finger *e* is thrown up, carrying the cord up around the bill H, as shown in Fig. 10. Now the shaft P is rotated quickly, and the bill causes the cord to twist around it, as shown in Fig. 11. The holder K now approaches and brings the end of the cord it holds and that of the needle into position, so that as the bill completes its rotation the cord ends are forced between the jaws and over the tooth H^4, as shown in Fig. 12. A further movement of the holder K and the throw-off N causes the cord passing from the needle to be caught, then both ends severed, and the knot pushed off, as shown in Fig. 13. As the bill only makes one revolution and then stops, pointing at right angles to the place from where the pull upon the cord comes when the bundle is bound, as indicated in Figs. 5 and 7 by the arrows, this pull causes the cord-loop to slide up the inclined face H^4 of the tooth H^6, and thus becomes free. When tightening the knot, the push by the throw-off N is against the vertical face H^6 of the tooth, and then there is no possibility of the loop slipping off; but when the knot is tied and tightened and pulled to one side it slides off most freely. When the bundle is bound, the arm D D′ ascends, allowing the needle E to ascend also through the agency of the spring-sheave G and chain *g*, and the discharging fingers or kickers C C′ swing around and discharge the bundle over the shaft B and frame.

The binding mechanism may be used in any position found most convenient to suit the various makes of harvesting-machines.

While I prefer the construction shown, I do not limit myself to the details, as they may be modified in various ways without departing from my invention.

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

1. The combination, in a grain-binder, of the rock-shaft and its discharging-fingers with eccentric gearing to rock said shaft and oscillate its fingers with a varying velocity, so as

to move down quickly, raise the bundle slowly, and then quickly discharge it, substantially as and for the purpose specified.

2. The combination, in a grain-binder, of the rock-shaft and its discharging-fingers, provided with hinged or jointed ends, with eccentric gearing to rock said shaft and oscillate its fingers with a varying velocity, so as to move down quickly, raise the bundle slowly, and then quickly discharge it, the hinged ends of the fingers being adapted to fold up in one direction to pass the grain in its backward movement, but not in the other, or when discharging the grain, substantially as and for the purpose specified.

3. A tying-bill having the two rigid jaws arranged substantially straight and at right angles to the axis of rotation, and in which the lower jaw is provided with an inclined tooth, in combination with mechanism for rotating said tying-bill and varying its speed of revolution, substantially as and for the purpose specified.

4. The combination of a binder-arm, a needle, E, a guide, F, therefor, frame A, passage-way A′, and returning spring device G *g*, substantially as and for the purpose specified.

5. A needle or needle-arm having its point pivoted or hinged and provided with rearwardly-extending finger to raise the cord around the tying-bill, substantially as and for the purpose specified.

6. A needle or needle-arm having its point pivoted or hinged and provided with rearwardly-extending finger to raise the cord around the tying-bill, in combination with a cam-guideway, into which said needle runs, substantially as and for the purpose specified.

7. A binder or needle arm having a hinged end adapted to actuate a finger to raise the cord around the tying-bill, in combination with a cam to actuate said hinged end and actuate the finger, substantially as and for the purpose specified.

8. The combination of the rotating tying-bill and its actuating mechanism, substantially as described, with shaft P, cranks P′ B^4, and link P^2, substantially as and for the purpose specified.

9. The combination of bill H, shaft H′, pinion H^2, wheel J, having teeth J^2 and smooth face J′, and camway L, with arm K′, having roller K^2, a cord-holder, and the curved throw-off N, substantially as and for the purpose specified.

10. The combination of frame A, shafts B B′, fingers C, and binder-arm D with eccentric gears C^2 D^2 C^3 D^3 and crank-arm B^2, substantially as and for the purpose specified.

11. The combination of frame A, shaft B, fingers C, cam-gear C^2, shaft B′, eccentric gear C^3, and arm B^2, substantially as and for the purpose specified.

12. The combination of frame A, binder-arm D, having cam-gear D^2, shaft B′, eccentric gear D^3, and arm B^2, substantially as and for the purpose specified.

13. The combination of frame A, shafts B B′, fingers C, and binder-arm D with eccentric gears C^2 D^2 C^3 D^3, and crank-arm B^2, rod B^3, cranks B^4 P′, link P^2, and knotting mechanism actuated by said crank P′, substantially as and for the purpose specified.

14. The combination of binder-arm D D′, rod *d*′, guide F, needle E, frame A, and passage-way A′, substantially as and for the purpose specified.

In testimony of which invention I hereunto set my hand.

EDWARD W. JENKINS.

Witnesses:
R. M. HUNTER,
CHARLES F. ZIEGLER.