2 Sheets—Sheet 1.

J. F. GORDON.

Grain-Binder.

No. 211,150. Patented Jan. 7, 1879.

Fig. 1.

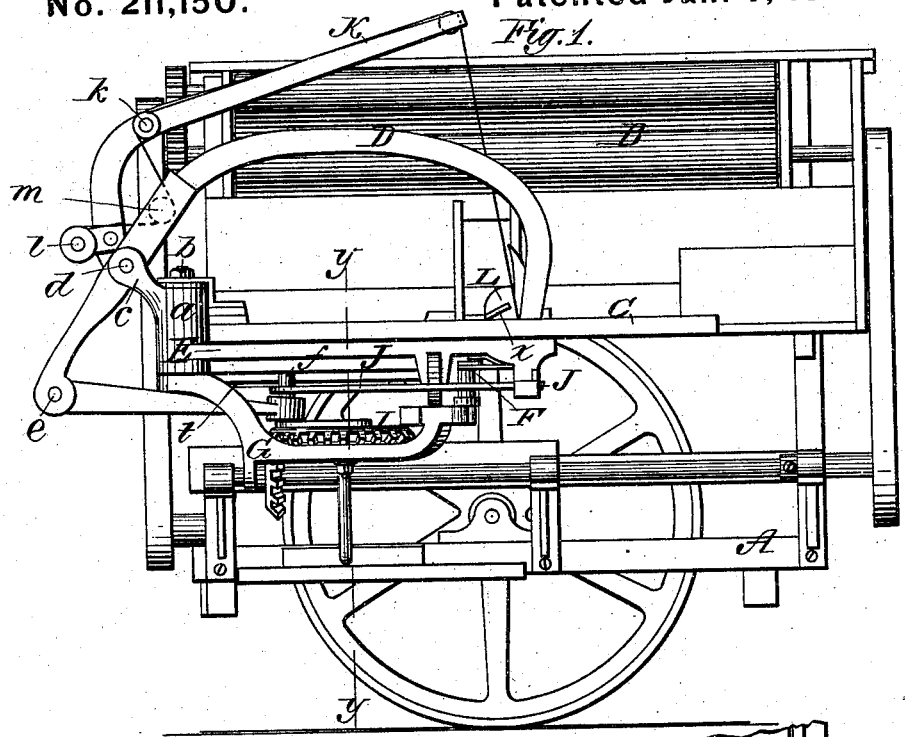


Fig. 2.

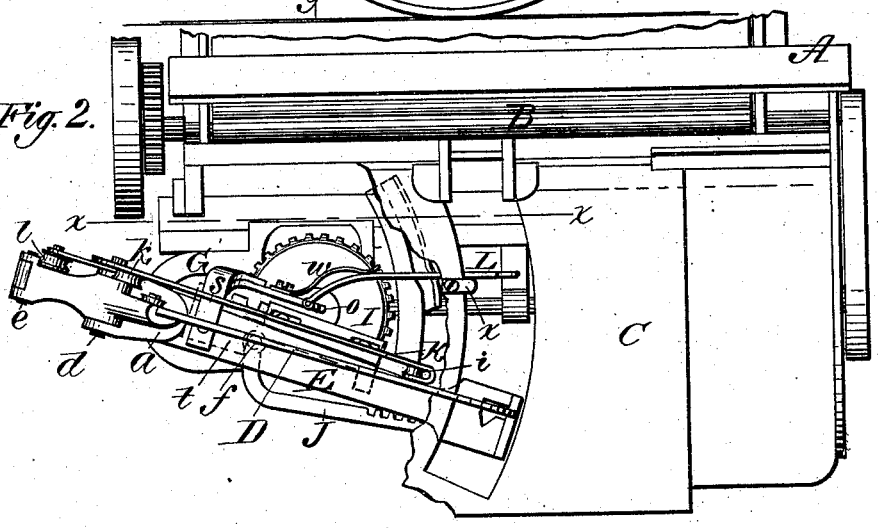
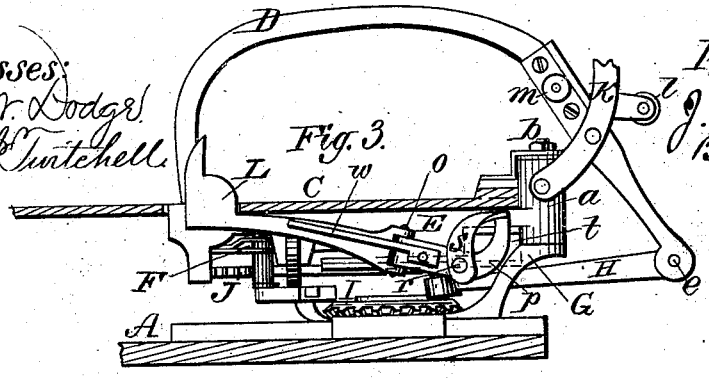


Fig. 3.



Witnesses:
Will N. Dodge
Donn R. Tuttchell.

Inventor:
J. F. Gordon.
By his attys
Dodger & Son

2 Sheets—Sheet 2.

J. F. GORDON.

Grain-Binder.

No. 211,150. Patented Jan. 7, 1879.

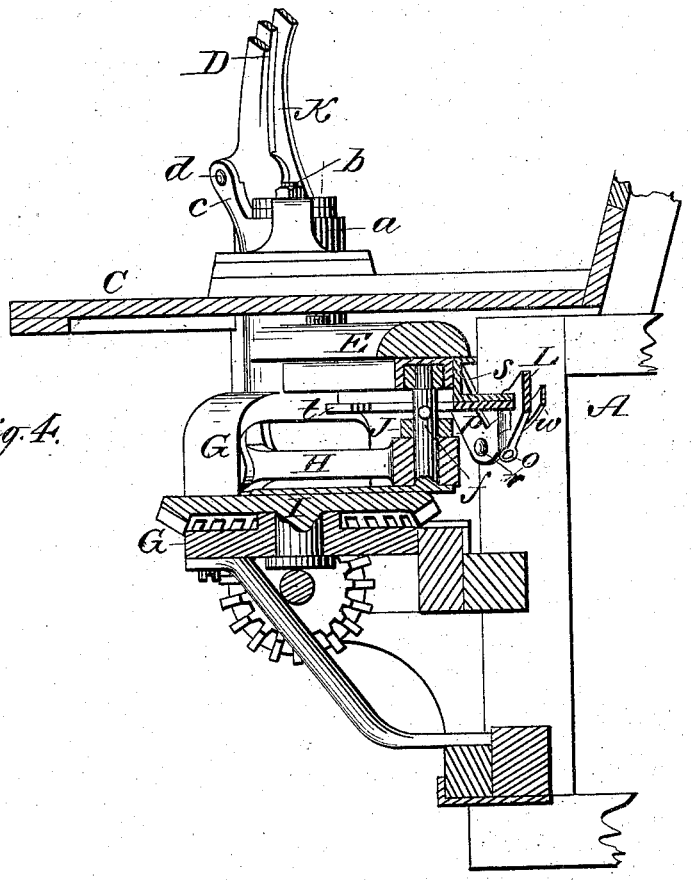


Fig. 4.

Witnesses:
Will W. Dodge
Down P. Twitchell

Inventor:
James F. Gordon
By his attys:
Dodge & Sm

UNITED STATES PATENT OFFICE.

JAMES F. GORDON, OF ROCHESTER, NEW YORK.

IMPROVEMENT IN GRAIN-BINDERS.

Specification forming part of Letters Patent No. **211,150**, dated January 7, 1879; application filed November 29, 1878.

To all whom it may concern:

Be it known that I, JAMES F. GORDON, of Rochester, in the county of Monroe and State of New York, have invented certain Improvements in Grain-Binders, of which the following is a specification:

This invention relates to that well-known class of machines in which vibrating or reciprocating binding mechanism is employed, more particularly to that type of Gordon machine in which the binding mechanism vibrates about a vertical axis.

The invention consists in employing, in connection with a binder-arm, which descends through the moving grain, a divider, which ascends through the grain, the divider and binder-arm being arranged with reference to each other in such manner as to separate the grain and effect a clean separation of each bundle or gavel from the loose grain; in the manner of mounting and operating the binder-arm; in a peculiar take-up device, and in other details hereinafter described.

Referring to the accompanying drawings, Figure 1 represents an outside elevation of my machine in position on a harvester; Fig. 2, a top-plan view of the same, with a portion of the grain table or receiver broken away to expose the parts below; Fig. 3, a vertical section on the line *x x* of Fig. 2, showing the divider and binder-arm and their operating mechanism; Fig. 4, a vertical cross-section on the line *y y* of Fig. 1.

In its general construction and mode of operation the present machine is similar to that for which Letters Patent were granted to me on the 26th day of October, 1875, No. 169,258, consisting, essentially, of a grain table or receiver, a vertically-moving binder-arm, arranged to vibrate horizontally above the table, and a corresponding vibrating twisting mechanism below the table, the whole binding mechanism being made adjustable, as usual, in the direction of the length of the grain, in order to secure the application of the band to the middle of the same.

A represents the frame of the harvester; B, the elevator by which the grain is delivered from the harvester to the binding mechanism; C, the horizontal grain table or receiver, upon which the grain is delivered by the elevator; D, the vertically-moving and horizontally-vibrating binder-arm; E, the vibrating arm, upon which the binder-arm and twisting devices are supported and carried; F, the twisting devices, located beneath the binding-table; G, a metal frame, mounted on ears or guides, and adapted to support the vibrating arm E. The arm E is provided at its rear end with an upright hub or enlargement, *a*, which is mounted upon a vertical axis or pivot, *b*, formed on the rear end of the frame G, as shown in Figs. 1 and 2. At its upper end the hub *a* is provided with two rearwardly-extending ears, *c*, between which the rear end of the binder-arm D is mounted on a horizontal pivot, *d*. This admits of the binder-arm moving vertically on the pivot *d*, while at the same time said pivot connects the binder-arm and twister-carrying arm E in such manner that the two must vibrate horizontally together.

In order to impart the proper movements to the arms D and E, the rear end of the former is extended downward beyond the pivot *d*, and connected by a horizontal pivot, *e*, to an arm, H, which latter has its forward end mounted on a vertical crank-pin, *f*, on a horizontal wheel, I, as shown in Figs. 1, 2, and 3, so that the rotation of the wheel and crank-pin moving the arm H endwise effects the vertical reciprocation of the arm D, and at the same time, by moving the end of the arm H laterally, causes it to impart to the arm D, and thence to the arm E, a horizontal vibration.

In order to relieve the joint *e* from horizontal strain and admit of the parts being made lighter than otherwise, the crank-pin *f* is extended into a longitudinal groove in the arm E, as represented in Figs. 1 and 4, so as to act directly thereon and impart, or assist in imparting, the vibratory motion thereto.

While it is preferred to thus extend the crank-pin into the arm E, the connection may be dispensed with and a horizontal vibration of the parts effected wholly by means of the arm H; or, instead of extending the crank-pin into the arm E, the arm may be provided with a depending stud arranged to enter a longitudinal slot in the arm H, the effect of such arrangement, like that of the upward extension of the crank-pin, being to relieve the joint *e* from lateral strain and to cause the crank-pin

to impart the vibratory motion directly to the arm E instead of transmitting it through the binder-arm, as in the drawing.

By arranging and operating the binder-arm in the manner above described, I am enabled to simplify and lighten the machine without in the least impairing its efficiency.

For the purpose of rotating the twister-head, which may be of any suitable construction, and provided with a pinion, as usual, I employ a reciprocating rack-bar, J, having its rear end mounted on the crank-pin *f*, this arrangement imparting the necessary movements to the rack and twister, and avoiding the necessity of the complicated arrangements hitherto employed for that purpose.

As a means of guiding the binding-wire and taking up the slack of the same at the proper time, I employ a guide-arm, K, rigidly attached to the hub *a*, overhanging the binding-table from the rear side, mounting on said arm at its forward end a pulley, *i*, and at its rear end two pulleys, *k* and *l*, and also mounting on the binder-arm a pulley, *m*, midway between the pulleys *k l*. The wire passes over the pulley *l*, which may, if desired, be a wire reel or spool, thence under the pulley *m*, over the pulley *k*, and down over the pulley *i* to the twisting devices. As the binder-arm descends, the pulley *m*, passing down between the pulleys *k l*, causes the slack of the wire to be taken up, so as to prevent it from winding about the nose of the binder-arm; but as the binder-arm ascends, previous to passing the wire around the grain, the wire is again slackened, the arrangement of parts being such that the rise of the arm and slackening of the wire commence just previous to the commencement of the action of the twister-head. By thus causing the arm to rise and slightly slacken the wire before the twister acts thereon, the twister is enabled to grasp the wire with certainty and ease, and is prevented from cutting or breaking the same—a result which often happens when the hook is brought suddenly and violently in contact with the highly-strained wire, as in machines of the ordinary construction. This slackening of the wire previous to the action of the twister forms an essential and improved feature of my present invention.

For the purpose of dividing each bundle or gavel from the loose grain, I mount beneath the binding-table a swinging and vertically-moving divider-arm, L. This arm is arranged to ascend through the slot in the grain-table by the side of the binder-arm as the latter descends through the inflowing grain to separate the bundle therefrom. The divider and binder-arm swing outward together until they reach a point at or about the center of the binding-table, when the divider-arm comes to a rest and holds back the loose grain, while the binder-arm continues its outward movement with the bundle, whereby a perfect separation of the bundle from the loose grain is effected. As the binder-arm swings inward previous to the formation of another bundle the divider-arm drops downward below the table out of the grain, and swings inward directly beneath the binder-arm previous to its ascent, as before described.

The manner in which the movement of the divider is effected will be readily seen on reference to Figs. 2 and 3, the arm extending backward beneath the table, and being connected at its rear end by a vertical pivot, *o*, and a block, *p*, which latter is connected by a horizontal pivot, *r*, to an arm, *s*, secured rigidly on the side of the arm E. The pivot *o* permits the divider-arm to swing laterally independent of the motion of the binder-arm in order to separate therefrom, while the pivot *r* permits the vertical swinging motion of the divider, which is effected by means of a horizontal slide, *t*, arranged to act upon the rear end of the arm *p*, the slide receiving its motion from the crank-pin *f*, which acts against studs or ears on the ends of the slide. A spring, *w*, applied to the arm *p* and bearing against the divider-arm L, pushes the latter outward in the direction in which the binder-arm moves while receding with the bundle of grain. A strip, *x*, applied to the binding-table, serves to arrest the outward movement of the divider-arm at the proper point.

The action is as follows: The binder-arm being swung inward in position to enter the grain, the divider-arm rests directly below the same. The rotation of the crank-pin *f*, at the same time that it causes the descent of the binder-arm, acts upon the slide *t*, which, in turn, tipping the arm *p*, causes the point of the divider-arm to be thrown upward through the grain. As the binder-arm swings outward with the bundle the spring *w* causes the divider-arm to accompany it until the stop *x* is reached, when the outward movement of the divider-arm is arrested thereby, the binder-arm continuing, however, its outward movement, and separating from the divider, which meanwhile is sustained in its elevated position. As the binder-arm swings inward after the delivery of the bound bundle the crank-pin *f*, acting on the slide, causes the divider-arm to descend below the table by the side of the arm E, which swings it inward toward the conveyer or inner side of the table, in position to ascend again through the grain.

While it is preferred to arrange and actuate the divider-arm in the manner shown, it is obvious that it may be changed in form, and that other devices may be employed for operating it, if desired.

I do not in this patent claim the broad idea of divider and binder arms mowing in opposite directions, nor the combination of the binder-arm, arm H, and pin *f*, as they constitute the subject-matter of a separate application.

Having thus described my invention, what I claim is—

1. The combination of a grain-table, C, a vertically and horizontally moving binder-arm,

D, above the table, and a vertically and horizontally moving divider-arm, L, below the table, substantially as shown.

2. In combination with a divider-arm, L, the laterally-moving arm E, pivoted arm *p*, spring *w*, slide *t*, and crank-pin *f*.

3. The combination of the laterally-vibrating arm E, having the twisting mechanism thereon, the vertically-moving binder-arm D, arm H, and crank-pin *f*, substantially as described and shown.

4. In a grain-binder, the combination of the horizontally-rotating crank-pin *f*, arranged to effect the horizontal vibration of the binding devices, and the twister-operating rack J, connected to said crank-pin, substantially as shown.

5. In combination with the grain-table, the aterally-vibrating binder-arm and the laterally-vibrating divider-arm L, a stop device, *x*, arranged to limit the lateral movement of the divider-arm, substantially as described and shown.

6. In combination with stationary pulleys or guides for the binding-wire, a take-up pulley, *m*, attached to the vibrating binder-arm D, substantially as shown.

7. In a grain-binding machine, the combination of a binder-arm, a twisting mechanism, a take-up or tension device, substantially such as shown, arranged to slacken the wire at or immediately prior to the time of its being seized by the twister, substantially as described.

JAMES F. GORDON.

Witnesses:

ARTHUR R. SELDEN,

GEO. B. SELDEN.