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Harvester.

No. 162,929. Patented May 4, 1875.

Fig. 1.

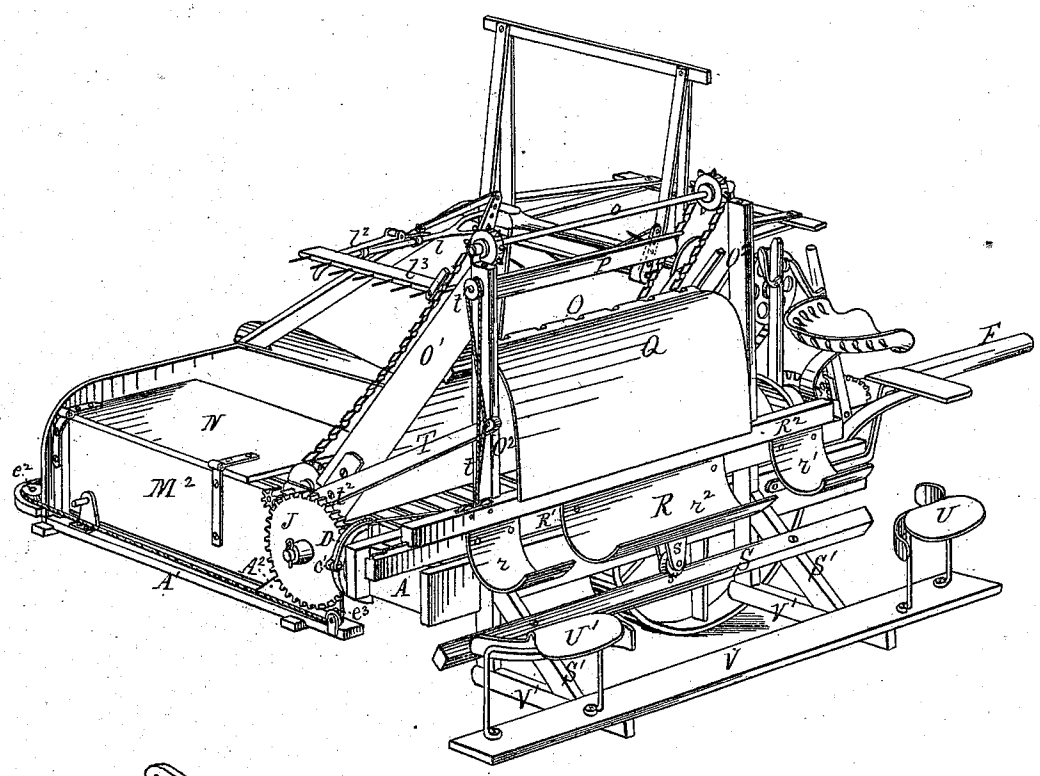

Fig. 2.

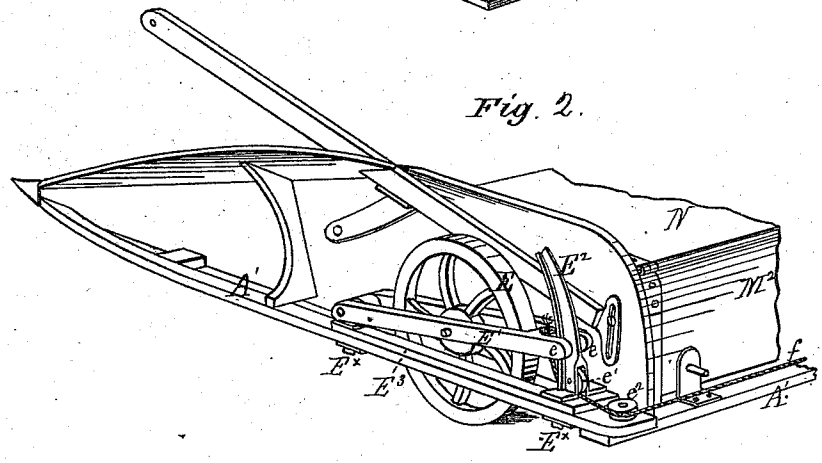

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Fig. 3.

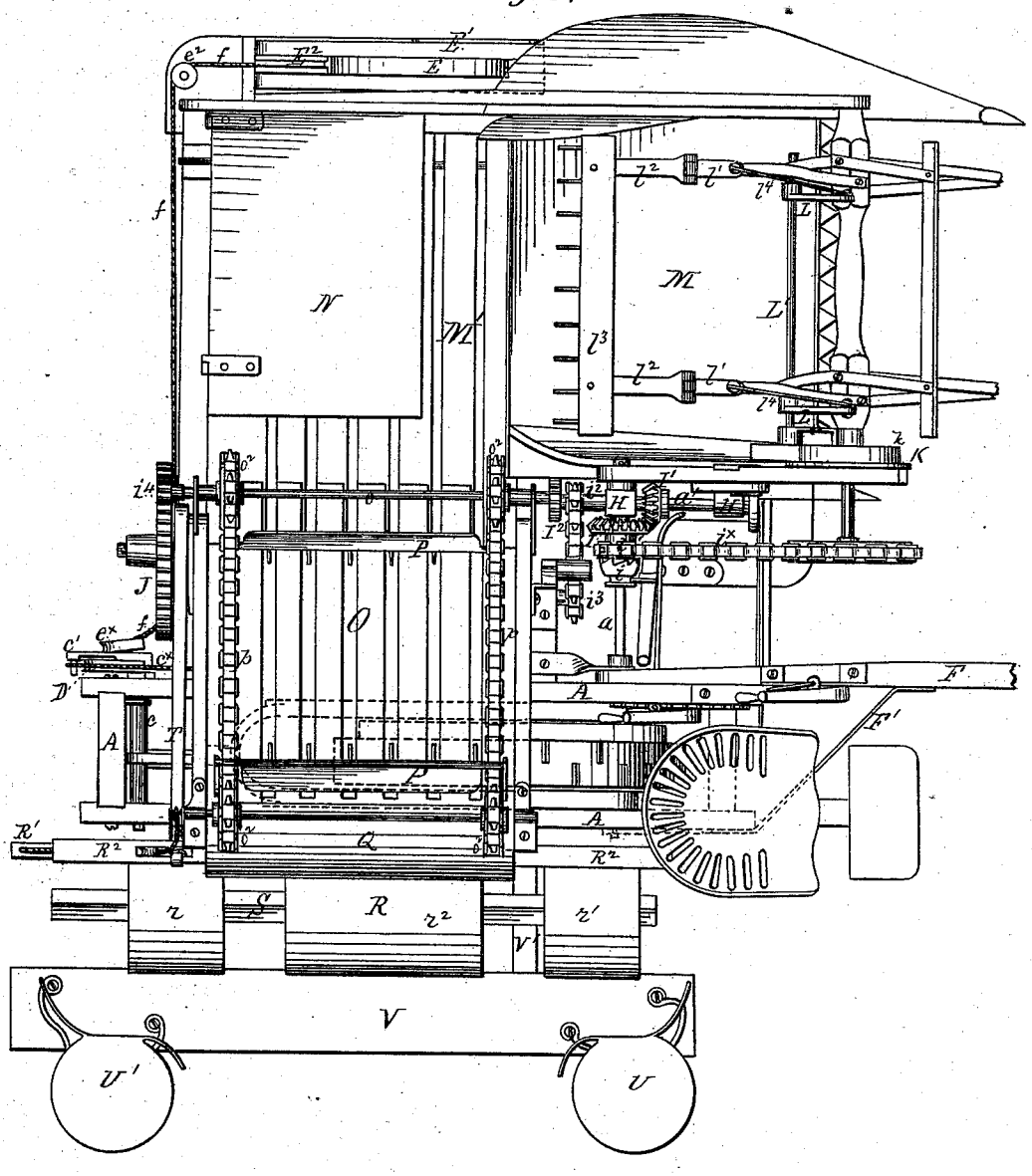

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Fig. 4

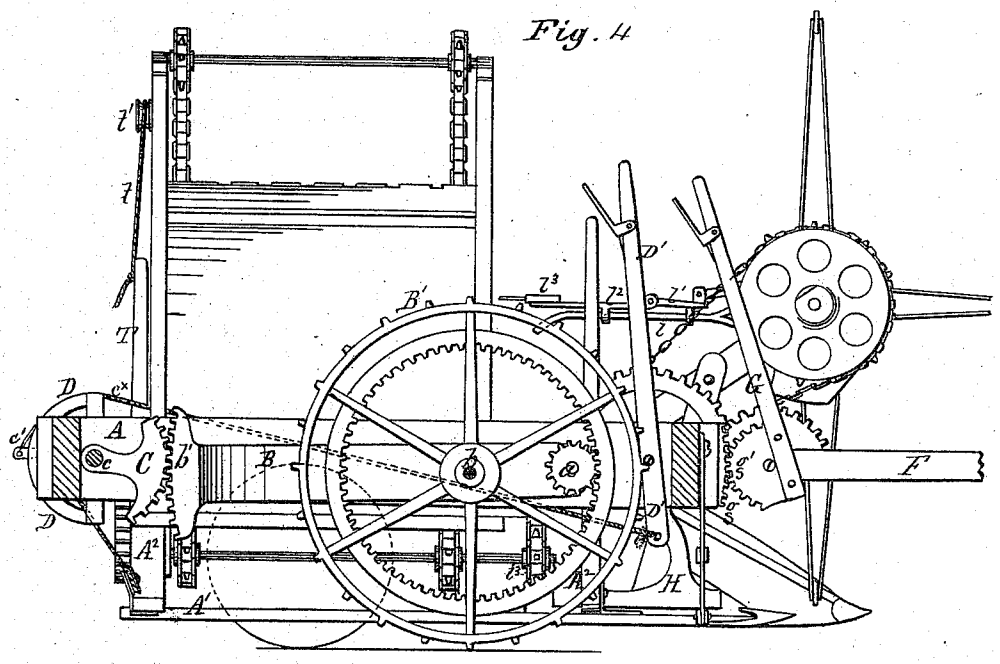


Fig. 5

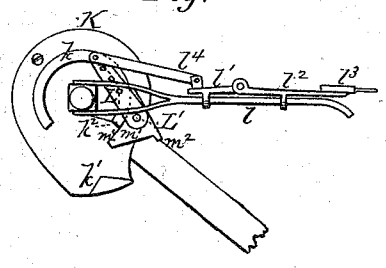
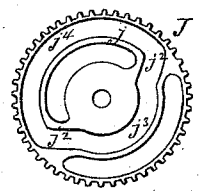


Fig. 6



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UNITED STATES PATENT OFFICE.

JAMES H. KIRTON, OF ROCKFORD, ILLINOIS.

IMPROVEMENT IN HARVESTERS.

Specification forming part of Letters Patent No. **162,929**, dated May 4, 1875; application filed December 1, 1874.

To all whom it may concern:

Be it known that I, JAMES H. KIRTON, of Rockford, in the county of Winnebago and State of Illinois, have invented a new and useful Improvement in Harvesters; and I do hereby declare that the following is a full and exact description of the same, reference being had to the accompanying drawings and to the letters of reference marked thereon.

Figure 1 represents a perspective view of the improved harvester, taken from the rear stubble corner of the machine. Fig. 2 is a perspective view of the grain side of the platform. Fig. 3 is a plan view of the machine. Fig. 4 represents a vertical longitudinal section through the main frame, looking toward the platform or grain side. Fig. 5 is a side elevation of the reel-rake and of the cam for actuating the same, and Fig. 6 is a face view of the cam-wheel which actuates the reciprocating binder's grain-receptacle.

Similar letters of reference denote corresponding parts wherever used.

The invention consists, first, in a novel arrangement of means for enabling the driver in his seat on the machine, and while the machine is in operation, to regulate, at will, the height of the main frame and platform, and the consequent height of the cutters, above the ground, and also the angle of inclination of the platform and cutters, as hereinafter explained. It further consists in a novel construction of the stationary cam, which imparts the reciprocating movements to reel-rake, and to the combination therewith of a novel means for actuating and guiding the movements of said rake. It further consists in the combination, with the reciprocating grain-receptacle, of means for actuating the same automatically and at regular intervals; and, lastly, the invention consists in certain detail of construction and arrangement, hereinafter fully set forth.

In the accompanying drawing, A represents the rectangular main frame; A^1, the platform-frame, rigidly connected with the main frame by oblique or downwardly-inclined bars A^2 in front and rear. Within the rectangular main frame is placed a vibrating stirrup-frame, B, made in loop or U form, with its open end in advance, and mounted and turning upon the counter or pinion shaft *a*. In rear of the pinion-shaft, and in suitable bearings in the frame B, is secured the axle *b*, upon which the main ground and drive wheel B^1 is mounted, and from which motion is imparted to the pinion-shaft *a* through the usual spurred rim and pinion. The vibrating rear end of the loop-frame B is provided on its outer face with a toothed vertical segment, *b'*, curved in the arc of a circle of which the pinion-shaft is the center. In rear of the loop-frame, and in suitable bearings in the main frame, is mounted a rock-shaft, *c*, upon which is rigidly secured a forwardly-facing toothed segment, C, curved in the arc or a circle, of which the rock-shaft *c* is the center, and the teeth of which engage with the teeth of segment *b'*, as represented in Fig. 4. The shaft *c* at its inner end extends through the inner longitudinal frame-bar, and has rigidly connected with it a crank-arm, *c'*, the outer swinging end of which is provided with a pin or spur, and a cord attached thereto and passing over a grooved stationary segment, D, is connected at its forward end with the lower end of a lever, D', by the vibration of which the loop-frame B is vibrated relatively to the main frame for adjusting the height of the latter, as described.

The lever D' is held at any desired point of adjustment by means of any usual or preferred construction of toothed or perforated rack and spring bolt or latch. The outer longitudinal bar of the platform-frame is slotted vertically, or made in two parts, to accommodate between them the grain-wheel E, which has its axle secured in bearings in a vibrating frame, E^1, which is pivoted, at its forward end, to the forward end of a slotted frame, E^3, mounted and sliding on the slotted outer bar of frame A^1. The frame E^3 is secured to and made adjustable longitudinally upon said frame-bar by means of bolts passing through the slot therein, and held by clamping plates and nuts at $E^\times$, which permit the forward and backward adjustment of the wheel for balancing the weight of the platform frame and its attachments, for facilitating the adjustment of the angle of said frame or the height of cut. The frame E^1, near its rear end, is provided with a friction-roller, which rests against the forward face of a standard, E^2, curved in the arc of a circle, of which the pivot at the for-

ward end of the frame E^1 is the center, the rear ends of the longitudinal bars of said frame overlapping the sides of the standard, and preventing lateral play or movement of the frame. The standard E^2 is forked or slotted at its lower end, and is provided with horizontal flanges or feet, by means of which it is bolted to the rear bar or frame E^3. Within the slot is placed a grooved vertical pulley, e^1, and a cord, f, connected at one end with the rear end of the vibrating wheel-frame E^1, passes underneath the pulley e^1, and thence around a horizontal pulley, e^2, at the rear outer corner of the platform-frame A^1. Along the rear of said frame, and under a vertical pulley, e^3, mounted in a standard at the inner end of said frame, and thence up to the upper end of a grooved sector, $e^\times$, rigidly secured to the crank-arm c' at or near midway of the length of said arm.

The operation of these parts will be readily understood. As the crank-arm is raised by means of the lever D′ for depressing the segment C and frame B, as above explained, it carries the segment $e^\times$ upward with it, and this drawing upon the cord f depresses the rear end of the frame E^1 relatively to the platform-frame A^1, and raises the outer end of the latter simultaneously with the raising of the main frame and inner end of said platform.

The tongue F of the machine is pivoted at its rear end upon the pinion-shaft a, or upon a sleeve-bearing therefor, projecting on the inner side of the main frame, the inner longitudinal bar of said main frame extending some distance forward of said pinion-shaft, with the tongue resting snugly against it. F′ is an angular brace, connected rigidly with the tongue in advance of the main frame, extending thence obliquely outward to the outer front corner of said frame. It passes thence by the side of said frame, and is pivoted thereto in line with the shaft or pivot a of the tongue, this arrangement of the brace preventing lateral play of the tongue, while in no way interfering with its free vertical movement. The forward end of the inner longitudinal frame-bar has a toothed segment, g, rigidly connected with it, curved in the arc of a circle, of which the pinion-shaft and tongue-pivot a is the center. Upon the tongue F, in advance of the segment g, is pivoted a lever, G, provided with a toothed segment, g', facing to the rear, with its teeth engaging with those of segment g, the forward end of the tongue being supported at a fixed height in the neck-yoke of the team. A backward or forward vibration of the lever serves to depress or raise the forward end of the frame, rocking it upon the wheels B′ and E, and depressing or raising the points of the guards of the cutting apparatus, as the condition of the crop or the nature of the surface of the ground may require.

The pinion-shaft a extends inward beyond the main frame, and at its inner end is supported in a bearing in a forked standard, H, mounted upon the inner end of the platform-frame. Near its front corner, and just inside of this bearing a bevel-wheel, I_1, is mounted loosely on the shaft a, said bevel-wheel being connected therewith, when the machine is in operation, by a sliding clutch, i, feathered to said shaft a, and from this bevel-wheel motion is imparted to all the operative parts of the machine. A sprocket-wheel at i^1, formed upon or connected with the sleeve of said wheel, operating through a chain, $i^\times$, imparts motion to a similar wheel on the inner end of the rake and reel shaft, arranged in advance of and above the shaft a, and the bevel-wheel I engages with and drives the bevel-pinion I^1 on the crank-shaft a^1, from a crank on the forward end of which motion is imparted to the sickle. The crank-shaft has its bearings in the standard H, and in rear of its rear bearings is provided with a sprocket-wheel at i^2, from which a chain, passing around a similar pulley at i^3 on the front end of the inner shaft of the endless band platform, or horizontal rake, imparts motion to said rake. The crank-shaft a^1, at its rear end, is further provided with a pinion, which engages with and drives a pinion, I^2, on the forward end of the lower shaft of the elevator, imparting motion to said shaft, and thence, through sprocket-wheels, to the endless chains carrying the elevator-rakes. The shaft o^1 of the elevator, at its rear end, is armed with a pinion, i^4, from which motion is imparted to the cam-wheel J, and thence to the reciprocating grain-receptacle, as hereinafter explained.

It will thus be seen that all the operative parts are connected with the bevel-wheel on the pinion-shaft, and that by simply disconnecting said wheel from its shaft by the withdrawal of the sliding clutch all of said operative parts will be thrown out of action, thereby greatly facilitating the process of preparing the machine for removal from place to place, or for repairs.

The reel-shaft is mounted in bearings in adjustable standards, and upon the inner face of one of these standards is secured a stationary cam-plate, K, surrounding the reel-shaft, and provided on its vertical face with a horizontal flange or rib, k, curved in an arc extending through two hundred and forty degrees to two hundred and seventy degrees, more or less, of a circle concentric with the reel-shaft, and broken or cut away underneath said shaft, as shown. The form of the plate K at this point is eccentric, and at its lowest part said plate is provided with a lug or spur, k^1, in the form of an inverted **V**. The reel may be of any usual construction, except that the arms l upon one side, upon which the sliding reel-rake is mounted, at the end connected with the reel-shaft, are forked, and the arms of the fork also diverge laterally, so as not only to clamp the shaft firmly between them, but also to prevent lateral movement. The arms terminate in a cylindrical rod, which is curved at its outer end, as shown, and upon these rods are mounted jointed rods l^1 l^2, forming the rake-stale, and

to the outer ends of the parts l^2 the rake-head l^3 is connected. The parts l^1 l^2 are connected with the rods l, each by an eye or loop which permits them to slide freely toward or away from the reel-shaft, and the joint between the parts l^1 l^2 permits the deflection of the outer portions l^2 carrying the rake-head, conforming to the curvature in the outer ends of the arms l. The inner ends of the parts or sliding links l^1 have each one end of a connecting-rod, l^4, attached to it, the other ends of said rods being connected to crank-arms L, secured to a rock-shaft, L′, mounted in bearings on the arms l, or in independent arms connected with the reel-shaft, as preferred. Upon the inner end of this rock-shaft, adjacent to the cam K, is secured a triangular block or shoe, m, curved on one face, m^1, in an arc of a circle conforming to the periphery of the circular rib k, and moving in contact therewith.

The outer angle m^2 of the block is provided with a spur, which, after the block or shoe has moved over the cam K, and passed off at one end thereof, strikes the lug or spur k^1, causing the shoe to be partially rotated, carrying the rock-shaft L′ with it, and this movement, acting through the crank-arms L, links l^4, and slides l^1 l^2, moves the rake outward from the reel-shaft with sufficient rapidity to keep it in close proximity with the inclined platform, on which the grain falls, for removing such grain therefrom. The curve in the outer ends of the rods l serves to deflect the rake-head from a line radial to the reel-shaft sufficiently to keep the rake-teeth at about right angles to the plane upon which the straw or grain rests up to the point of discharge, and, consequently, prevents the straw from becoming entangled with said teeth, and thus carried onward in the further revolution of the rake-head. After the rake has been thus moved outward to discharge the grain, the shoe m, having passed the spur k^1, comes in contact with the end k^2 of the rim or rib k, and its rocking movement is thereby reversed, withdrawing the rake toward the reel-shaft until it assumes about the position or relation of an ordinary reel-beater, when the curved face being brought against the periphery of the rim k, it travels thereon until, having performed the work of a gatherer or beater, it again reaches the platform, and begins its discharging or raking movement, as before.

A single rake is shown applied to the reel, so that the grain will be discharged only once in each revolution of the reel; but others may be added for increasing the frequency of the raking action, if desired.

The grain discharged by the reel-rake is received upon a rear horizontal platform, M¹, slightly elevated, so as to bring it into about the same horizontal plane with the rear edge of the inclined receiving-platform M. The platform M¹ is slotted transversely, or at right angles to the path of the machine, and underneath this slotted platform are two shafts, one at each side or end, provided with sprocket-wheels or pulleys, carrying endless chains, to which rakes are connected at regular intervals, the teeth of which project upward through the slots in the platform M¹, and serve, by their movement, to carry the grain to the inner or main frame end of said platform.

These rakes are set and timed relatively to the reel-rake in such manner as to remove the grain from the platform M¹ in the intervals between the discharge of grain by the reel-rake, thereby avoiding conflict or the entangling of the grain between the two. At the rear of the platform M¹ is is a vertical guard, M², rising above said platform, and preventing the grain from being thrown beyond said platform by the action of the reel-rake, and to the upper edge of said guard a board, N, is hinged by its rear edge, said board overhanging the platform M¹, as shown in Figs, 1, 2, and 3, sufficiently raised above said platform to permit the free ingress between it and the platform of the grain discharged by the reel-rake, said cover or board N serving to assist the rear guard M² in keeping the grain in compact shape. The board N can be turned back or up into a vertical position, and removed to afford access to the platform M¹.

At the inner or main frame end of the platform M¹ is secured the lower end of an inclined elevator-table, O, grooved or corrugated on its upper face, and connected at its lower end with the platform M¹ by curved metallic straps, which serve as clearers to the teeth of the platform-rake, and also to transfer the grain from said platform to the lower end of the table O. The table O is secured between inclined bars O¹, which, at their lower ends, rest upon the platform M¹ or platform-frame, and at their upper outer ends are secured to uprights O² on the main frame. At the upper and lower ends of this elevator-frame, and in suitable standards or straps secured thereto, are mounted shafts o o^1, provided in front and rear with sprocket-wheels o^2, over which pass endless chains p carrying rakes P attached to and moving with said chains, and to which motion is imparted by the pinion on the forward end of shaft o^1, as heretofore explained.

The teeth of these rakes P enter the grooves in the table O in their movement upward over said table, and carry the grain received from the platform M¹ upward and outward over the drive-wheel, discharging it at regular intervals upon a curved or inclined shield, Q, over which the grain descends into a concave receptacle, R. The receptacle R is formed of a series of concave plates, r r^1 r^2, connected at their inner sides with a sliding bar, R¹, and is of a length equal to, or greater than, double the length of an ordinary bundle of grain. The central longer portion r^2 of the concave receptacle, centrally of its width, is provided on its lower face with pendant lugs or ears s, in which is mounted a grooved roller, s', resting and moving longitudinally on a bar or track, S, attached to the binder's platform-frame, or to the inclined braces S′, thereof, so

as to give the bar the oblique position shown, in which its upper angle enters the groove in the roller s', and serves as the way on which said roller moves. The bar R^1 is provided on its upper face with a tongue which matches a corresponding groove in a bar, R^2, secured to uprights on the main frame, directly over the bar R^1; or friction-rollers may be substituted for the tongue, if preferred, to facilitate the endwise movement of bar R^1. The bar R^2 is mortised vertically near its rear end, and has grooved pulleys mounted in the mortise, and between said pulleys the ends of a cord, *t*, are passed, one end extending toward and being connected with the rear end of bar R^1, and the other toward the front end of and connected with said bar, the cord or the loop thereof passing upward over a grooved pulley, t^1, near the top of the elevator-frame, and one side of said loop being connected with a vibrating arm or lever, T, through which the reciprocating movements are communicated to the grain-receptacle R, as will be explained.

The lever T is pivoted at t^2 to the rear face of the elevator-frame, and its heel-extension beyond said pivot is provided with a rearwardly-projecting spur and friction roller, which enter a cam-groove, *j*, in the forward face of the spurred cam-wheel J, hereinbefore referred to, and by the rotation of which a vertical vibration at regular intervals is imparted to the lever T. The vibration of the lever takes place in the eccentric portions $j^2 j^2$ of the cam-groove, the lever remaining at rest in the intervals between said eccentric portions, and while the roller passes through the concentric portions $j^3 j^4$ of the groove, the intervals being about equal at each end of the throw or vibration of the lever—this effect being due to the fact that the concentric arcs j^3 and j^4 extend through about the same number of degrees, though formed in arcs of circles of different diameters—the lever T, thus vibrated, acting through the cord *t*, moves the bar R^1, and the receptacle R connected therewith, alternately forward and backward in such a manner that the grain discharged intermittently by the elevator-rakes is alternately deposited in the forward and rear ends of said receptacle, which is of sufficient length to accommodate two gavels or bundles placed end to end, and the longitudinal movement of said receptacle is sufficient to cause the bundles or gavels to be received alternately in said relation to each other. The elevator-rakes may be placed at such a distance apart as that one, two, or more will carry up the quantity of grain required to form a bundle, and said rake and the receptacle being geared together, as described, will be timed by the relative sizes of the gears, so that the receptacle will remain stationary at either end of its throw until a sufficient quantity is received to form a bundle, when the endwise movement carries the bundle on the forward end of the receptacle in front of the binder on seat U, who binds or partially binds it while a gavel is accumulating on the rear end, removing it as the reverse movement of the receptacle begins, carrying the bundle on the rear end thereof in front of the binder on seat U′, to be bound by him, while another gavel is being deposited at the forward end. The binder's stand or platform V is secured to arms or bars V′ attached to the main frame, and the seats U U′ are secured thereon as shown.

Parts of the machine not particularly described may be of any usual or preferred construction.

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

1. The vibrating frame B, in which the driving-wheel is mounted, pivoted on the pinion-shaft, and provided at its swinging end with the toothed segment b', in combination with the segment C, mounted on the rock-shaft *c*, and operated by means of the crank-arm c', cord $c^\times$, and lever D′, arranged and operating as described.

2. The crank-arm c', which operates the segment C and wheel-frame B, as described, provided with the grooved sector $e^\times$, and connected, by means of the cord *f*, with the vibrating grain-wheel frame E^1, said parts being combined and operating substantially as described, for simultaneously raising both sides of the machine.

3. The pivoted vibrating wheel-frame E^1, arranged and operating as set forth, in combination with the sliding frame E^3, made adjustable on the platform-frame A^1, substantially as and for the purpose described.

4. The stationary cam-plate K, provided with the curved way *k* and spur k^1, in combination with the traveling block or shoe *m*, for actuating the reel-rake through the connecting crank and links, as described.

5. The hinged guard or cover N, connected to the vertical guard or fender M^2, and overhanging the platform M^1, as described.

6. The reciprocating grain-receptacle R, adapted to receive and support the gavels alternately upon its opposite ends, in combination with the cord, lever, and cam, substantially as described, for automatically reciprocating the receiver, in the manner and for the purpose set forth.

7. The reciprocating grain-receptacle R, supported and guided by the grooved roller s', and the longitudinal rails or tracks S and R^2, arranged as described.

8. The cam-wheel J, provided with the cam-groove, formed substantially as set forth, in combination with the lever and cord, or their equivalents, for automatically operating the grain-receptacle, as described, whereby intervals of rest are given to said receptacle at each end of its throw, for the purpose specified.

This specification signed and witnessed this 25th day of November, 1874.

JAMES H. KIRTON.

Witnesses:
G. W. FORD,
JAMES KIRTON.