

(No Model.)

5 Sheets—Sheet 1.

C. CLAPP.  
Harvester.

No. 239,648.

Patented April 5, 1881.

Fig. 15.

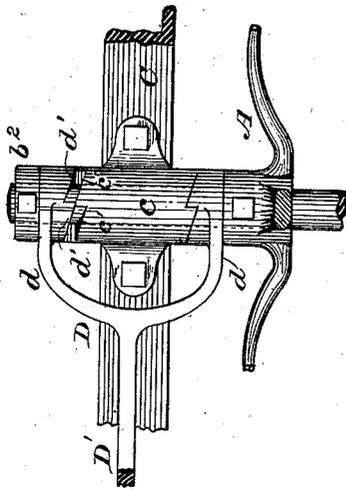
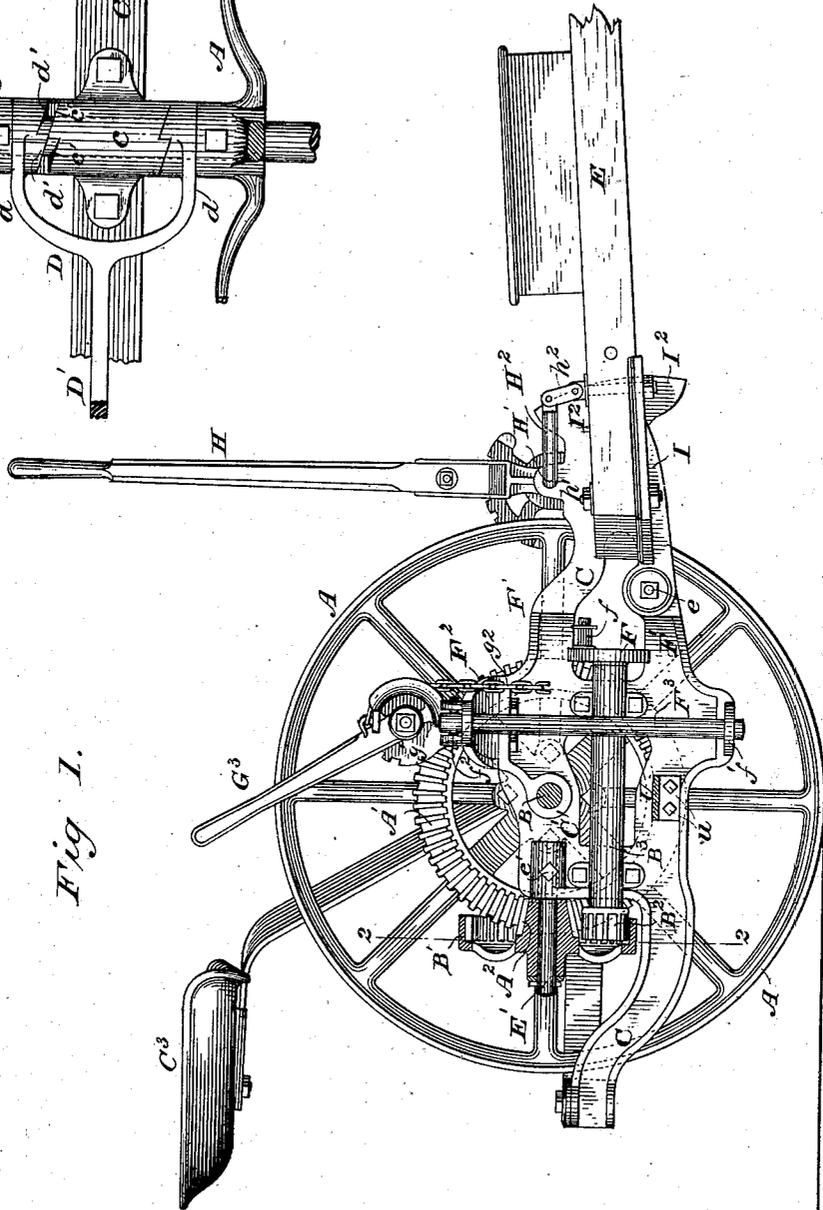


Fig. 1.



WITNESSES

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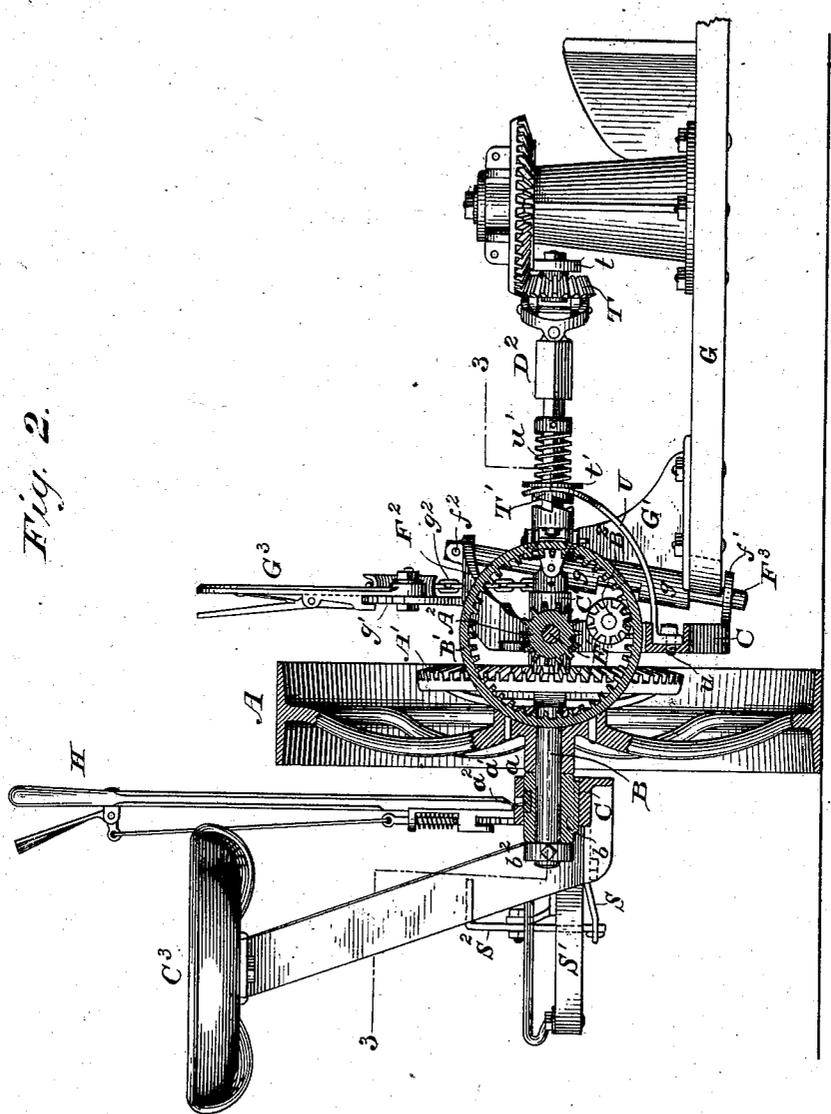


Fig. 2.

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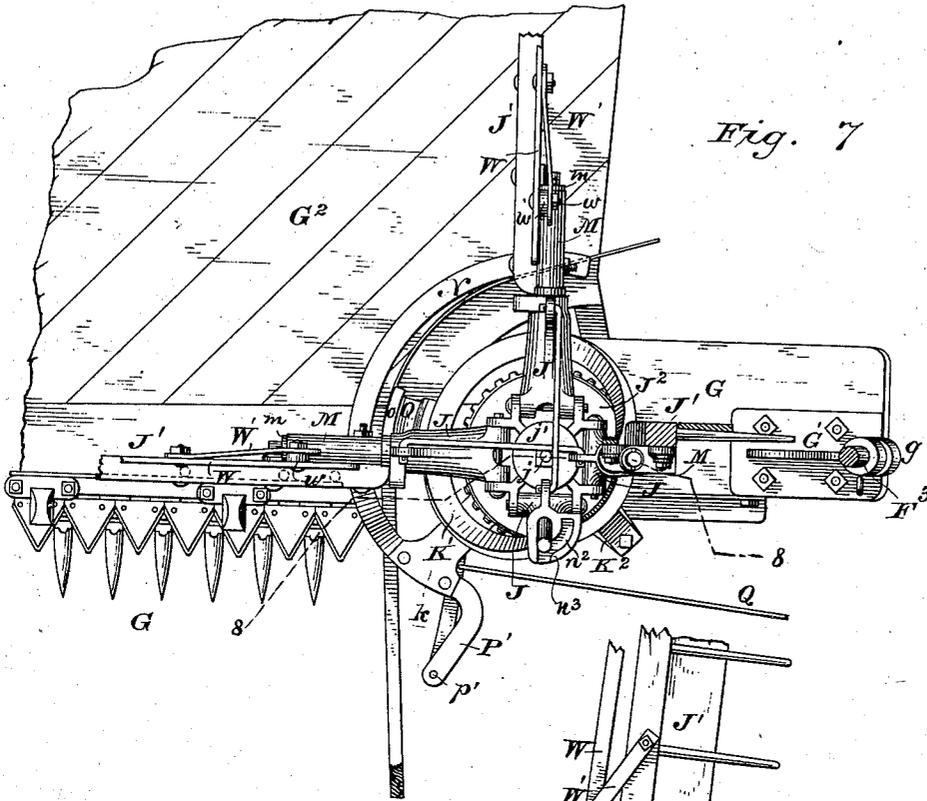
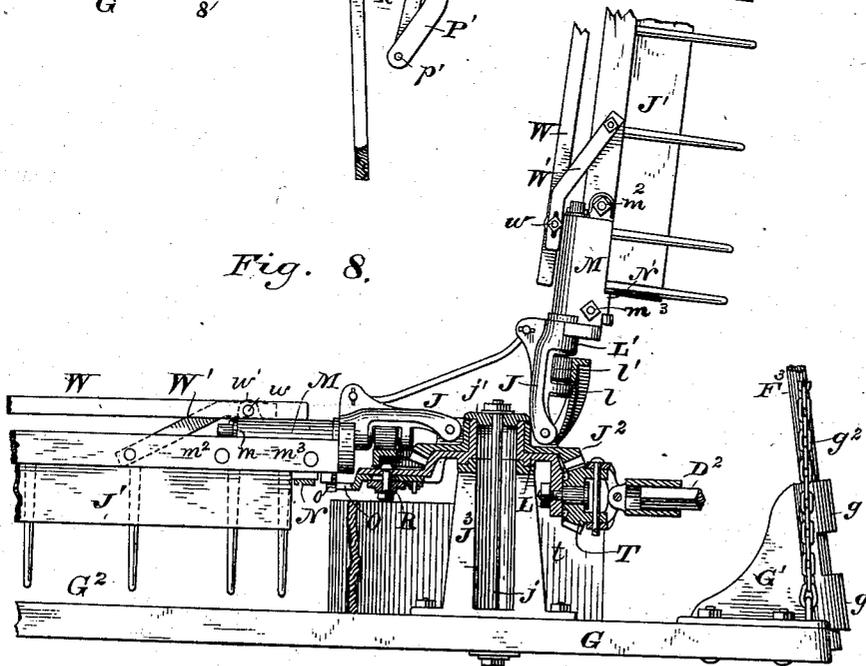


Fig. 7

Fig. 8.



WITNESSES

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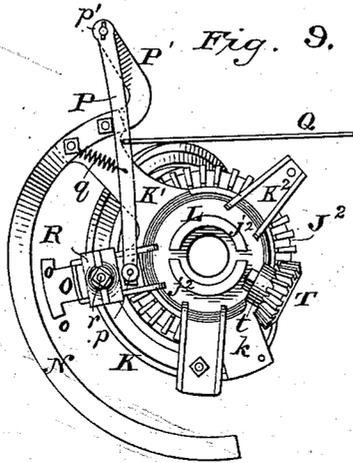


Fig. 10.

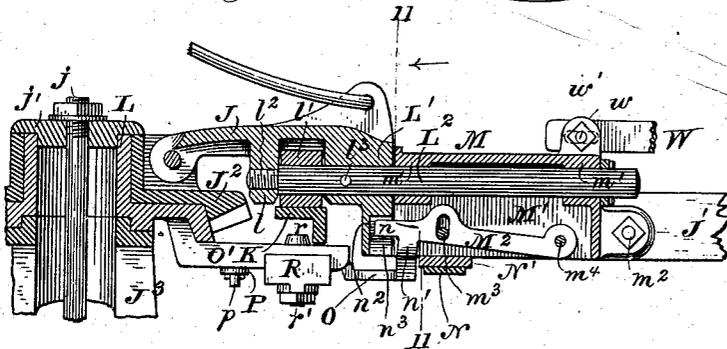


Fig. 11.

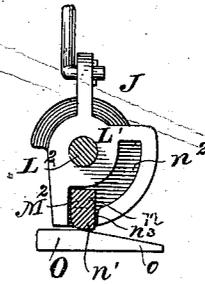


Fig. 12.

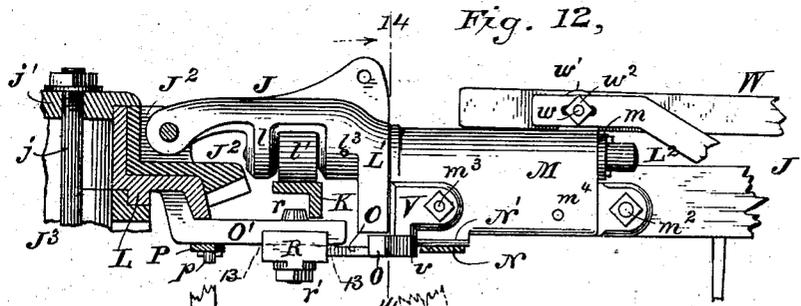


Fig. 14.

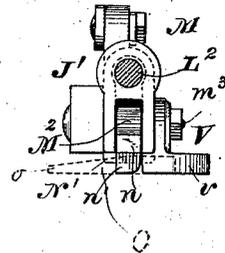
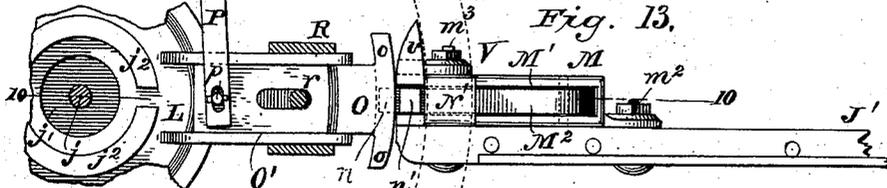


Fig. 13.



WITNESSES

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# UNITED STATES PATENT OFFICE.

CHARLES CLAPP, OF TRUMANSBURG, NEW YORK, ASSIGNOR TO  
GREGG & CO., OF SAME PLACE.

## HARVESTER.

SPECIFICATION forming part of Letters Patent No. 239,648, dated April 5, 1881.

Application filed January 21, 1881. (No model.)

To all whom it may concern:

Be it known that I, CHARLES CLAPP, of Trumansburg, in the county of Tompkins and State of New York, have invented certain new and useful Improvements in Harvesters, of which the following is a specification.

My invention relates to improvements in harvesters, applicable chiefly to the class known as "one-wheel machines," especially such machines of this class as are provided with continuously-rotating rising-and-falling combined rakes and reels of the type in which the rake-heads are adapted to oscillate or swing about their longitudinal axes, so that the rake-teeth may be caused to rock up to pass clear of cut grain upon the platform or be swung down to sweep off gavels.

My improvements, as will hereinafter specifically be designated by the claims, pertain to certain novel organizations of parts and combinations of devices, among which may be mentioned the gearing for driving the rakes and cutters, shifting mechanism for throwing the rakes and cutters into and out of operation, means for securing the rake-teeth against oscillation, and means by which to cause the teeth to rock.

In the accompanying drawings, which show all parts of a harvester which are deemed necessary to a proper understanding of my invention, my improvements are shown as embodied in the best way now known to me. Some of these improvements may, however, be used without the others, and in machines differing in some respects from the one therein shown and hereinafter particularly described.

Figure 1 is a view in side elevation as seen from the inner or grain side of the machine, with the cutting apparatus, platform, &c., removed, and portions in section, as in part indicated by the line 1 1 of Fig. 3. Fig. 2 is a view, partly in rear elevation and partly in section, as indicated by the lines 2 2 of Figs. 1 and 3. Fig. 3 is a view, partly in plan and partly in section, as indicated by the line 3 3 of Fig. 2. Fig. 4 is a plan view representing in detail, on an enlarged scale, the gearing-shifting devices; Fig. 5, a sectional elevation of the same parts, the section being indicated

by the lines 5 5 of Figs. 4 and 6; Fig. 6, a view of the same parts, partly in front elevation and partly in section, on the lines 6 6 of Figs. 4 and 5. Fig. 7 is a plan view, with parts broken away and in section, showing the platform, the raking and reeling devices &c. Fig. 8 is a view, partly in front elevation and partly in section, on the line 8 8 of Fig. 7. Fig. 9 is a bottom view of the rake-post, the rake-gearing, cam-track, tripping devices, &c. Fig. 10 is a view, partly in rear elevation and partly in longitudinal section, in the plane of the line 10 10 of Fig. 13, showing details of the construction of a rake-arm, the manner of attaching it to the rake stand or post, connecting it with the rocking rake-head, &c., the trip-lever or gravity locking-latch being represented as in the position it is caused to assume as the rake-head is about to rock. Fig. 11 is a view, partly in elevation and partly in transverse section, on the line 11 11 of Fig. 10, showing the trip-lever or gravity-latch as acted upon by the tripper for unlocking the rake-head to allow the teeth to swing up. Fig. 12 is a view, partly in rear elevation and partly in vertical section, through the rake-stand, cam-track, &c., showing parts represented in Fig. 10, with a detachable trip-block upon the rake-head, to prevent actuation of the trip-lever, and so insure the action of the rake upon the grain on the platform at each revolution. Fig. 13 is a bottom view, with parts in section, on the line 13 13 of Fig. 12; and Fig. 14, a section on the line 14 14 of Fig. 12. Fig. 15 is a view showing a slight modification of the frame-shifting mechanism or devices for sliding the main frame on the axle.

A dished or curve-spoked driving and main supporting-wheel, A, is suitably fastened to its axle B, which is mounted at its opposite ends in inner and outer bearings in a shifting or sliding main frame, C, so as to turn freely therein as the drive-wheel revolves. The frame incloses the drive-wheel, may be rocked on the axle, and is made in sections suitably bolted together, so as to be rigid or as though of one piece only. That the shifting main frame may be readily moved lengthwise the axle or slide along it for a purpose hereinafter to be ex-

plained, the axle at its outer end is supported by and connected with the frame in the following manner, while the axle turns at its inner end in a frame-bearing,  $C'$ . A removable cap,  $a$ , provided with a straight slot,  $a'$ , extending from front to rear, is bolted upon the frame so as, together with a seat groove or socket in the frame, to form a housing or bearing in the frame to receive and be capable of sliding upon a cam-grooved bearing sleeve or collar,  $b$ , in which the outer end of the axle turns. A longitudinal rib or spline,  $b'$ , on this sleeve fits a corresponding groove in the frame and prevents the sleeve from turning. A cam slide or block,  $a^2$ , fits in the cam-groove  $a^3$  of the sleeve, and has a lever,  $C^2$ , securely attached to it. The lever projects through and works in the vertical walled or straight slot  $a'$  of the bearing-cap as a guideway, and serves to rock or slide the cam-block  $a^2$  around in the bearing and along the cam-groove of the sleeve. The outer surface of the cam-block works against the inner surface of the cap bearing on either side of the slot thereof, in which the rocking lever works. Endwise movement of this sleeve  $b$  relatively to or upon the axle is prevented by the hub of the drive-wheel at one end and a pin or washer,  $b^2$ , bearing against the opposite end of the sleeve. The result of this construction is that as the lever is rocked backward the main frame  $C$  is moved inward toward the grain side, upon or relatively to the axle and wheel  $A$ ; and when the lever is moved forward the frame is slid outward.

So far as the effect of the operation of the devices just described is concerned, it would be wholly immaterial were the frame to maintain its position and the wheel and axle to move by the working of the lever; but in practice the frame will usually—probably invariably—slide on the axle, as the resistance to the movement of the wheel is greater than that to the movement of the frame, owing to the weight carried by the wheel and its broad bearing and hold upon the ground.

The lever  $C^2$  is within convenient reach of the driver in his seat  $C^3$  upon the machine.

Instead of the above-described and preferred construction and organization of parts the frame-shifting mechanism may be varied somewhat. For instance, as represented in Fig. 15, a cap or bearing-sleeve,  $c$ , having ratchet-like teeth or projections on its ends, is substituted for the previously-described cam-grooved bearing-sleeve  $b$  and slotted cap  $a$ , and the axle is fitted to turn directly in this sleeve  $c$ , bolted to the frame. A yoke,  $D$ , having a lever,  $D'$ , fixed to it, is fitted by its forks  $d$   $d'$  upon the axle at each end of the sleeve  $c$ , and between the sleeve ends and the drive-wheel hub and washer  $b^2$ , respectively. Inclined projections or ratchet-like teeth  $d'$   $d'$  on the yoke ends corresponding respectively with those,  $e'$   $e'$ , on the sleeve ends engage alternately with the opposite ends of the sleeve as the lever is operated to rock the yoke. It will readily be understood that

the result of the operation of this modified construction of parts is to shift the main frame along the axle, as before. Suitable detent devices to hold the shifting-lever  $d'$  in the position to which it may be adjusted are provided, such detent devices being unnecessary in the first-described organization of shifting mechanism.

Obviously a cam-slot might be substituted for the straight slot  $a'$  in the frame-housing and a straight groove be substituted for the cam-groove  $a^3$  in the sleeve-bearing  $b$ , the frame-shifting lever  $c^2$  and its slide being suitably adapted to this modified arrangement.

The inner bearing,  $C'$ , for the axle is made long and projects within the vertical plane of the edge of the wheel's rim or tread, and extends quite close to the drive-wheel hub. The axle, it will be seen, is supported close up to the wheel on both sides and relieved of all unnecessary strain.

That the cutter and rake and reel actuating gearing may be thrown either into or out of operation simply by the one lever and its cooperating mechanism for imparting the sliding movement to the frame, a main driving-gear or master-wheel,  $A'$ , is fastened to the drive-wheel by bolts or in other suitable way, and so always occupies a fixed relation to the drive-wheel and axle, while the driven gearing for actuating the cutters is mounted upon the frame, so as to be engaged with or disengaged from the main gear, according to the position of the frame. The rake and reel arms are driven by a tumbling-shaft,  $D^2$ , from the main axle, and a clutch on this shaft is coupled or uncoupled, according to the position of the frame, as will hereinafter be explained.

The beveled toothed main gear or master-wheel  $A'$  is dish-shaped or formed with curved spokes, that the bearing  $C'$  may project well in toward the hub of the drive-wheel. This bevel-gear  $A'$  meshes with a beveled pinion,  $A^2$ , fast to or formed with an internally-toothed spur-gear,  $B'$ , with which meshes a pinion,  $B^2$ , on the crank-shaft, which drives the cutters by the usual crank and pitman. The crank-shaft is mounted in a pipe-box bearing,  $B^3$ , extending along beneath the inner frame-bearing,  $C'$ , for the axle.

The main frame is capable of rocking about the axle, as usual in this class of machines, and the tongue  $E$  is pivoted at its heel in suitable way, as by the bolt  $e$ , to the main frame at or near its inner front corner, so that the frame may be vibrated about its hinged connection with the tongue-heel, as usual.

The gearing-supporting portion of the main frame—that part of the frame inside the drive-wheel and its attached driving-wheel gear  $A'$ —is of somewhat peculiar construction. A socket is made in the frame to receive a steel pin,  $E'$ , constituting the stud-shaft, about which the bevel-pinion  $A^2$  and internally-toothed gear  $B'$  rotate. This stud-shaft is detachably fastened in the frame-socket by a set-screw,  $e'$ .

By loosening the set-screw the shaft may be removed to displace the gearing supported by it. The crank-shaft bearing  $B^3$  is secured by lugs and bolts near its opposite ends to the frame, as clearly shown by the drawings. By slotting the frame, as at  $f$ , near the point of its pivotal connection with the tongue, space is provided for the crank-wheel  $F$ , which projects partially through the frame-slot, thus admitting of the crank-shaft being mounted close in and providing for a compact arrangement of parts. In advance of the crank-wheel the frame projects inwardly, at  $F'$ , for connection with the tongue, so that the attachment of the draft is inside the axle and crank-shaft. Above and slightly in advance of the axle the frame is formed with or has attached to it an overhanging arm or inward-projection bracket,  $F^2$ , and at the bottom of the frame there is provided a shorter arm or lug,  $f'$ , projecting inwardly beneath but to a less extent than the overhanging arm. An inclined rod,  $F^3$ , for the attachment of the finger-beam to the frame, is fitted at its top and bottom in holes in the overhanging arm  $F^2$  and lug  $f'$ , and the rod is held against vertical displacement in its supporting arm and lug by a pin,  $f^2$ , passed through the rod and through ears on the overhanging arm.

The finger-beam  $G$  is provided with a strong bracket,  $G'$ , securely bolted to its heel end and provided at its edge with bearings  $g$ , inclined to correspond with the rod  $F^3$ , and fitting upon said rod. By making the lower rod-support or lug,  $f'$ , shorter than the upper support,  $F^2$ , and inclining the rod  $F^3$  and the finger-beam bracket, the heel end of the finger-beam is located well in or closer to the drive-wheel than it could be located were the rod  $F^3$  supported at its lower end as far out as it would be necessary to support it were a truly vertical or perfectly upright rod employed, as the rod has to pass up outside of and clear of the crank-shaft bearing  $B^3$ , and far enough therefrom to admit of a free up-and-down play of the bracket in adjusting the height of cut. This adjustment of the finger-beam, the platform  $G^2$ , and parts mounted upon or supported by them, is accomplished by means of a lever,  $G^3$ , supported on an arm,  $g'$ , on the overhanging arm or bracket  $F^2$ , and provided with suitable detent devices and a chain,  $g^2$ , connecting with the bracket  $G'$ .

The cutting apparatus and platform are braced by a diagonal rod extending to the tongue, as usual in this class of machines, and the frame is vibrated about the heel of the tongue and rocked on the axle, for a well-known purpose, by a lever,  $H$ , provided with suitable detent devices, and pivoted to rock at the outer front corner of the main frame. This lever connects at its lower end with or is mounted upon a cranked rock-shaft,  $H'$ , supported in lug-bearings  $h$   $h'$ , respectively, at the inner and outer corners of the frame. The bent or cranked end  $H^2$  of the rock-shaft is linked at  $h^2$  with

the tongue a little in advance of its pivotal connection with the frame. In addition to the socket-plate  $I$ , to which the tongue is bolted at its heel, and by which it is jointed to the frame, the tongue has secured to it a slide-bracket or angle-clip,  $I'$ , which overlaps the curved edge of an arm or segmental protecting portion,  $I^2$ , at the inner front corner of the frame. The slide-clip  $I'$  and segmental-edged arm  $I^2$  brace the tongue against lateral strains, as outward sway of the tongue is prevented by its bearing against the surface of the segmental arm next it, and inward sway is resisted by the hold of the clip, which slides up and down in contact with the surface of the segment opposite that which lies next the tongue.

A series of short rake-carrying arms,  $J$ , for the combined reels and rakes  $J'$ , in any desired number, are hinged at their heel ends in suitable way to a revolving carrier or inverted crown-wheel,  $J^2$ , supported upon and rotating about a rake-stand or vertical post,  $J^3$ , mounted in the usual position at the inner front corner of the platform or upon the finger-beam adjacent thereto.

The details of construction of the rake-stand  $J^3$ , as in this instance shown, are as follows: The stand or post proper is hollow, open at one side intermediate its ends, and has a flanged base by which to bolt it in place. A rod or long bolt,  $j$ , headed or provided with a nut and washer at its lower end to bear against the under side of the finger-beam, is passed through the beam, up through the post, and through a cap,  $j'$ , and by a nut secures this cap firmly down upon the top of the sleeve or hub of a detachable plate or stand-head,  $L$ , which forms a bearing and seat for the rotating rake-carrier or crown-wheel  $J^2$ . The hub of the crown-wheel is overlapped by the cap  $j'$ . The stand-head  $L$ , at the base of its hub, interlocks with the top of the stand proper or post  $J^3$  by means of projections  $j^2$  on the one taking into corresponding recesses in the other, so that the head cannot turn, the two parts of the stand, when secured together, becoming practically rigid or as though in one piece. A one-part or single cam-track,  $K$ , is bolted to the stand-head by means of the lug  $k$  thereof, as well as by an arm,  $K^2$ , and, if desired, at any other suitable points, by providing one or more additional lugs, such as shown at  $k$ .

The rake and reel hinged supporting studs or short arms  $J$  are linked together in pairs, as usual, so that the requisite rising and falling movements are imparted to the rotating combined rake and reel arms without the employment of cam switches or latches. The short arms  $J$ , and the means employed for connecting the rakes and reels with them, are peculiar. Each arm  $J$  has a hole formed longitudinally in it at its outer end or head,  $L'$ , and is provided intermediate its head and heel or hinged end with a lug,  $l$ . The space between the lug and head of the arm constitutes a recess, in which a cam-track-traveling roller,  $l'$ ,

is fitted upon a rod,  $L^2$ . This rod is inserted in the hole formed in the head  $L'$  of the arm, crosses the roller-cavity, and at its inner end is supported in the lug  $l$ . The rod is shown as reduced in size and thread at its inner end,  $l^2$ , and the lug  $l$  as tapped or provided with a female screw to receive the rod end. The rod is secured against oscillation or working loose by a screw-bolt or set-screw, by which to connect it with the arm; or by a cross-pin,  $l^3$ , passed through the rod and the head of the arm  $J$ . A strong compact arrangement of parts, avoiding unnecessary strain, results from this construction, advantages due to which would be retained were the reduction in size of the end of the rod and the formation of the screw-thread upon it dispensed with, the anti-friction roller for traveling the cam-track  $K$  being still mounted directly upon the pivot-rod about which the rake-head oscillates, as will presently be described, and the rod supported at both sides of the roller.

Each oscillating rake-head or combined reel and rake  $J'$  is pivoted at its inner end upon the rod  $L^2$ , so as to be capable of rocking about its longitudinal axis on said rod to turn the rake-teeth down or up, so as to extend out horizontally. A butt-socket or bearing-bracket,  $M$ , fastened at the inner end of the rake-head, is fitted upon the rod  $L^2$ , so as to rock about it, and secured by a pin and washer,  $m$ , or in equivalent way, against endwise movement. Two bearings,  $m'$   $m'$ , one at each end of the bracket, are preferably provided, and the bracket hollowed out or recessed between the bearings, instead of forming one long sleeve-bearing in the bracket. The bracket is secured to the side of the butt-end of the rake-head by bolts and nuts  $m^2 m^3$ , the former shown as passing through a lug at the outer end of the bracket and through the rake-head, and the latter as passing through the head and the bracket near its inner end. A housing,  $M'$ , formed by recessing the bracket, receives and admits of the proper movements of a vibrating latch or gravitating trip-lever,  $M^2$ , which is pivoted at its heel on a pin,  $m^4$ , near the bottom of the housing-recess, and close to the outer end of the bracket  $M$ . A slot is provided in the trip-latch near its nose or outer end,  $n$ , and the bolt  $m^3$  passes through this slot to limit the play of the latch. An inclined or round-edged short lug or toe,  $n'$ , is provided on the vibrating latch intermediate its guide-slot and nose or projecting end  $n$ . This nose enters a curved way or guide-groove,  $n^2$ , in the face of the outer end or head,  $L'$ , of the hinged short arm  $J$ . The guide-groove  $n^2$  is extended transversely at its lower end, or there terminates in a lateral groove passing to the edge of the head  $L'$ , thus forming a shoulder,  $n^3$ , against which the nose  $n$  of the latch abuts when the rake-head is locked against swinging or rocking on the pivot  $L^2$ . When the latch is so dogged against traveling in the groove the tripping-toe or inclined lug  $n'$  projects out of

the groove and below the head  $L'$ . When this toe strikes and is raised by a suitable tripper, so as to bring the latch-nose into position to travel the curved part of the guide-groove, the rake-head, as it rotates about the rake-stand, is free to be rocked to turn up its teeth.

A curved spring,  $N$ , constituting a vertically-yielding self-adjusting rake-rolling track, is secured at front to the arm  $K'$  on the overhanging part or head  $L$  of the rake-stand. This spring is curved horizontally concentrically with the vertical axis about which the rake and reels rotate, and acts upon the rake-heads by pressing against the under sides of the bearing-brackets  $M$  or by frictional contact with the shoulders or ribs  $N'$ . The rake-teeth may thus be rocked up in a way well understood, or be caused to sweep off gavels by the yielding of the spring  $N$  when the rake-heads are locked against rolling.

A tripper,  $O$ , (shown as formed by a plate sliding in a guideway,  $O'$ , secured to the rake-stand head  $L$ , and provided with the curved ribbed cross-head end  $o$ ,) serves to trip the latches  $M^2$  to unlock the rake-heads. The head  $o$  of this sliding tripper is inclined from its front backward, to allow the toe  $n'$  of the trip-latch to at first pass above and then ride up on it to unlock the latch when the slide or tripper-piece  $O$  is in its outward or normal position in its guideway  $O'$ . When the tripper is slid back or inward its head does not operate upon the latch of a head,  $J'$ , and the rake-teeth then sweep over the platform  $G^2$ , in contact with it, to rake off the grain, the spring-track  $N$  yielding, as usual in this type of rakes, to the pressure of the bearing-shoulder  $N'$  of the butt-socket or bracket  $M$ .

The tripper  $O$  is operated by way of a lever,  $P$ , supported at its heel end by a pivot, and connected at its opposite end by means of a slot and bolt or pin,  $p$ , with the inner end of the tripper. The heel end of the lever is shown as pivoted by the pin  $p'$  upon a support,  $P'$ , formed by a bent extension of the front end of the spring-track  $N$ . A coiled spring,  $q$ , acts upon the lever always with a tendency either to draw it in position to slide the tripper outward or to hold it in its advanced or operative position, so as to actuate the gravity trip-latches and unlock the rake-heads as they are successively rotated into proper position. A cord or other flexible connection,  $Q$ , controlled by the driver, serves to move the lever  $P$  in a direction to draw the tripper inward against the force of the spring  $q$ . The tripper is held in place and limited in its movements in its guideway,  $O'$  by a clip,  $R$ , and a bolt,  $r$ , which passes through the clip and through a slot in the tripper, is headed above the tripper, and secured at its lower end against the clip by a nut,  $r'$ .

It should be noticed that the tripper, between its main guiding portion or shank and its head  $o$ , is recessed or depressed slightly to prevent obstruction to the movements of the heads  $L'$

of the rake and reel carrying arms J; and the tripper-head *o* is curved horizontally, ribbed or formed so as to project upward slightly, and inclined, as clearly shown by the drawings.

5 The tripper-lever-actuating cord Q is connected with one arm of a bell-crank lever, S, pivoted at its elbow to the under side of the driver's foot-rest S'. A foot-lever, S<sup>2</sup>, is linked to the opposite arm of the bell-crank.

10 It is obvious that the driver, by pressing with his foot upon the lever S<sup>2</sup>, can cause the combined rake and reel arms to act as rakes in sweeping across the platform, and that when the reel action only of these arms is required 15 he has simply to remove his foot from the lever.

The extensible and universally-jointed or tumbling shaft D<sup>2</sup> drives the beveled-toothed rake and reel carrying wheel J<sup>2</sup> by means of the pinion T. The tumbling-shaft is mounted 20 at its outer end in a lug-bearing, *t*, on the rake stand or head L thereof. The sliding or spring-actuated section T', of a well-known form of clutch-coupling, with which the shaft is provided, is automatically disengaged from the 25 remaining section of the coupling when the machine is backed, as will readily be understood. A shoulder or collar, *t'*, fast on the sliding section of the clutch, is engaged or borne against by the forked end of a shifter, 30 U, secured to the main frame. This shifter is shown as formed by a bent arm fixed in position by its heel end by bolts or screws *u*, securing it to the frame beneath the axle and crank-shaft. When the frame is shifted in the manner before explained to throw the cutters out 35 of operation the rakes and reels are also thrown out of gear by the action of the bifurcated end of the shifter U upon the clutch-coupling, so as to slide the movable section thereof out of gear 40 with the fixed section by compressing its thrust-spring *w*.

To adapt the machine for uniform or regular work in reaping—that is to say, to convert it into a self-raker instead of leaving the rakes 45 controllable by the driver from his seat—any one or more of the rake-heads may, by means of a trip-block or dog, be locked against oscillation by the action of the tripper O upon the latch. This tripper-dogging device consists 50 of a button or block, V, adapted to be readily secured upon or removed from the bracket-bearing or butt-socket M of a combined reel and rake by means of a nut upon the end of the securing-bolt *m*<sup>2</sup> near the heel end of the 55 bracket. (See Figs. 12, 13, and 14.) The curved or inclined nose or wiper-projection *v* of this trip-block acts when during the revolution of the rake-head it is brought into proper position against the head *o* of the tripper, 60 slides the tripper inward, and so dogs it against action on the locking-latch M<sup>2</sup>, leaving the rake-teeth to maintain their hanging or raking position. The trip-blocks, it is obvious, may readily be attached or removed.

65 It will be understood that when, during the operation of the machine, a rake-head has been

rocked by the action of the spring-track upon it, it resumes its normal position by the roll of its teeth downward, and is locked against rocking as soon as the end of the track has 70 been passed.

Each of the rake-heads or combined rake and reel arms J' is braced and stiffened to compensate wear of the bracket M or pivot-rod L<sup>2</sup>, and prevent sagging by means of inclined brace-bars W W', the former connected 75 by a pivot to the outer end of the head, and provided with a slot near its inner end, through which passes a bolt, *w*, supported in a lug, *w'*, on the butt-socket or bearing-bracket M, and provided with a jam-nut, *w*<sup>2</sup>, to clamp 80 the brace in its adjusted position. The short diagonal brace-bar W' is pivoted at one end to the rake-head near its heel, and connects with the bolt *w* by means of its slot. 85

I claim as of my own invention—

1. The combination of the driving-wheel, the axle to which it is fastened, the shifting main frame having the inner and outer bearings for the axle, by which bearings the frame slides 90 upon the axle, and the frame-shifting lever outside the driving-wheel, and acting upon the frame-bearing at the outer end of the axle, substantially as and for the purpose hereinbefore set forth. 95

2. The combination of the driving-wheel, the axle to which it is fastened, the shifting main frame inclosing or extending on both sides of the driving-wheel, and provided with inner and outer bearings, in which the axle is mounted, 100 at its opposite ends and by which the main frame may be slid upon the axle, the main gear carried by the driving-wheel, the cutter-actuating driven gearing mounted on the main frame, and the shifting mechanism actuated 105 by the lever C<sup>2</sup> at the outer end of the axle, substantially as and for the purpose hereinbefore set forth.

3. The combination of the driving-wheel, the axle to which it is fastened, the shifting main 110 frame inclosing the driving-wheel, and having the inner and outer bearings for the opposite ends of the axle, the shifting mechanism actuated by the lever C<sup>2</sup> outside the driving-wheel, the cutter-actuating driven gearing operated 115 from the driving-wheel gear, and the driven gearing for actuating the rakes and reels, to which gearing motion is imparted, by way of the tumbling-shaft and axle, from the driving-wheel, substantially as and for the purpose 120 hereinbefore set forth.

4. The combination of the shifting main frame, the axle supported at its inner and outer ends therein, the driving-wheel fast on the axle, the rake and reel driving tumbling-shaft connected with the axle, the clutch-coupling of the shaft, and the clutch-shifter mounted on the main frame, substantially as and for the purpose hereinbefore set forth. 125

5. The combination of the axle, the slotted 130 main-frame bearing or housing, the non-turning grooved sleeve-bearing for the axle, sup-

- ported in the main-frame housing, the lever and its cam slide or block, these members being and operating substantially as hereinbefore set forth.
- 5 6. The combination, substantially as hereinbefore set forth, of the main frame, the axle supported at its inner end therein, the driving-wheel fast on the axle, the slotted frame-housing for the outer end of the axle, the cam-grooved non-turningsleeve-bearing mounted in the frame-housing around the outer end of the axle and prevented from endwise movement on the axle, the cam slide or block working in said groove, and the shifting-lever secured to said slide and working in the frame-housing slot to shift the frame lengthwise the axle.
- 10 7. The combination of the main frame, the axle, the driving-wheel fast thereon, the master-wheel or main gear carried by the driving-wheel, the pinion meshing therewith, the internally-toothed gear mounted with said pinion on the main frame, the crank-shaft, its pinion, and the bearing for the crank-shaft, these members being and operating substantially as hereinbefore set forth.
- 15 8. The combination of the rocking main frame vibrating about the heel of the tongue, the overhanging arm or inwardly-projecting bracket  $I^2$ , the shorter inwardly-projecting arm or lug  $I'$ , and the finger-beam supporting inclined rod  $F^3$ , supported in said bracket and lug clear of the crank-shaft, and close into the driving-wheel at its lower end, substantially as and for the purpose described.
- 20 9. The combination of the finger-beam, the bracket provided with the inclined bearing, the inclined rod supported at both ends in arms of the rocking main frame, and closer into the driving-wheel at bottom than at top, and the lever and its connections for raising and lowering the finger-beam, all substantially as and for the purpose hereinbefore set forth.
- 25 10. The combination of the main frame having the curved edge or segmental front arm,  $I^2$ , the tongue-socket plate jointed to the frame, and the slide or angle clip, substantially as and for the purpose hereinbefore set forth.
- 30 11. The combination of the rocking main frame, the hinged tongue, the cranked rock-shaft linked to the tongue, the lever secured to said rock-shaft and mounted upon the outer front corner of the frame, and the slide or angle clip secured to the tongue and working against the curved-edged projecting portion of the frame, substantially as and for the purpose hereinbefore set forth.
- 35 12. The combination of the series of short rake-carrying arms hinged to the rotating carrier or crown-wheel, and having curved ways or guide-grooves in their outer ends or heads, the combined rakes and reels or rake-heads having the capacity of rolling about their longitudinal axes on pivotal connections with said arms, and the vibrating latches or trip-levers connected with the rake-heads and having the capacity of interlocking with said heads and the rake-carrying arms to hold down the rake-teeth, and of releasing the heads and traveling in the guide-grooves of the rake-carrying arms to allow the rake-teeth to turn up, substantially as hereinbefore set forth.
- 40 13. The combination, substantially as hereinbefore set forth, of the short rake-carrying arm, the pivot-rod, the rake-head, the bearing-bracket or butt-socket, the vibrating latch or gravitating trip-lever housed in said bearing-bracket and having the capacity of locking the rake-head against rolling on the pivot secured to the rake-carrying arm, tripper mechanism by which to actuate the latch and unlock the rake-head, and the rake-rolling track by which to turn up the teeth of the rake.
- 45 14. The combination of the short rake-carrying arm provided with the perforated head and lug, and the pivot-rod provided with the cam-track-traveling roller between said head and lug, substantially as hereinbefore set forth.
- 50 15. The combination of the series of combined rakes and reels or rolling rake-heads, the short rake-carrying arms, the revolving carrier or crown-wheel to which said arms are hinged, the pivot-rods fast in said arms, the cam-track, and the rollers mounted directly upon the pivot-rods, substantially as hereinbefore set forth.
- 55 16. The combination of the rotating carrier or crown-wheel, the rake-carrying arm hinged thereto and having the guide-groove in its head, the rolling rake-head, the vibrating latch or trip-lever, the tripper, and the rake-rolling spring-track, substantially as hereinbefore set forth.
- 60 17. The combination of the rolling rake-head, the recessed bearing-bracket, and the vibrating latch or trip-lever housed in said bracket, and provided with the projecting end or nose and inclined lug or toe, substantially as and for the purpose hereinbefore set forth.
- 65 18. The combination of the rolling rake-head, the rake-carrying arm, the vibrating latch or trip-lever interlocking by its nose with the rake-carrying arm, and provided with the toe, the tripper, and the lever by which to actuate the tripper, substantially as and for the purpose hereinbefore set forth.
- 70 19. The sliding tripper  $O$ , formed with the curved ribbed cross-head  $o$ , inclined from its front backward, as and for the purpose set forth.
- 75 20. The combination of the sliding tripper, and the dogging trip-block or button provided with the inclined nose acting against and moving the tripper inward, substantially as and for the purpose hereinbefore set forth.
- 80 21. The combination of the rake-stand provided with the guideway, the sliding tripper working in said guideway and provided with the curved head, and the dogging trip block or button provided with the inclined or curved

nose acting against the tripper-head to slide the tripper inward and prevent its unlocking action on a rake-head, substantially as hereinbefore set forth.

5 22. The combination of the rolling rake-heads, the bearing-brackets or butt-sockets, by which they are mounted upon their pivots on the rake-carrying arms, the vibrating latches or gravitating trip-levers having the  
10 inclined lugs or toes for engagement with a

tripper, and the trip blocks or buttons secured to the bearing-brackets, substantially as and for the purpose hereinbefore set forth.

In testimony whereof I have hereunto subscribed my name.

CHAS. CLAPP.

Witnesses:

R. H. STEWART,  
ARTHUR S. GREGG.