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W. F. GOODWIN.

HARVESTER.

No. 176,402. Patented April 18, 1876.

Fig. 1.

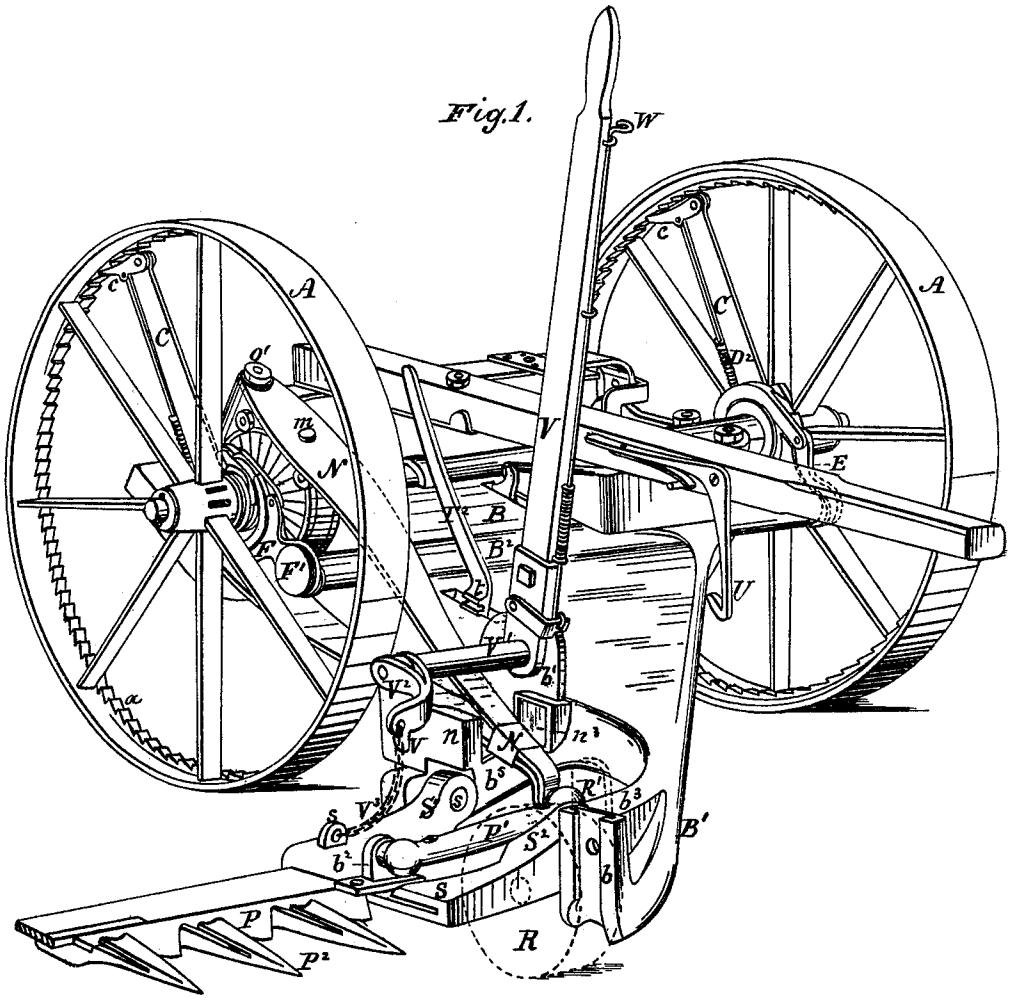


Fig. 2.

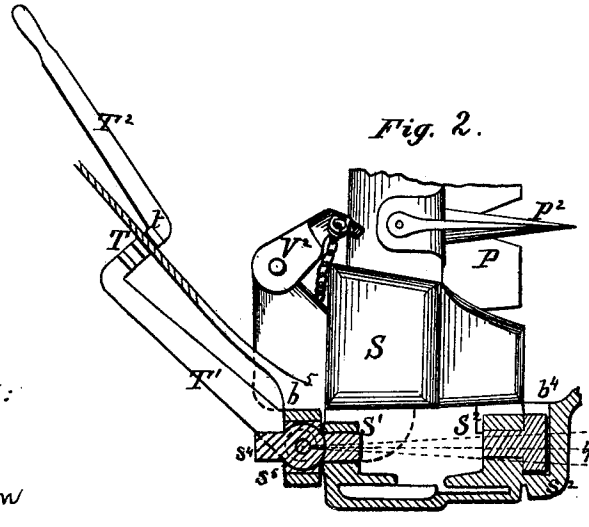
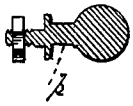


Fig. 12.



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W. R. Edelen.
E. E. Masson

Inventor:
Wm. F. Goodwin
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W. P. Doubleday
atty.

2 Sheets—Sheet 2.

W. F. GOODWIN.

HARVESTER.

No. 176,402. Patented April 18, 1876.

Fig. 3.

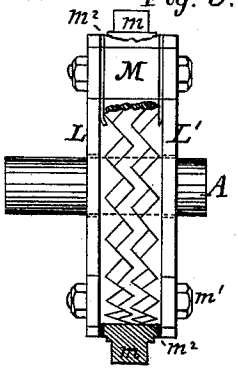

Fig. 4.

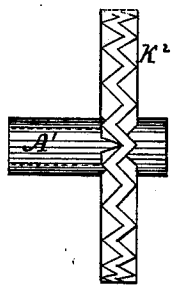

Fig. 5.

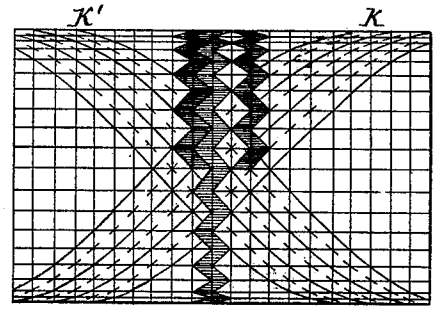

Fig. 6.

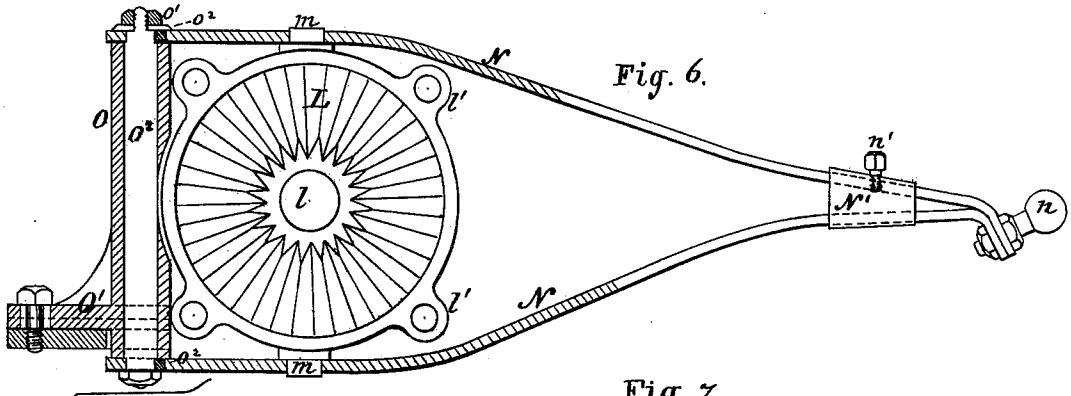

Fig. 7.

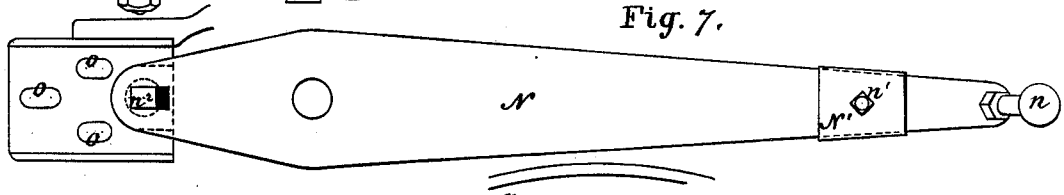

Fig. 10.

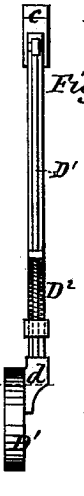

Fig. 8.

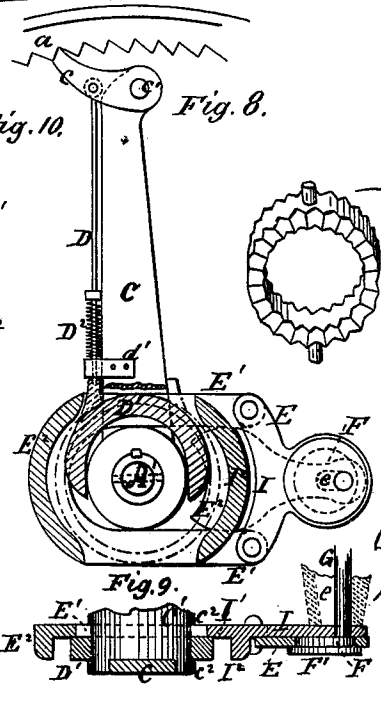

Fig. 13.

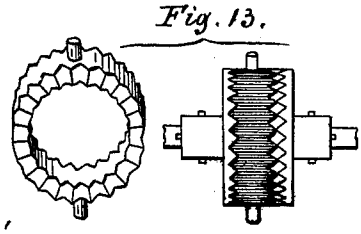

Fig. 11.

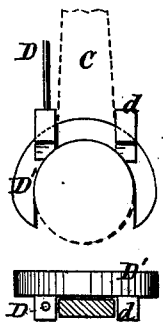

Fig. 9.

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UNITED STATES PATENT OFFICE.

WILLIAM F. GOODWIN, OF STELTON, NEW JERSEY.

IMPROVEMENT IN HARVESTERS.

Specification forming part of Letters Patent No. **176,402**, dated April 18, 1876; application filed March 14, 1876.

To all whom it may concern:

Be it known that I, WILLIAM FARR GOODWIN, of Stelton, in the county of Middlesex and State of New Jersey, have invented certain new and useful Improvements in Harvesters; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

Figure 1 is a perspective view of my improved machine. Fig. 2 is a detached view, enlarged, of the lever which is employed for the double purpose of rocking the cutting apparatus upon its longitudinal axis when mowing, and of tilting the cutting apparatus backward to lock it in a vertical position. Fig. 3 is a detached view of the reciprocating-screw movement, a part of the inclosing case or shell being broken away. Fig. 4 represents that part of the screw mechanism which is keyed to, and rotates with, the main axle. Fig. 5 illustrates the method of laying out the patterns from which the screw is cast. Fig. 6 is a side view, partly in section, of the bifurcated lever and its support, with one of the outer plates of the reciprocating-screw movement. Fig. 7 is a plan or top view of the same. Fig. 8 is a side view, partly in section, of the devices employed for locking the driving-wheels to the main axle, taken from the outside of the machine, the driving-wheels having been first removed. Fig. 9 is a plan view of same, partly in section. Fig. 10 is an edge view of ratchet-arm. Fig. 11 is a side view of the same. Fig. 12 is the wrist-pin which connects the pitman with the cutter-bar. Fig. 13 shows a modification of the reciprocating screw.

In the drawings, A A are the driving-wheels, mounted loosely upon the axle A′, the rim of each wheel having an internal ratchet, *a*. The main frame consists of a central or rear part, B, supported upon the axle, and a drooping front part, B^1, which projects in front of the inner drive-wheel—that is, the wheel next the uncut grass, and is provided with an upwardly-projecting standard, *b*, which carries the leading-wheel, and also supports the front side of the finger-bar frame, as will be hereinafter fully explained. A second upwardly-projecting ratcheted standard, b^1, carries a lifting-lever, which tilts the cutter-bar frame—to be explained. The main frame is provided, at a short distance in front of the main axle, and parallel therewith, with a semi-cylindrical rib, B^2, which receives, upon the under side of the frame, a rock-shaft. Each driving-wheel is connected with the axle by means of the following locking devices, (shown more plainly in Figs. 8, 9, 10, 11,) to which attention is now more especially directed. C is an arm, attached to or formed in one piece with a hub or short sleeve, C′, keyed to the axle A′. *c* is a pawl, pivoted to the outer end of arm C, and engaging with the ratchet-teeth *a* when not withdrawn therefrom. In practice, I prefer to make the outer end of this pawl, and the faces of the ratchet-teeth with which the pawl engages, in arcs of a circle, of which the pivot c^1 of the pawl is the center, in order that there shall be the least possible power required to withdraw the pawl from these teeth when the machine is in operation. D is a tripping-link, carrying at its lower end a segment, D^1, with which it is connected by brackets *d*. This link is arranged in the same vertical plane with arm C, its upper end being connected with the pawl *c*, and its lower end sliding in a strap or block, d^1, secured to the arm; but the segment D^1, although attached to, and carried by, link D, is located behind arm C, as shown in Figs. 8 and 11 by the dotted lines. E is a T-piece, the central leg of which is expanded and formed into an eccentric strap, which incloses an eccentric, F, mounted upon rock-shaft G, arranged below the semi-cylindrical rib B^2 of the frame, and actuated by the foot-lever H, the upper end of which projects through a slot in the frame, and within convenient reach of the driver. (See Fig. 1.) E^1 E^1 E^2 constitute a yoke, connected to the T-piece E. The part E^2 of this yoke forms an arc of a circle, the inside diameter of which is the same as the outside diameter of the segment D^1, and projects from the vertical plane of the parts E^1 E^1 of the yoke, as seen in Fig. 9, and forms a segment-clamp. I I^1 is a metal

plate, having at its rear end a hole, which fits over the shaft G, and carrying near its front end a segment-clamp, I^2, substantially like the clamp E^2. The end I^1 of this plate slides behind the segment D^1, as indicated. F′ is a cap, to secure cam F and plate $I\,I^1$ in place on the rock-shaft.

The shaft G is mounted in elongated bearings or slots *e;* hence, when the parts are in the position shown in the drawings, the clamps $E^2\,I^2$ are spread as widely apart as is possible, the shaft G occupying the rear of slot *e*, and, of course, permitting the spring D^2 to force the link D and the central part of segment D^1 from the sleeve C′, thus causing pawl *c* to engage with ratchet-teeth *a*. The operator, in order to throw the cutters out of action, moves the lever H over to the front end of its slot, thus rotating rock-shaft G and cam F. This operation simultaneously closes the segment-clamp into the dotted line *x*, Fig. 8, the inner faces of these clamps engaging with the outer circumference of segment D^1, forcing it down upon the sleeve C′, and withdrawing pawl *c* from teeth *a*. The ends of segment-clamps E^2 I^2 approach each other so closely that whenever they are moved toward sleeve C they shall gripe segment D^1 in whatever point in its revolution the latter may chance to be.

When preferred, the sleeve C′ may be provided upon one or both ends with flanges c^2, to confine the clamps in proper position.

Having described the construction and operation of the devices through which the rotary motion of the driving and carrying wheels is communicated to the axle, I will now explain the means by which the rotary motion of the axle is converted into a reciprocating motion, and is imparted to the cutter-bar.

One of the peculiarities of an ordinary-screw movement is this: When the bolt rotates continuously in one direction upon its axis, the nut, being held from turning with the bolt, moves in a right line, that line being parallel with the axis about which the bolt revolves, one face of the thread of the bolt engaging with and acting upon one face of the thread within the nut throughout the entire extent of one or more convolutions of such thread; and if we have a screw with a right-hand thread extending from end to end, or a left-hand thread from end to end, then the nut will—the screw being rotated continuously in one direction—have a rectilinear motion in one direction only from one end of the screw to the other, this motion being on a line parallel with the axis of the screw.

The object of this part of my invention is to retain all of the desirable features of the screw as a mechanical power, and yet impart to the nut an alternating rectilinear motion in opposite directions from a screw which has a continuous rotary motion; and to do this I have devised what I term a "reciprocating screw"—that is, a screw the thread of which alternates from right to left at short intervals, combined with a nut adapted to engage with and be actuated by such a screw.

The manner of constructing my movement is as follows: Having decided to give to the cutters nineteen reciprocations in each direction by each complete revolution of the driving-wheels, I take a cylinder of the proper diameter, say eight inches in diameter, and proceed to lay out nineteen right-hand threads K, and nineteen left-hand threads K^1, around its circumference. These lines will, of course, form nineteen points of intersection upon the circumference of the block, as indicated by the light and heavy shade lines in Fig. 5, these lines forming the pattern or outline of the periphery of the screw; and by cutting down from the circumference to the center upon radial lines, following this pattern, I form the central helicoidal part K^2, which is then cast in metal and keyed to the axle, an edge view of which is seen in Fig. 4. Any desired number of reciprocations at each revolution of the screw may be produced by increasing or diminishing the number of the threads. The reciprocating casing or nut is formed of three sections, L L′ M, the inner face of each section L L′ corresponding substantially to either side of the helicoidal part K^2. (See Figs. 4, 5, 6.) Each section of the nut is provided with a central opening, *l*, and lugs *l′*, having bolt-holes. M is the central section or casing-ring, to which the outer sections are secured by bolts m^1. *m m* are trunnions cast upon ring M. m^2 is a packing, to make the nut retain oil, as will be explained. N N is a bifurcated lever, carrying at its lower end a wrist-pin, *n*. This lever is made of two comparatively thin plates or bars of metal. N′ is a buffer-guard attached to the lever N N near its lower end. My object in applying this guard to the lever is to provide a wide flat surface upon each side of the lever, instead of the thin edges of the bars of which the lever is constructed, to engage with buffers, to be hereinafter described, a flat surface being better adapted for this purpose than the thin edges, which would be liable to cut and abrade the rubber of which I propose to make the buffers.

The nut or casing L L′ M is mounted in this lever, the trunnions *m* being seated in suitable perforations near the rear end. N′ is a buffer-guard, secured to the lever near its front end, preferably by means of a set-screw, n^1.

O O^1 is a tubular standard, adjustably secured to the frame of the machine by means of bolts, which pass through slots *o* in the base-plate O^1. This standard is located immediately in rear of the reciprocating movement.

O^2 is a round shaft or pivot, supported in the upright tubular portion of the standard. The projecting ends of this shaft are squared, and enter rectangular slots n^2 in lever N N, the lever being secured to the shaft by means of nuts o^1. o^2 are bearing-blocks, arranged in

slots n^2 in front of the pivot under the adjustment of parts shown in the drawings.

From the above description it will be seen that when the pawl *c* is engaged with the ratchet, as shown, a forward movement of the machine will produce a rotary movement of the part K^2 in the same direction as that of the driving-wheels A, and will produce a reciprocating movement of the nut L L′ M, and a vibratory movement of the lever N N about the shaft O^2 as a center, which motion is imparted to the cutter-bar P through the pitman P^1.

Should it be desired to lengthen the throw or traverse of the cutters beyond that produced under the adjustment shown in the drawings, it can be done by moving the pivot O^2 and its supporting-standard nearer to the nut or casing L L′ M, thus shortening that part of the lever between its fulcrum (the pivot O^2,) and the trunnions *m*, at which latter point the power is applied; and in order that a proper working relation between the reciprocating screw and its nut shall not be disturbed by said adjustment, a thickness equal to the advance of the pivot must be taken from each of the bearing-blocks o^2, and be placed between the ends of the pivots and the rear walls of the slots n^2 of the levers.

The ends of pivot O^2 being squared, as are slots n^2, with the bearing-blocks o^2 fitting closely thereto, it is apparent that the pivot will oscillate or vibrate with the lever, and that there will be very little wear or friction upon these parts.

The opening *l* is a little larger than the axle A′, and as the nut and lever N N are wholly supported upon the pivot O^2, the nut is entirely suspended from both the axle and the screw; and as the lower portion of the space within the nut is filled with oil, the screw runs in the oil, and applies it to the upper parts of the nut; thus the friction is very slight.

In addition to the fact that this reversed thread upon both the screw and the nut reduces the friction and increases the durability of the device, it also enables me to make the parts very much thinner and lighter than I could otherwise do, this corrugated form making the parts much stronger, with the same amount of metal, than any other of which I have knowledge.

Near the lower end of lever N N, I arrange two buffers, n^3 n^3, preferably of rubber, against each of which the guard N′ alternately strikes, thus materially assisting the screw and nut at each end of the throw of the lever. The wrist-pin *p*, Fig. 12, is arranged eccentrically to its shank p^1, which is, by preference, square, octagonal, or otherwise many-sided in cross-section, and is secured by a nut in a correspondingly-shaped hole in a lug, p^2, on the heel end of the cutter-bar P, the pitman being connected with the wrist-pin *p* and lever-pin *n* by ball-and-socket joints, or any other usual or approved means.

The leading-wheel R is mounted upon an axle projecting from the lower end of a plate, R′, which slides vertically in grooves in the standard *b* of the frame, (see Fig. 1,) and is adjusted vertically therein by means of a set-screw, or otherwise. Thus the front end of the frame, which corresponds substantially to the shoe in ordinary mowing-machines, may be set at any desired height from the ground.

The cutting apparatus is attached to and projects laterally from a cutter-frame, which is constructed, mounted, and operated as follows, particular reference being made to Fig. 2: It consists of a flanged or grooved portion, S, and two inner lugs or ears, S^1 S^2, each provided with a circular bearing. The rear groove receives and supports the finger-bar, the heel of the cutter-bar or one of the knife-sections vibrating through or into the front slot or groove. The front ear or lug S^2 of the cutter-frame is mounted upon one end of a T-shaped stud-pin, s^2, the head of which is supported in a recess or way, b^4, formed for its reception in the inner portion b^3 of the front drooping end of the main frame, the stud-pin being free to rise and fall within certain limits in the recess b^4. The rear lug S^1 is mounted upon one end of a pivotal rock-shaft, s^1 s^4 T T^1 T^2 is a finger-bar lever, attached to the inner end of the pivotal rock-shaft s^1 s^4. The parts T T^2 of the lever are in substantially parallel planes, and are connected by an intermediate section, T^1, arranged at about a right angle to the parts T T^2, and provided with ratchet-teeth *t*. That part of the rock-shaft which is shown in section in Fig. 2 is expanded centrally into a globular bearing, and is seated in a recess in an arm, b^5, of the main frame, and is pivoted to this arm for a further support, the inner end s^4 being supported in a bearing upon the under side of the frame, but not shown. The object in making this inner end curved is to bring that point which rests in the last-mentioned bearing into a line coincident with the pivot s^5, so that when the rock-shaft is actuated by lever T T^1 T^2 to rock or tilt the cutter-frame, as indicated by the dotted lines *y*, Fig. 2, there shall be no undue cramping of parts.

V is the lifting-lever, actuating the rock-shaft V^1 and crank-arm V^2. V^3 is a chain connecting crank-arm V^2 with an eye on the cutter-frame. *v* is a spur projecting at a right angle from crank-arm V^2. The rock-shaft V^1 is journaled at one end in the segment-standard b^1, the curved upper surface of the standard forming an arc of a circle, of which the rock-shaft is the center, and having notches, into which the spring thumb-latch W takes.

In Fig. 1 the spur *v* occupies a vertical position, as does the lever V, and it is apparent that when this lever is drawn backward into a nearly horizontal position, for the purpose of tilting the cutting apparatus upon the pivots s^1 s^2, the spur *v* will be turned upward into a nearly horizontal position; and that when

the cutting apparatus has been placed in a nearly vertical position, it (the cutting apparatus) may be tilted backward by means of tilting-lever T T^1 T^2, so that the finger-bar shall engage with spur *v*, and be thereby securely locked in place for transportation. (See Fig. 2.) In this figure the full lines represent the cutting apparatus as being locked in an upright position, the section-lines indicating the cutter-frame as being down for mowing—the dotted lines *y* also the movement of the tilting-lever and the pivots s^1 s^2 in rocking or tilting up the points of the guard-finger P^2 when the machine is in operation.

U is a spring, hook, or latch, pivoted to the tongue to support the front end of the main frame and the cutting apparatus when desired.

The curved form of the drooping front end B^1 of the frame insures that this portion of the frame shall serve to sweep the grass which has been cut on the previous round in toward the center of the machine, out of the path of inner driving-wheel—that is, the wheel next to the uncut grass.

By turning the shank of the pin *p* in its seat in the lug p^2 the distance of the cutter-bar P from the vibrating lever N may be so adjusted as to maintain a proper working relation between the cutters and the guard-fingers, as will be readily understood without further explanation.

By arranging the ratchet-teeth and pawl near the rim of the driving-wheel, I almost entirely avoid the lost motion which is incident to all of the backing-ratchets which are located near the hub of the wheel or upon one of the gear-wheels.

Having so fully explained the construction and function of the various parts of my machine, no detailed description of its general operation need be given, as this will be fully comprehended by those who are familiar with mowers.

The tongue is provided at the rear end with a yoke or bracket, the downwardly-projecting ends of which are perforated, and are mounted upon lugs upon the arms which project rearward from the main frame. Both of these lugs are cast upon the same side of the arms. In the drawings they are shown upon the right-hand side of these arms. The ends of the tongue-strap or yoke are then slipped over the studs, the tongue being raised into a nearly-vertical position, in order that the clamp on the yoke may slip past the arms; and when the tongue is let down into a horizontal position, this clamp shuts inside of the arm, and thus confines the yoke upon the studs.

I disclaim anything shown or claimed in my Patent No. 111,633, dated February 7, 1871, for improvement in harvesters.

What I claim is—

1. The combination, with the driving-wheel A, provided with the ratchet-teeth *a*, of the arm C, rigidly connected with the axle, the pawl *c*, and tripping-link D, for withdrawing the pawl from the ratchet-teeth and permitting the wheel A to revolve without actuating the cutters, substantially as set forth.

2. The combination of the segments D^1 E^2 I^2, plates E I, and cam F with rock-shaft G, for operating pawl *c*, substantially as set forth.

3. The combination, with rock-shaft G, cam F, and perforated plate I, of the bearing *e*, of greater size than shaft G, whereby the segment-clamps E^2 I^2 may both be moved in opposite directions with a single cam, F, substantially as set forth.

4. The herein-described reciprocating-screw movement, consisting of the part K^2, each of whose faces is formed of two series of intersecting warped surfaces of the helicoid rigidly attached to the axle, and the reciprocating nut or casing acting as a cam-block, the inner faces of which are suited to the conformation of the part K^2, substantially as set forth.

5. In combination with the central part M of the nut, provided with trunnions *m*, the bifurcated lever N N, substantially as set forth.

6. In combination with the bifurcated lever N N, the adjustable standard O O^1, substantially as set forth.

7. In combination with the lever N and tubular standard O O^1, the pivot O^2, connected to and oscillating with the lever, substantially as set forth.

8. In combination with the lever N, provided with slots n^2 and the pivot O^2, the bearing-blocks o^2, substantially as set forth.

9. In combination with the bifurcated lever N N, composed of bars or plates of metal, the buffer-guard N′, constructed to operate substantially as set forth.

10. In combination with the vibrating lever N, the buffers n^3, secured in boxes or sockets cast upon the frame B B^1, substantially as set forth.

11. A cast-metal harvester-frame, provided with a drooping front portion, B^1, adapted to sweep the cut grass from the path of one of the supporting-wheels, substantially as set forth.

12. A cast-metal harvester-frame, provided with a grooved standard, *b*, in combination with the leading-wheel R, mounted upon the adjustable plate R′, which slides in the grooved standard *b*, substantially as set forth.

13. The cutter-frame S S^1 S^2, provided with slots to receive the finger-bar and the cutters, substantially as set forth.

14. In combination with the cutter-frame, the pivotal rock-shaft s^1 s^4 and a tilting-lever attached to and actuating the rock-shaft, substantially as set forth.

15. The tilting-lever having the part T^1 arranged below the main frame, the part T^2 arranged above the frame, and the toothed part T vibrating through the frame, substantially as set forth.

16. The combination, with the cutting apparatus, of the lifting crank-arm V^2, provided with the locking-spur *v*, the pivotal rock-shaft s^1 s^4, and the tilting-lever, substantially as set forth.

17. The combination, with the yoke or bracket attached to the rear end of the tongue, of the clamp which engages with the arm on the rear of the frame, substantially as set forth.

In testimony that I claim the foregoing as my own I affix my signature in presence of two witnesses.

WILLIAM FARR GOODWIN.

Witnesses:
E. C. WEAVER,
H. H. DOUBLEDAY.