(No Model.)

3 Sheets—Sheet 1.

J. W. JAMES.

MOWING MACHINE.

No. 445,894. Patented Feb. 3, 1891.

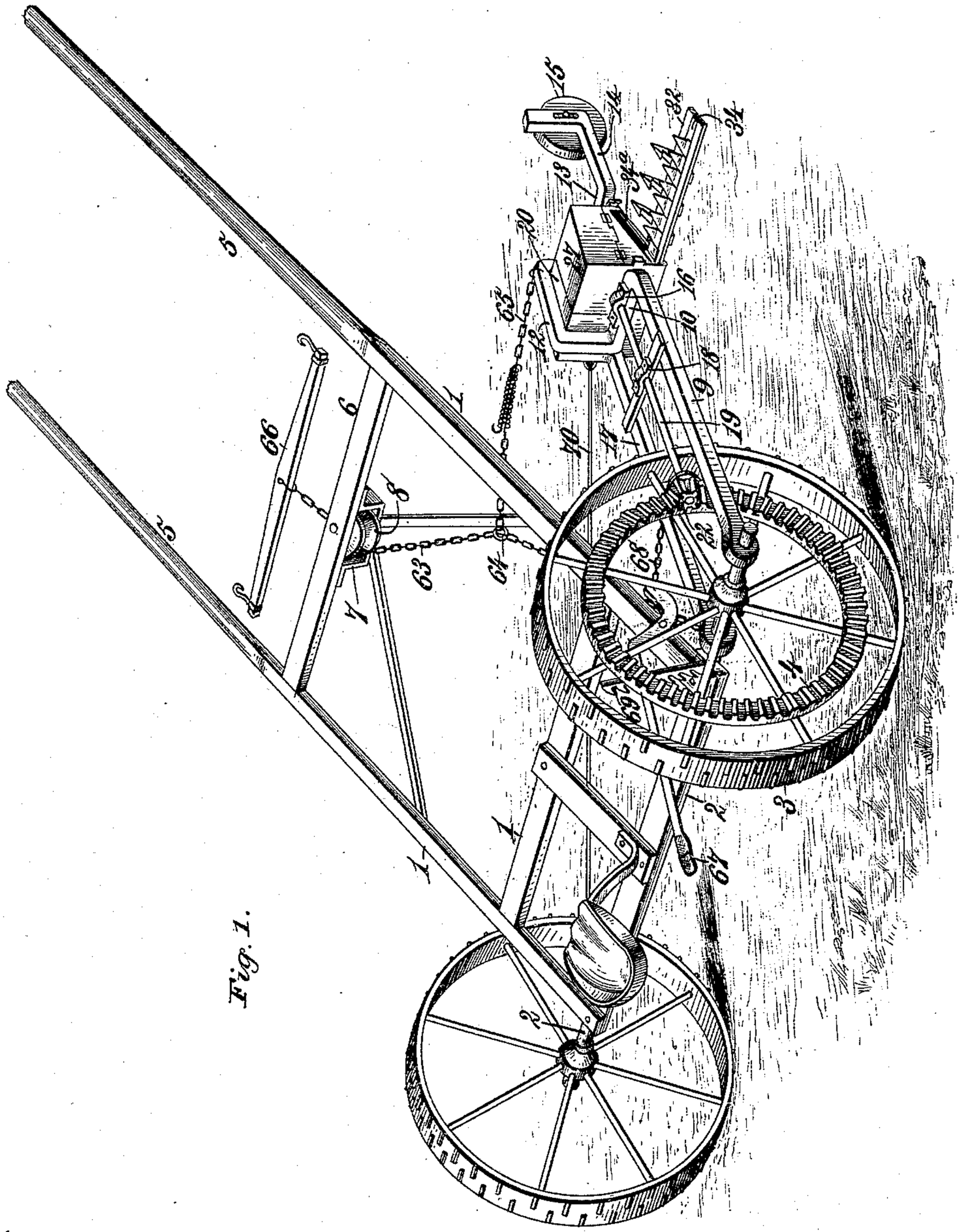

Fig. 1.

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(No Model.)

3 Sheets—Sheet 2.

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Fig. 2.

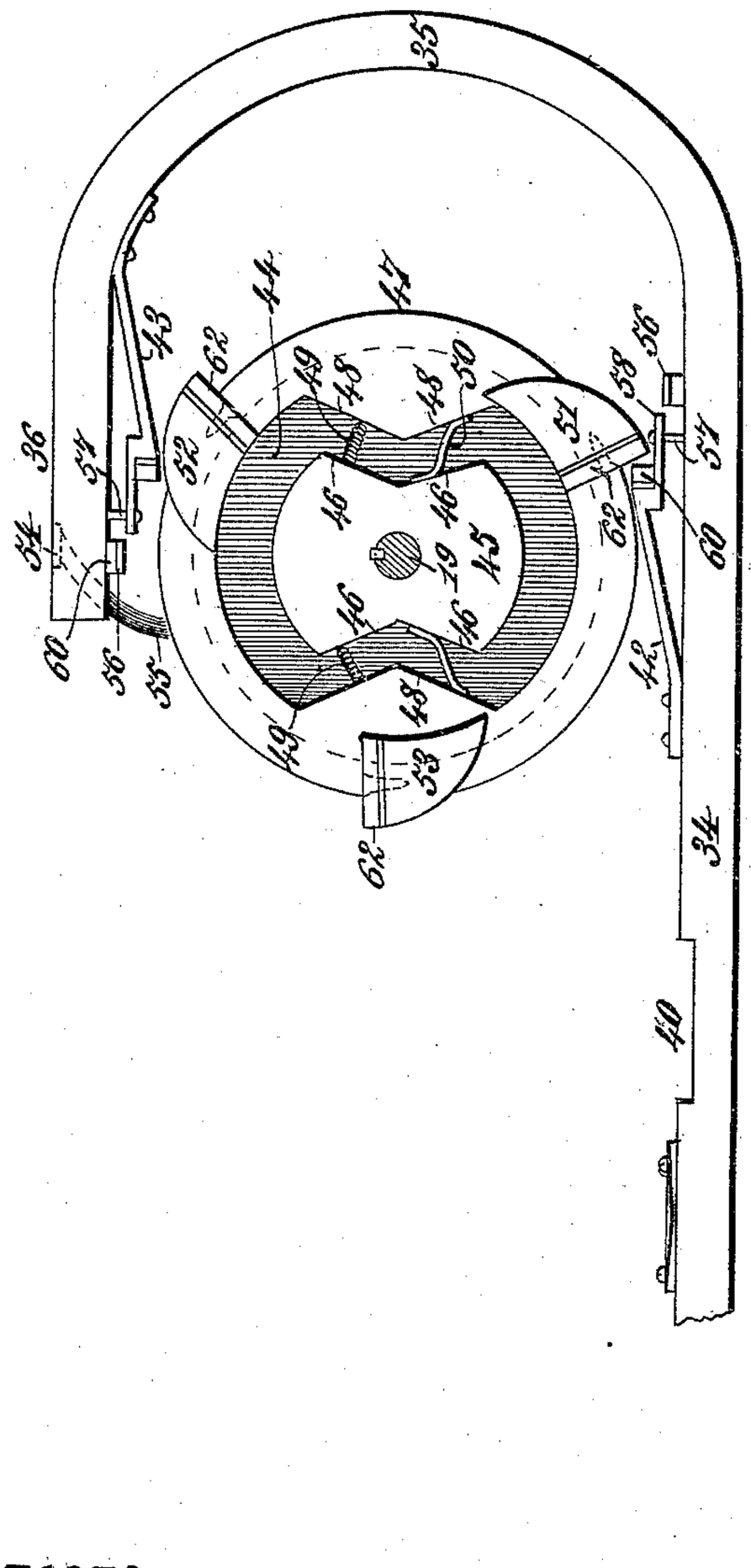
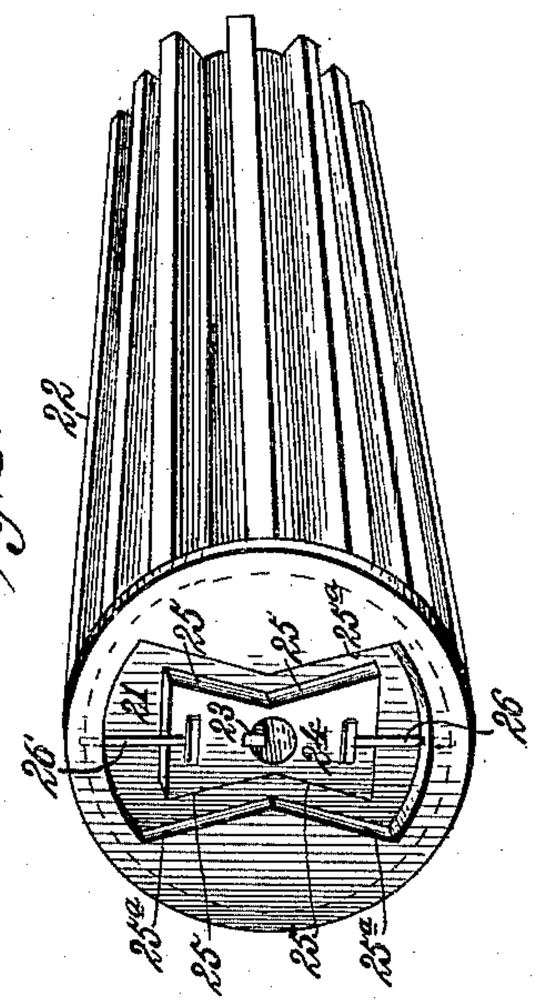


Fig. 3.



WITNESSES.

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(No Model.) 3 Sheets—Sheet 3.

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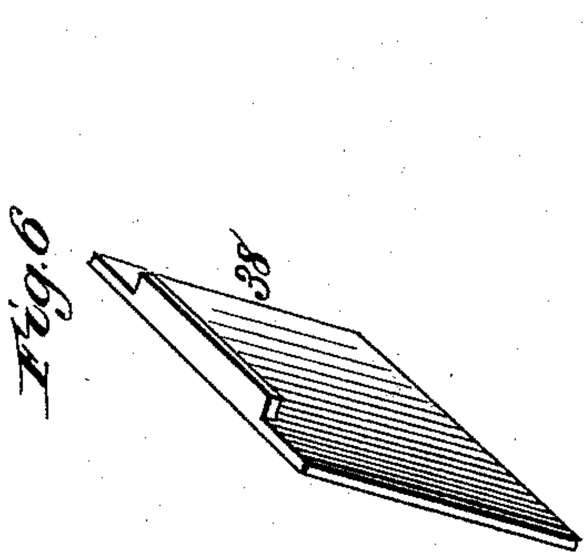

Fig. 6.

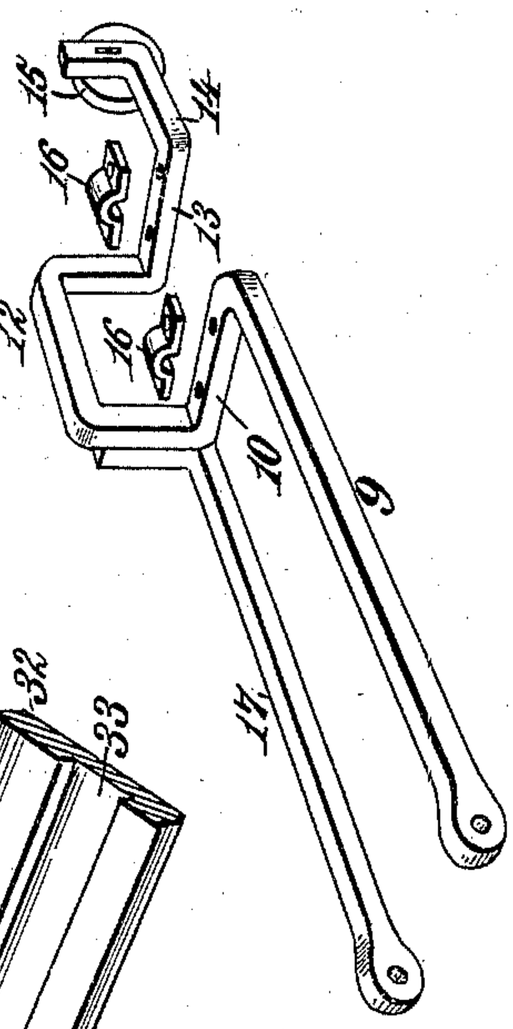

Fig. 8.

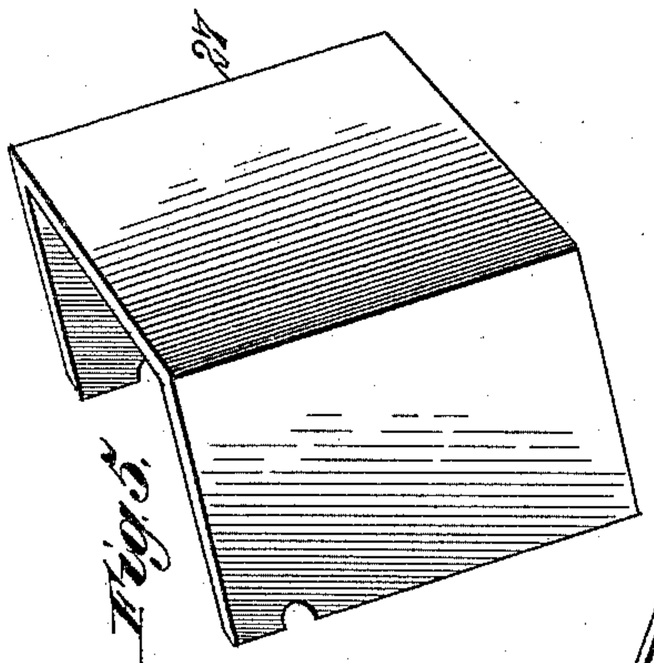

Fig. 5.

Fig. 4.

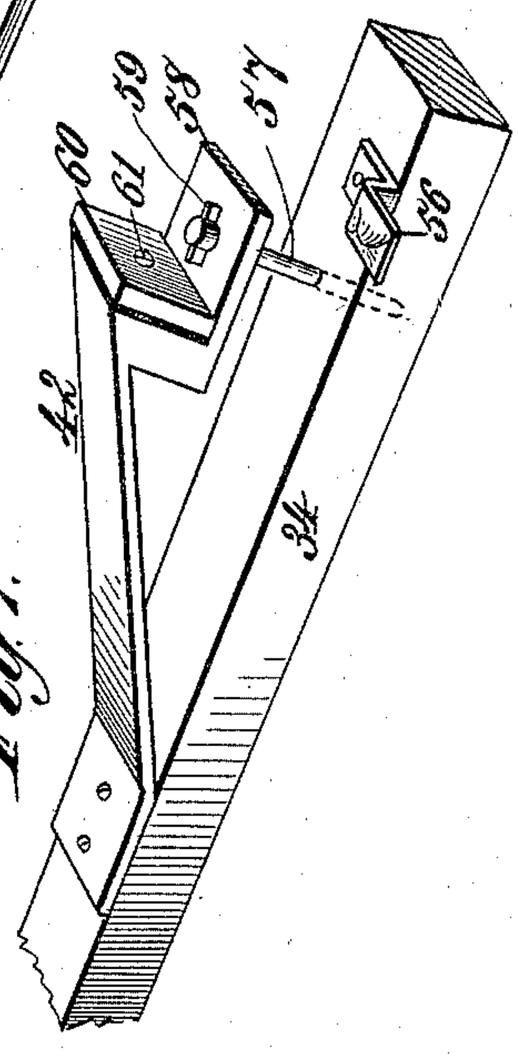

Fig. 7.

WITNESSES.

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UNITED STATES PATENT OFFICE.

JACK W. JAMES, OF CUBA, TENNESSEE.

MOWING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 445,894, dated February 3, 1891.

Application filed May 31, 1890. Serial No. 353,784. (No model.)

To all whom it may concern:

Be it known that I, JACK W. JAMES, a citizen of the United States, residing at Cuba, in the county of Shelby and State of Tennessee, have invented new and useful Improvements in Mowing-Machines, of which the following is a specification.

This invention relates to mowing-machines, and has for its objects to avoid the employment of ratchet-wheels and shifting-clutches in the driving mechanism for the cutter-bar; to provide novel means for reciprocating the cutter-bar without the employment of a pitman and crank connection with the drive-wheel; to provide novel cam mechanism for reciprocating the cutter-bar rectilinearly; to provide means whereby the power is elastically transmitted to the cutter-bar to avoid damage to the working parts; to provide novel, simple, and efficient mechanism for permitting back motion of the drive-wheel without actuating the cutter-bar, and to otherwise improve and simplify the cutter-driving mechanism for mowing-machines.

To accomplish all these objects, my invention involves the features of construction, the combination or arrangement of devices, and the principles of operation hereinafter described and claimed, reference being made to the accompanying drawings, in which—

Figure 1 is a perspective view of a one-horse mower embodying my invention. Fig. 2 is a detail side elevation on an enlarged scale, showing a portion of the cutter-bar and the actuating cam and cam-wheel therefor. Fig. 3 is a detail perspective view on an enlarged scale, showing the bevel-pinion which is operated by the main drive-wheel. Fig. 4 is a detail perspective view of the cutter box or head, showing a portion of the finger-bar. Fig. 5 is a detail perspective view of the movable section or lid of the cutter box or head. Fig. 6 is a detail perspective view of the cover-plate for the slotted end of the cutter box or head. Fig. 7 is a detail perspective view on an enlarged scale, showing a portion of the cutter-bar. Fig. 8 is a detail perspective view on a reduced scale, showing the rising and falling frame which carries the drive-shaft and cutter-box.

In order to enable those skilled in the art to make and use my invention, I will now describe the same in detail, referring to the drawings, wherein—

The numeral 1 indicates the main frame of a mowing-machine; 2, the axle; 3, the main drive-wheel having an annular gear 4, and 5 the thills connected with the main frame and to a cross-bar 6, provided with a hanger or bracket 7, in which is journaled a grooved roller 8. A rising and falling frame 9, loosely journaled on the axle, extends beside the drive-wheel and is bent laterally, as at 10, is arched, as at 12, and is rebent, as at 13, and thence extended forward, as at 14, to carry a vertically-adjustable wheel 15, which serves as a divider. The lateral bent portions of the frame are provided with bearings 16, and the arched portion 12 is braced by a bar 17, extending to and journaled on the axle at a point inside of the drive-wheel hub. A bearing 18 is arranged on the frame 9 and bar 17, and in the bearings 16 and 18 is arranged a drive-shaft 19, which extends at one end portion into the cutter box or head 20, and at its other end portion carries a bevel-pinion meshing into the annular gear on the drive-wheel. The bevel-pinion comprises an internal core 21, Fig. 3, on which the toothed part 22 is arranged as a shell, so that it can slightly turn on the core, and the core is rigidly secured to the drive-shaft 19 by a key 23 or otherwise. To one end of the core is rigidly attached a duplex cam-block 24, having two pairs of edges 25, converging toward the axis of the drive-shaft, and this cam-block has its opposite ends flexibly connected to the toothed shell 22 by springs 26 of suitable form, but preferably composed of spring-steel rods or bars. The end of the toothed shell which overlies the end of the core is cut away to form two pairs of edges 25^a, which also converge toward the drive-shaft 19. The object of this construction is to yieldingly or elastically transmit the power from the annular gear to the drive-shaft.

The cutter box or head 20 is composed of a metallic casing having a section 27 removed to constitute the opening and closing lid or cover of the box, and which, if desired, may be hinged by pivot-bearings 28 at the outer end of the box.

The box is provided with half-bearings 29, adapted to receive the drive-shaft 19, and with a movable slide 30 to open and close its inner end, this slide being supported by guide-flanges, as at 31. The half-bearings 29ª, Fig. 4, are cast separate and bolted or otherwise secured to the bearings 29 to retain the cutter-box on the drive-shaft.

The finger-bar 32 is rigidly attached to the bottom wall of the box and contains a rectilinear groove or guideway 33 to receive the reciprocating cutter-bar 34. (Shown in Fig. 2.) The outer end of the box is slotted, as at 34ª, for the movement of the cutter-bar and its cutters, and the cutter-bar at its inner end is formed or otherwise provided with an arch or yoke 35, that stands in a vertical plane and at its top portion 36 is adapted to slide in a guideway or groove 37, provided at the top portion of the cutter-box.

The cutter-box is journaled on the drive-shaft through the medium of the bearings 29 and 29ª, as before stated, and consequently the box is supported by and can swing in a vertical plane on the drive-shaft as a center, thus permitting the finger-bar and cutter-bar to be turned to an approximately perpendicular position.

A cover-plate 38, Fig. 6, is adapted to slide in the guides 39 at the outer end of the cutter-box, such cover-plate having its lower edge adapted to enter a longitudinal recess 40 in the cutter-bar and to engage the notches 41 in the finger-bar, whereby the cover-plate closes the slotted end of the cutter-box to prevent the entrance of trash.

The cutter-bar is provided on its horizontal base portion with a spring-tappet 42, and the overhanging portion of the arch or yoke 45 is provided with a similar but reversely-arranged spring-tappet 43, and between these tappets is placed the actuating cam mechanism for reciprocating the cutter-bar by alternate impulses imparted to the tappets. The cam mechanism will be understood by reference to Fig. 2, where the numeral 44 indicates a disk rigidly secured to that part of the drive-shaft 19 which is inside of the cutter-box. The disk is provided with a rigidly-attached cam-block 45, having two pairs of edges 46 converging toward the drive-shaft, and on the disk is loosely arranged as a shell the cam-wheel 47, which is internally cut away to form two pairs of edges 48, which also converge toward the drive-shaft. The cam-wheel 47 is flexibly connected with the cam-block 45 by means of two coiled springs 49 or by two spring-steel rods or bars 50. I have exhibited the two forms of spring, but in practice only one or the other form will be used. The cam-wheel is provided at its periphery with three cam-teeth 51, 52, and 53, having square acting faces to strike the spring-tappets 42 and 43.

In operation the annular gear on the forward motion of the drive-wheel turns the toothed shell 22 on the core 21 against the tension of the springs 26 until two of the cam-block edges 25 diagonally opposite each other strike the corresponding edges 25ª of the toothed shell, when the core and shell rotate in unison and actuate the drive-shaft, which latter turns the disk 44 and cam-block 45 against the tension of the springs 49 or 50 until two of the edges 46 diagonally opposite each other strike corresponding edges 48 of the cam-wheel, when the disk and wheel rotate in unison. As shown in Fig. 2, the cam-tooth 51 is about striking the tappet 42 while the cam-tooth 52 has passed the tappet 43, and consequently the rotation of the cam-wheel causes the cam-tooth 51 to strike the tappet 42, to impart the outstroke to the cutter-bar 34. At about the time the cam-tooth 51 leaves the tappet 42 the cam-tooth 53 is in position to strike the tappet 43 to impart the instroke to the cutter-bar. When this occurs, the cam-tooth 52 will be in position to strike the tappet 42 for a repetition of the operation. By the yielding or spring connection of the toothed shell with the cam-block on the core the power is elastically transmitted to the drive-shaft, and by the yielding or spring connection of the cam-wheel with the cam-block on the disk the power of the drive-shaft is elastically transmitted to the cutter-bar, thereby avoiding shocks and preventing damage to the working parts. If the drive-wheel be turned backward, the cam-surfaces of the cam-teeth 51, 52, and 53 will glide past the tappets, the latter yielding by reason of their spring or elastic construction. It will be obvious, therefore, that the back motion of the drive-wheel will not reciprocate the cutter-bar, and I am thus enabled to dispense with ratchets, pawls, and shifting-clutches.

To lubricate the cam-teeth, I provide the overhanging part of the arch or yoke 36 with an oil-receptacle 54 and a brush or other pendent flexible device 55, which supplies oil to the cam-teeth in the operation of the machine.

To render the tappets inoperative during the transportation of the mower or for other purposes, I provide pivoted latches 56 to engage and hold the tappets when the latter are pressed out of the path of the cam-teeth. The motion of the spring-tappets toward the cam-wheel is limited by stop-pins 57 engaged with the cutter-bar and the arch or yoke. These pins pass through orifices in lips 58 on the spring-tappets, and are provided with heads 59, against which the lips abut in their spring movement of the tappets toward the cam-wheel.

To compensate for wear, I construct the acting faces of the tappets in the form of wear-plates 60, which are detachably secured by screws 61 or otherwise, and likewise I apply wear-plates 62 to form the acting faces of the cam-teeth, which are also detachably secured by screws or otherwise. These wear-plates when unduly worn at one point can be readily reversed to bring a fresh wearing-surface into

action. For this purpose the wear-plates are made of rectangular or square-shaped pieces of steel.

In position for moving, the top portion of the cutter-box at its inner end bears against the arched part 12 of the swinging frame 9, and hence such arch acts as an abutment to hold the finger-bar horizontal and parallel with the axle of the drive-wheel. That the cutter-box and finger-bar may set flat on the ground when the swinging frame is lowered, the bottom of the box is inclined.

In the type of mower illustrated the power is obtained from the main drive-wheel, and the draft should be direct from the center of such wheel for propelling the mower, and to accomplish this I attach a draft-chain 63 to the axle near the hub of the wheel. This chain extends through a loop or eye 64, and thence passes round the roller 8 to the whiffletree 66.

To counteract the backward strain on the finger-bar, I provide a spring chain connection 65 between the arched part 12 of the swinging frame 9 and the loop or eye 64, through which the draft-chain passes. The swinging frame is raised and lowered by a foot-lever 67, pivoted to the main frame and having a chain or other connection 68 with the brace-bar 17. A ratchet-bar 69, secured to the axle 2, serves to engage and hold the foot-lever in its adjusted position, the arrangement being such that the weight of the driver is utilized in raising the finger-bar. The swinging frame is also braced by a tie-rod 70, extending from the arch 12 to a point on the axle near the end opposite the drive-wheel.

Having thus described my invention, what I claim is—

1. In a mowing-machine, the combination, with a drive-wheel, a drive-shaft operated thereby, and a swinging cutter-box rising and falling in a vertical plane, of a cutter-bar guided in the cutter-box and having two opposite reversely-arranged yielding tappets projecting toward each other, and a single cam-wheel located in the cutter-box, rotated by the drive-shaft, and having cam-teeth which alternately act on the opposite reversely-arranged tappets to reciprocate the cutter-bar, substantially as described.

2. In a mowing-machine, the combination, with a drive-wheel, a drive-shaft operated thereby, and a swinging cutter-box rising and falling in a vertical plane, of a single cam-wheel located in the cutter-box and having a series of cam-teeth, and a cutter-bar moving rectilinearly in the cutter-box, having a tappet and provided at its inner end with an upwardly-projecting arch or yoke extending round and overhanging the cam-wheel, moving in a guide in the top portion of the cutter-box, and carrying a pendent tappet arranged reversely to the tappet on the cutter-bar, substantially as described.

3. In a mowing-machine, the combination, with a drive-wheel, a drive-shaft, and a cutter-box, of a cutter-bar having spring yielding tappets and a cam-wheel rotated by the drive-shaft in the cutter-box and having cam-teeth which alternately act on the tappets to reciprocate the cutter-bar in the forward motion of the drive-wheel and pass by the tappets without reciprocating the cutter-bar in the backward motion of the drive-wheel, substantially as described.

4. In a mowing-machine, the combination, with a drive-wheel, a drive-shaft, and a cutter-box, of a cutter-bar having oppositely-arranged tappets provided with reversible wear-plates, and a cam-wheel rotated by the drive-shaft in the cutter-box and having cam-teeth provided with reversible wear-plates, substantially as described.

5. In a mowing-machine, the combination, with a drive-wheel, a drive-shaft, and a cutter-box, of a cutter-bar having spring-tappets, a latch for engaging and holding each tappet in an inoperative position, and cam mechanism actuated by the drive-shaft for alternately acting on the tappets when the latter are disengaged from the latches, substantially as described.

6. In a mowing-machine, the combination, with a cutter-bar having spring yielding tappets, of a drive-shaft and a cam-wheel yieldingly connected with the shaft and having cam-teeth for reciprocating the cutter-bar, substantially as described.

7. In a mowing-machine, the combination, with a cutter-bar having spring yielding tappets, of a cam-wheel having cam-teeth, a drive-shaft for rotating the cam-wheel, a drive-wheel, and a pinion rotated by the drive-wheel and yieldingly connected with the drive-shaft, substantially as described.

8. In a mowing-machine, the combination of the axle, the drive-wheel, the drive-shaft, the swinging frame journaled on the axle, a cutter-box carried by the swinging frame and having an attached finger-bar, a draft-chain connected with the axle, a spring connection between the swinging frame and draft-chain, a cutter-bar, and means for operating the cutter-bar from the drive-shaft, substantially as described.

9. In a mowing-machine, the combination, with the axle, the main drive-wheel thereon, and the cutter-box-carrying frame journaled on the axle outside the wheel and having a brace-bar journaled on the axle inside the wheel, of the ratchet bar rigidly secured to the axle, and the foot-lever pivoted to the main frame in advance of the ratchet-bar and connected with the brace-bar, substantially as described.

In testimony whereof I have affixed my signature in presence of two witnesses.

JACK W. JAMES.

Witnesses:
N. F. HARRISON,
A. G. BOOTH.