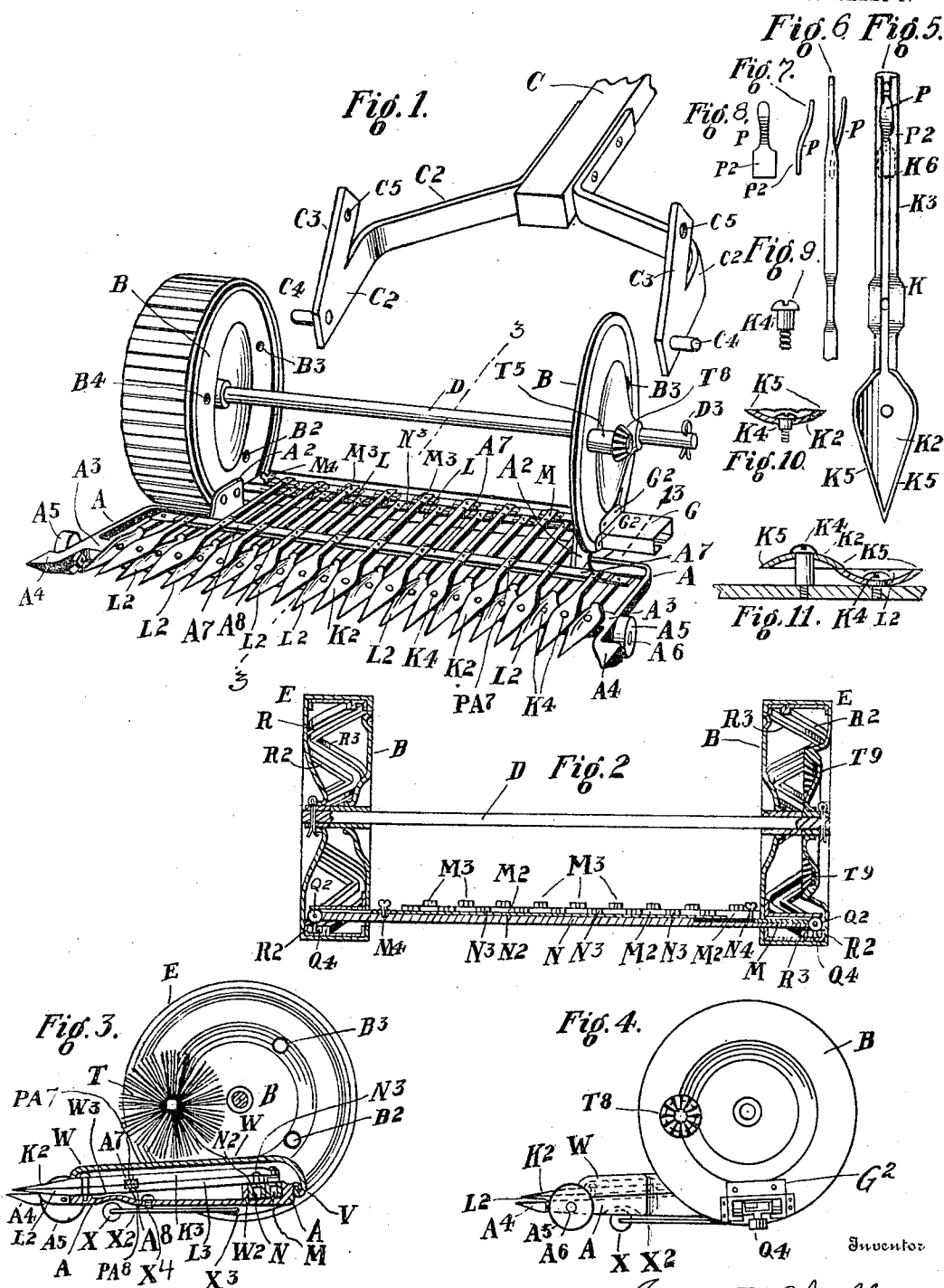


J. H. AUBLE.
LAWN MOWER.
APPLICATION FILED DEC. 28, 1903.

2 SHEETS—SHEET 1.



Witnesses
Samuel A. West.
A. Smith.

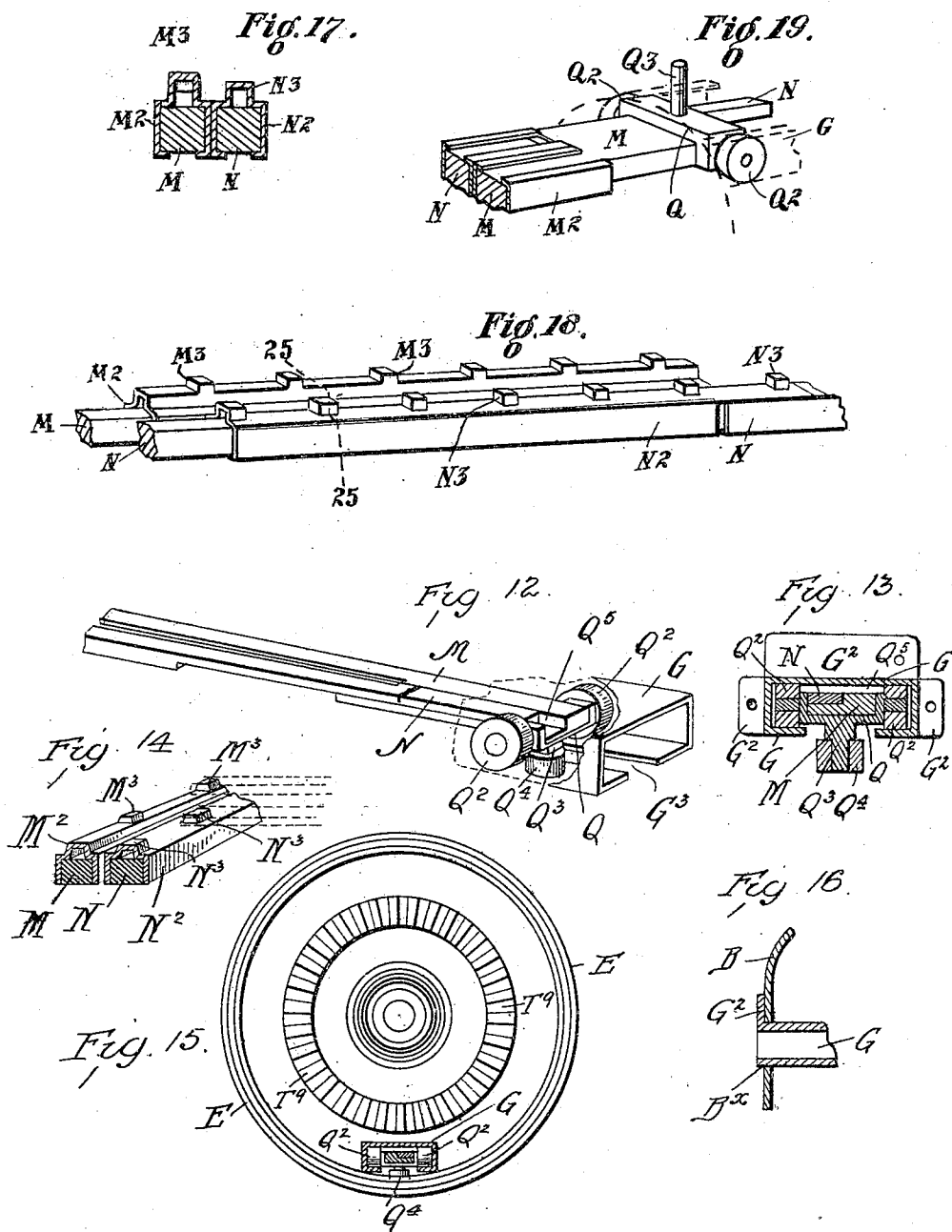
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PATENTED DEC. 19, 1905.

2 SHEETS—SHEET 2.



WITNESSES

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UNITED STATES PATENT OFFICE.

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LAWN-MOWER.

No. 807,897.

Specification of Letters Patent.

Patented Dec. 19, 1905.

Application filed December 28, 1903. Serial No. 186,803.

To all whom it may concern:

Be it known that I, JAMES H. AUBLE, a citizen of the United States, and a resident of the city of Cincinnati, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Lawn-Mowers, of which the following is a specification.

The several features of my invention and the various advantages resulting from their use, conjointly or otherwise, will be apparent from the following description and claims.

In the accompanying drawings, making a part of this application, and in which similar letters of reference indicate corresponding parts, Figure 1 is a perspective view illustrating the greater part of a machine embodying my invention. In this view one of the driving-wheels is omitted, and the upper cover, which protects the knives and their connections, is absent. The brush is also absent. The handle is shown detached from the remainder of the machine. The upper part of the shank of the handle is broken off to economize space. Fig. 2 represents a vertical section of the machine, taken in a plane passing through the center of the driving-wheels and their axle, the cover of the cutting mechanism and the shanks of the knives being omitted. Fig. 3 represents a vertical transverse section of the machine, taken on line 3 3 of Fig. 1, the parts beyond the section being shown in elevation. The handle is not shown in this view. Fig. 4 is an elevation of that end of the machine which is on the right hand in Fig. 1. In this view the adjacent driving-wheel has been removed and the disk which fits the inside of said wheel is shown in elevation. Fig. 5 is an elevation of the under side of one of the upper knives and of the means for keeping the knife-blade against the adjacent lower blade. Fig. 6 is an edge elevation of the knife-shank of one of the upper knives and of the spring which contributes to keep the upper blade against the lower blade. Fig. 7 is an edge view of this spring. Fig. 8 is a front view of this spring. Fig. 9 is an elevation of the preferred form of screw for holding the blade of a given knife to the frame. Fig. 10 shows a transverse section of a knife-blade, showing the manner in which a blade is held to the frame and the screw that respectively holds the knife thereto. Fig. 11 shows in section the mode in which the upper and lower

knife-blades lap each other. Fig. 12 shows in perspective parts of the reciprocating rods whereby the channel-bars which operate the knives are respectively reciprocated and a part of the guideway or bearing-box which cooperates to guide these reciprocating rods. Fig. 13 is a transverse vertical section of the parts shown in Fig. 12 and of the corresponding parts shown in Fig. 1, the section being taken in the plane of the dotted line 13 of Fig. 1 and the flanges of the bearing-box being shown in elevation. Fig. 14 shows in perspective parts of the reciprocating rods and of the channel-bars which they respectively reciprocate. Fig. 15 shows an elevation of a part of either one of the driving-wheels, illustrating the gearing on the wheel for operating the pinion of the brush. Fig. 16 is a vertical central section of a portion of one of the disks and of the adjacent guideway for the rods which operate the knives. The purpose of the figure is to show the preferred mode of uniting the guideway to the disk. Fig. 17 illustrates in cross-section the reciprocating rods and their respective channel-bars and the relative heights of the channel-bars. Said section is taken in the plane of the dotted line 25 25 of Fig. 18. Fig. 18 is a view in perspective of the said channel-bars and of a portion of the said rods. Fig. 19 is a view in perspective of the bottom portions of the channel-bars and the rods and of the bottom of the adjacent portion of the guideway or bearing-box.

The figures are not all upon the same scale; but the scale of the figures is varied to the better fulfil the purposes of illustration.

In the description of the figures the groove is referred to as if the driving-wheel was lying on its side.

A indicates the frame that contributes to support the knives. The flanges A^2 A^2 of this frame are respectively connected to the disks B B. and thus support the frame A. This frame A carries a cross-bar A^3 , which supports the upper and lower tier of knife-blades. The frame at the front is supported by suitable rollers or wheels A^5 , pivoted at A^5 to the frame. The frame A in front of each roller preferably carries a wedge-shaped guard A^4 , which latter operates to keep the grass, &c., away from the roller A^5 behind it and prevents the latter from being clogged; but a special advantage is that this guard A^4 can be run

close to trees or fences and will bring the grass in these places into the path of the knives to be cut. Thus little or no fringe of grass will be left at such places. At the rear there are
 5 two reciprocating rods—viz., rod M and rod N. Rod M carries a channel-bar M², and the latter carries the lugs M³. Rod M would slip within the channel-bar M²; but a set-screw M⁴ is provided, whereby channel-bar M² is com-
 10 pelled to move with rod M until this screw is intentionally loosened. The rear end of the shank of each of the upper knives K is located between two adjacent lugs M³.

The blade K² of each knife K is pivoted to
 15 the cross-bar A³ by a pivot, preferably a screw K⁴, whose shank above the screw-thread is the pivot-bearing. The head of the screw holds the blade down and prevents it from riding up and off the pivot. Thus when the rod M
 20 moves back and forth it will reciprocate the channel-bar M² and will move the rear ends of the knives K back and forth, and thus cause the knives to oscillate on their respective pivots K⁴. Thus the blades K² of these
 25 knives will oscillate edgewise.

Rod N carries a channel-bar N², and the latter has the lugs N³. Rod N is prevented from slipping within channel-bar N² by means of a set-screw N⁴. Thus the rod N and the chan-
 30 nel-bar N² may be made to reciprocate as one.

The rear end of each of the shanks of the lower row of knives L is located between two adjacent lugs N³. The blade L² of each knife L is pivoted to the cross-bar A³ by a pivot,
 35 preferably such as a screw K⁴, whose shank above the screw-thread is the pivot-bearing. The head of the screw prevents the blade L² from coming off the pivot. The shanks of screws K⁴ when used with blades K² are longer
 40 than when used with blades L². Thus when the channel-bar N² and the rod N are reciprocated the rear ends of the knives L will be moved likewise, and the knives L will be caused to oscillate on their pivots K⁴. There-
 45 by the blades L² of the knives L will oscillate edgewise.

My preferred mode of locating the upper knives relatively to the lower ones is as shown and consists in locating them not one directly
 50 over the other in pairs, substantially as in a pair of shears, but somewhat apart, so that when the machine is at mid-stroke the points of the upper blades shall be at a distance from the points of the lower blades. The rear swell
 55 of each knife-blade at all times laps and engages the rear swell of the blades of the adjacent knives, substantially as shown in Fig. 1. Such a construction assists in preventing
 60 the blades from becoming rusted after being taken out of the wet grass, because in the movement of the machine they readily wipe themselves, and there is but little surface of these knives that does at any time remain to-
 65 gether to hold moisture and result in rust. In connection with the remarks relative to the

location and operation of the knives see especially Figs. 1, 3, and 11.

In order to cause the blades K² of the upper knives to press continually against the blades L² of the lower knives and to make a proper
 70 shearing cut, I provide a spring for accomplishing this object. A suitable spring P is shown in Figs. 5 to 7, inclusive. This spring P rests on the channel-bar M² and tends to
 75 elevate the rear end of a knife K, so far as permitted to do so, for the pivot K⁴ holds the knife there and operates as the fulcrum, of which the knife-blade and its handle (or shank)
 80 are the lever. Thus each upper knife-blade is kept close to the lower blades opposite to it—that is, kept against such part of these lower blades as can come into contact with it. There is preferably one spring for each upper
 knife K.

To conveniently enable the upper knives to
 85 work in a desired plane above the plane in which the lower knives operate, the channel-bar M² is elevated relatively to the channel-bar N².

The construction of the knife is also a fea-
 90 ture of my invention. This feature consists in making the knife of sheet metal and of a form substantially as follows: A sheet-metal blank cut to the desired form is struck up and
 95 bent into the shape shown in the drawings. (See more particularly Figs. 5, 6, 10, and 11.) In this construction the handle is made more or less tubular by having its side edges bent
 100 at right angles to the rest of the shank and then bent inward, substantially as shown, and the blade is bent into a concave form, the edges of the concave being the cutting edges
 105 K⁵ K⁵ of the blade. Such a knife is more readily kept sharp than is a solid one. As the cutting edges wear, they obviously remain sharp. Thus much of that extraneous
 110 sharpening, which consists in removing the knives from the machine and sharpening them and replacing them, is obviated. There is no central portion between the cutting edges
 115 K⁵ K⁵ to hump up and remain elevated while the edges wear away and which elevated portion when present, as is usually the case, must be
 120 reduced to enable the cutting edges to work effectively. It is to be understood that the upper and lower knives are preferably made
 125 alike. The hollow shank or handle K³ of the knife affords a convenient chamber or space wherein the base P² of the spring P can be located and fixed. The slot K⁶ of the shank
 130 allows the spring to come through from its base and properly project substantially as shown. These knives K and L are about one-half as heavy as the solid ones. The power
 135 required to move them back and forth is much less than to reciprocate solid ones. Thus in a half-day's work with a mower there is a great economy of power.

In order to utilize the entire width of the machine, there should be knives in front of
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the driving-wheels. To this end upper and lower knives, as shown, are there located. The shanks of these knives are necessarily short and it would not be very practicable to
 5 respectively connect them to the reciprocating sleeves aforementioned; but these knives should be operated and should operate in unison with the other knives. I provide two bars A^7 and A^8 . The lower bar A^8 is connected to each of the knives of the lower tier by a pivot PA^8 , and each of the knives of the upper tier is connected to the upper bar A^7 by a pivot PA^7 . When the knives of the upper tier, that are connected to the channel-bar M^2 , reciprocate, these knives move the bar A^7 , and the latter moves the end upper knives connected thereto. When the knives of the lower tier, which connect with the channel-bar N^2 , reciprocate, these knives move the bar A^8 , and the latter moves the end lower knives connected to this bar.

The upper end knives are each provided with a spring P , located between the pivot PA^7 and the pivot K^4 . The free end of this spring lies on the bar A^7 . The function of this spring with each end knife is the same as with the upper knives first described.

The end knives are preferably made of sheet metal on the plan of the other knives.

It is to be understood that a shield W extends from the rear portion of the machine and over the knife-shanks and over the blades as far as to a line just in front of the pivots K^4 . This shield is pivoted at the rear of the machine at V . Thus it can at any time be raised and thrown back as far as the axle will permit and access be had to the knives and the mechanism for reciprocating them. The knife mechanism below is also protected by an under shield W^2 . The latter shield is preferably formed in one with the main parts A^3 , &c., of the frame, the whole being stamped out of a sheet of metal.

I provide a long roller X , located near the front of the machine. This roller is to run on the ground and is to support the front of the machine, the end rollers A^5 A^5 being preferably only used when a rut or a narrow elevation is present where such roller is. This long roller X is held by pivots, one at each end, and each pivot is preferably connected with an adjacent rod X^2 , which latter extends backward and pivots in the frame at X^3 . To accommodate this roller and keep the knives down close to the ground, I form an arch or concave W^3 in the shield W^2 , into which the upper part of the roller X fits. Thus the cutting mechanism can be low and the shield W^2 will not come into contact with the roller X .
 5 The rods X^2 may bear directly against the bottom of the shield W^2 , substantially as shown, and thus the front portion of the machine is supported; but I prefer to have each rod X^2 rest against a set-screw X^4 , screwed into the frame. I can thereby adjust the rod,

and consequently the roller X , nearer to or farther from the frame A , and hence I am able to set the cutting-knives nearer to or farther from the ground. I am thus enabled to regulate the height of the cut on the
 70 grass, &c.

The construction of the preferred means for operating these knives is as follows: I provide guideways G , one at each wheel, and I connect the same to the adjacent disk B in a
 75 suitable manner. Various ways of securing the guideways G may be employed. Thus in Figs. 1 and 4 I have shown the guideways G provided with flanges G^2 , and these flanges of a given guideway are shown bolted to the adjacent disk; but a preferred mode of uniting these flanges to the disk is illustrated in Fig. 16 and is as follows: I provide an opening B^x in the lower part of each disk B . I pass the flanges G^2 of the guideway G before bending
 80 through said opening and then bend said flanges at right angles, so that they will lie against the inner side of the disk B . I then bolt the flanges to the disk, as in the former construction. In each of these guideways G
 85 there moves a carriage Q , provided at each side with a wheel Q^2 , pivoted to the carriage. At the bottom of this carriage is a stud Q^3 , extending down through a slot G^3 of the guideway G and provided with a roller or
 90 wheel Q^4 , whose plane of revolution is at right angles to the plane of revolution of the driving-wheels. To one of the carriages Q under one driving-wheel the end portion of the rod M is connected, and to the other carriage Q
 95 under the other driving-wheel the adjacent end portion of the rod N is connected. Thus when one carriage is moved by the adjacent driving-wheel the rod M is reciprocated, and when the other carriage is moved by its driving-wheel the rod N is reciprocated. The carriage Q is constructed to have a guideway Q^5 and in this the end part of the other knife-moving rod M or N , as the case may be,
 100 slides alongside of its companion rod. This construction is fully illustrated in Figs. 12 and 13. Thus each carriage serves also as a guideway, and the two rods M and N , with their respective channel-bars M^2 and N^2 , carrying their respective sets of knives, move
 105 back and forth by each other at all times near each other and in parallel lines. The means for operating these rods through the intermediate agency of the roller or stud Q^4 are as follows: Each driving-wheel contains a zig-zag or spiral guideway R , each having a side R^2 and an opposite side R^3 . The roller Q^4 of one carriage is in one of these guideways, and the roller Q^4 of the other carriage is in the other of these guideways. As the driving-wheels revolve the rollers Q^4 are caused to reciprocate and move their respective carriages Q , which latter in turn move their respective rods and oscillate the knives thereof. Thus the upper knives operate with the lower
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knives to make a shearing cut after the manner of a pair of scissor-blades; but with this additional difference that the blades are double-edged and cut at one side and then at the other in connection with the blades of the adjacent knives.

T is a brush for sweeping the grass from the machine. One end of this brush may be held in any suitable manner by one of the disks B—as, for instance, by being placed in a hole B⁴. The other end of the brush enters the sleeve T⁵ in the other disk B and has a gear T⁸ connected therewith, which is adapted to engage with gear T⁹, fixed to the driving-wheel E. Thus the wheel E will drive the brush T; but as this forms no part of my invention it will not be further described.

When the mowing-machine is to be run from one place to another and no cutting is to be done, it is desirable that the knives do not move and it is desirable that the knives be elevated out of the way.

The knives are readily put out of action by unscrewing the set-screws M⁴ and N⁴. This disengages the channel-bars M² and N² from their respective rods M and N. These rods will continue to reciprocate as the driving-wheels revolve; but the channel-bars and the knives they carry will not reciprocate.

The preferred construction of the handle and the mode of connecting it to the remainder of the machine and of using it is as follows: Each arm C has two portions C² C³, preferably made in one. Each arm near or at the junction of these portions C² C³ is provided with a stud C⁴. Each of the portions C³ at its free end is provided with a hole C⁵. The axle D passes through the holes C⁵ C⁵ of the arms. When the machine is in position to cut the grass, the studs C⁴ are respectively in the adjacent holes B². When it is desired to elevate the knives, the studs C⁴ are withdrawn from holes B² and inserted into their respective holes B³ B³.

Instead of the holes B² and B³ other suitable detents may be employed in connection with studs C⁴ or equivalent detents on the handle.

It will be understood that the wheels E rotate with the axle, while the disks B are adapted to rotate around the axle; but in the cutting position of the machine these disks are stationary.

My improvements are applicable not only to mowing-machines, but also to weed-cutters, to harvesting-machines, and to the like, and I claim the application of the same broadly wherever applicable.

Wherever in the specification and the claims the term "mowing-machine" or the like is used, I desire it to be understood as covering machines and devices for any and all of the purposes mentioned in the preceding paragraph.

What I claim as new and of my invention, and desire to secure by Letters Patent, is—

1. In a mowing-machine, a knife and its shank made of sheet metal, the knife and the shank being concave at their mid-portion, and the edges of the shank being further bent down and then inward toward each other, substantially as and for the purposes specified.

2. In a mowing-machine, a knife and its shank made of sheet metal, the knife being concave at its mid-portion, and the shank being at the edges bent over and around, forming a slotted tube, substantially as and for the purposes specified.

3. In a mowing-machine, a knife and its shank made of sheet metal, the metal at the shank bent around to form a tubular structure, having a slot left therein at the back, in combination with a spring, having an enlarged base located within the shank, and an elastic free portion, whose shank passes through said slot, substantially as and for the purposes specified.

4. In a mowing-machine, a frame, upper and lower tiers of knives, pivots K⁴, pivoting the knives to the frame, a channel-bar M² having lugs M³, a channel-bar N² having lugs N³, the channel-bar M² being higher than channel-bar N², the shanks of the upper tier of knives located on channel-bar M² between the lugs M³, and the shanks of the lower tier of knives located on the channel-bar N², between the lugs N³, and means for elastically keeping the upper knives in contact with the lower ones, substantially as and for the purposes specified.

5. In a mowing-machine, a frame, upper and lower tiers of knives, pivots K⁴, pivoting the knives to the frame, a channel-bar M² having lugs M³, a channel-bar N² having lugs N³, the channel-bar M² being higher than channel-bar N², the shanks of the upper tier of knives located on the channel-bar M² between the lugs M³, and the shanks of the lower tier of knives located on the channel-bar N², between the lugs N³, and springs respectively fastened to the upper tier of knives, and pressing on the channel-bar M² and pushing the shanks upward, and the knives downward against the lower knives, substantially as and for the purposes specified.

6. In a mowing-machine, bar A⁷, bar A⁸, the upper and lower tiers of knives provided with shanks, the knives themselves pivoted to the frame, the outlying or end knives having short shanks, all of the shanks being pivoted, the upper tier to the bar A⁷ and the lower tier to the bar A⁸, and mechanism for imparting to the long shanks a vibratory movement, for operating all the knives, substantially as and for the purposes specified.

7. In a mowing-machine, a cross-bar A³ the upper and lower tiers of knives, having shanks, each knife being pivoted to the cross-bar A³, and the channel-bars M² and N², each respectively oscillating the shanks of the knives of its respective tier, and the rods M and N, and means for respectively reciprocating

ing the rods M and N, and means for securing, at will, the rod M to the channel-bar M² and the rod N to the channel-bar N², substantially as and for the purposes specified.

5 8. In a mowing-machine, a cross-bar A³ the upper and lower tiers of knives, having shanks, each knife being pivoted to the cross-bar A³, and the channel-bars M² and N², each respectively oscillating the shanks of the

knives of its respective tier, and the rods M¹⁰ and N, and the set-screws M⁴ and N⁴, respectively securing the rods M and N to their respective channel-bars M² and N², substantially as and for the purposes specified.

JAMES H. AUBLE.

Attest:

SAMUEL A. WEST,
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