J. H. AUBLE.

LAWN MOWER.

APPLICATION FILED MAY 11, 1904.

962,407.

Patented June 28, 1910.

2 SHEETS—SHEET 1.

Fig. 1.

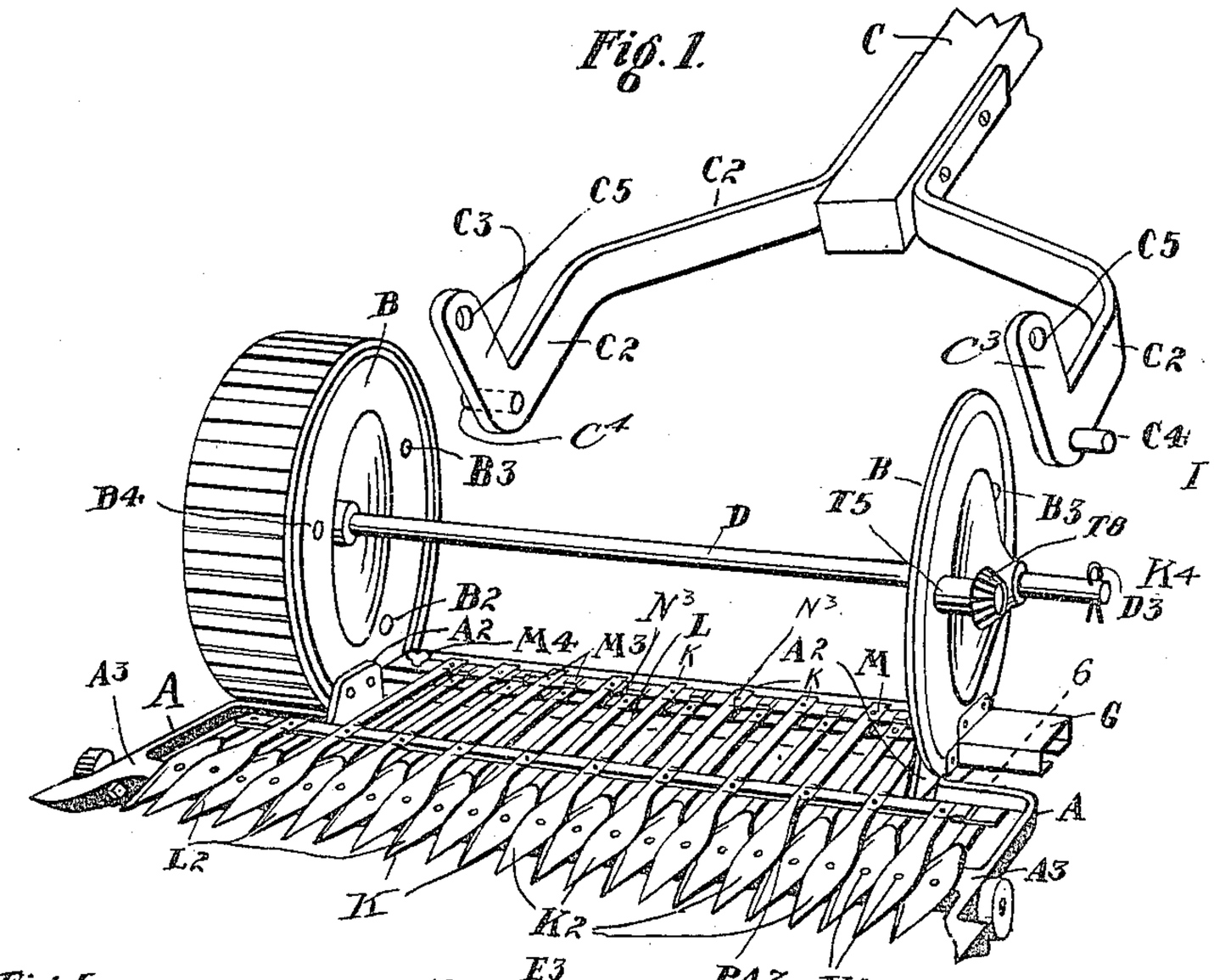

Fig. 5.

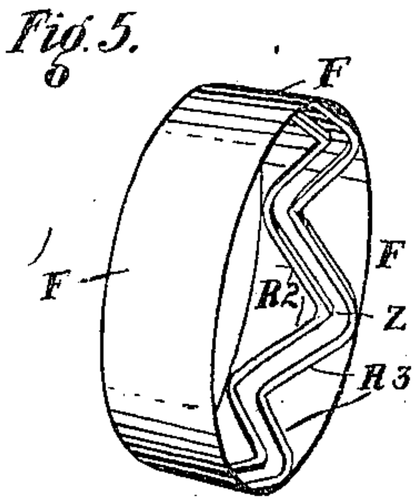

Fig. 2.

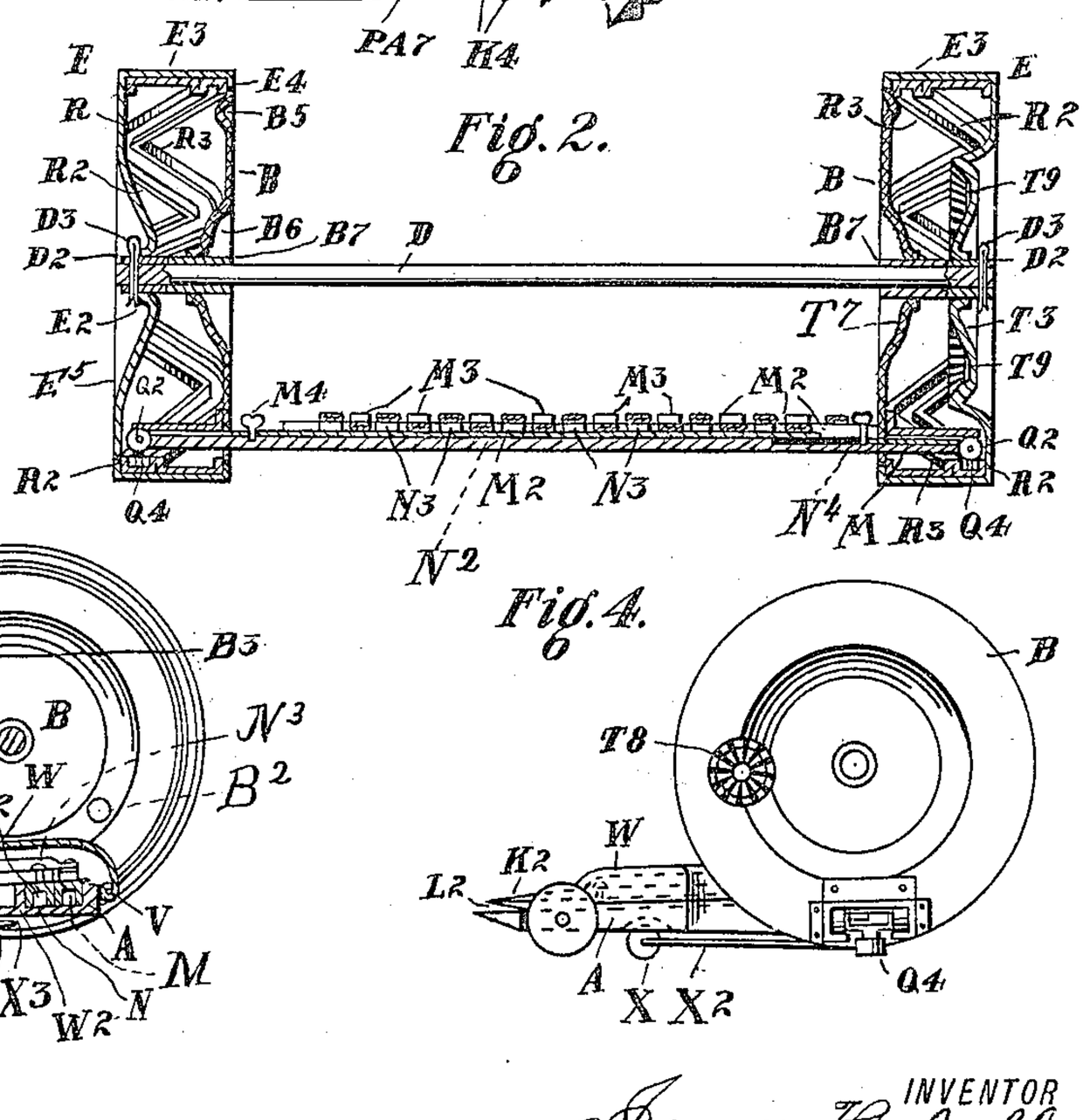

Fig. 3.

Fig. 4.

WITNESSES

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2 SHEETS—SHEET 2.

Fig. 6.

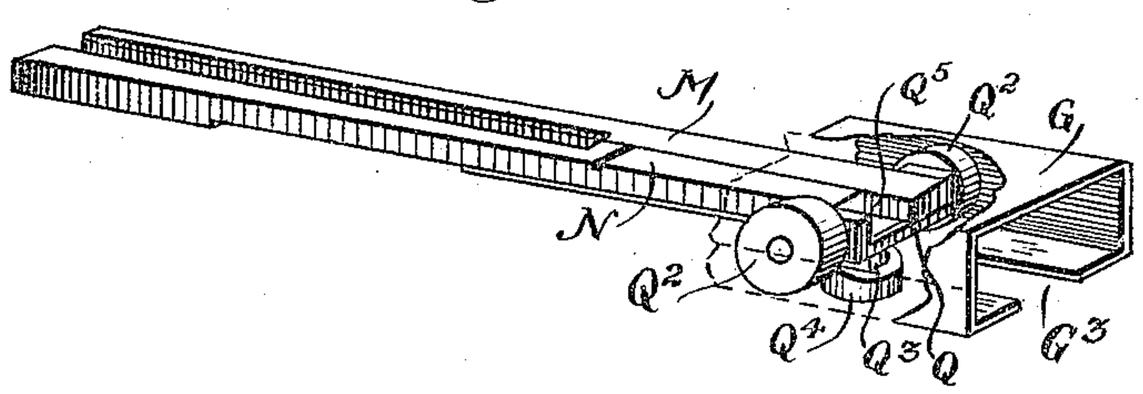


Fig. 8.

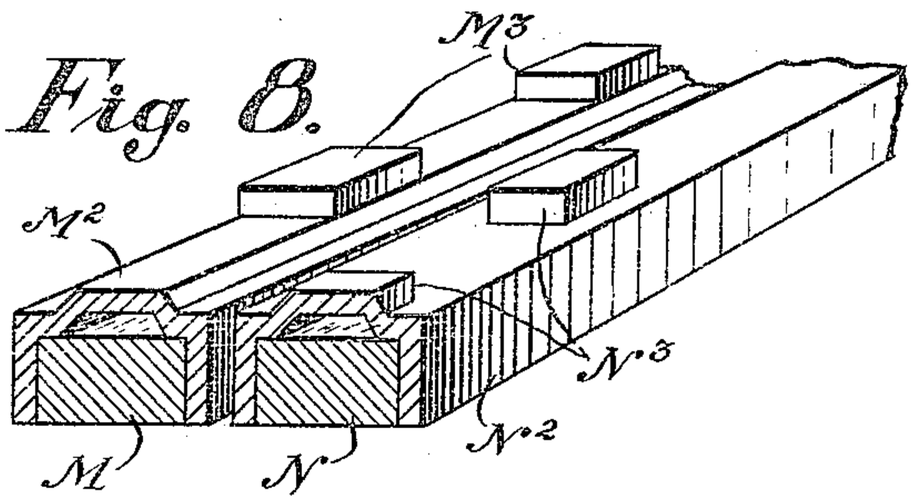


Fig. 7.

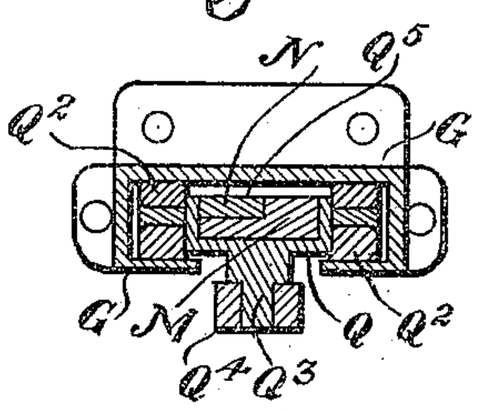
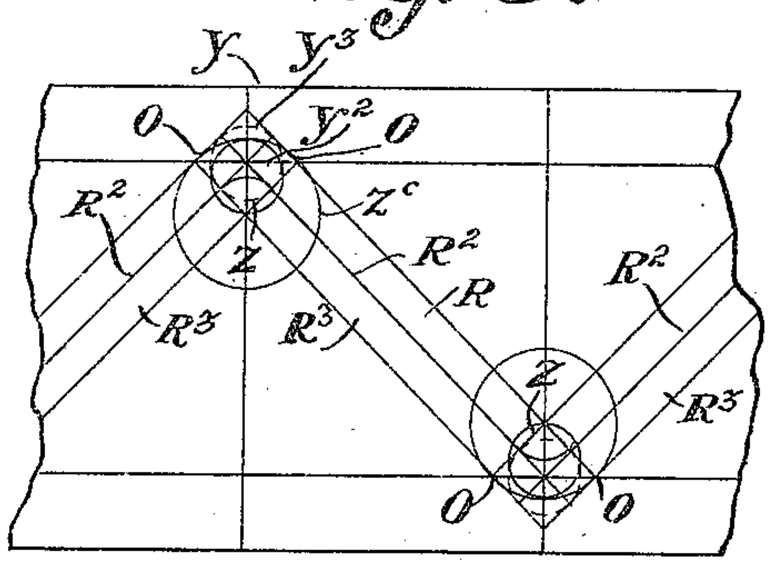


Fig. 9.



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UNITED STATES PATENT OFFICE.

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LAWN-MOWER.

962,407. Specification of Letters Patent. **Patented June 28, 1910.**

Original application filed December 28, 1903, Serial No. 186,803. Divided and this application filed May 11, 1904. Serial No. 207,400.

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.

This is a division of the application for lawn mowers filed December 28th, 1903, bearing the Serial Number 186,803.

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 also is 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 being omitted. Fig. 3 represents a vertical longitudinal section of the machine, taken at or near the midlength of the axle aforesaid, 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 shows in a perspective view one of the two cylinders, each of which contains a groove whereby through intermediate mechanism the knives are operated. Fig. 6 shows in perspective parts of the reciprocating rods, whereby the sleeves which operate the knives are respectively reciprocated, and a part of the guideway or bearing box which coöperates to guide these reciprocating rods. Fig. 7 is a transverse vertical section of the parts shown in Fig. 6, and of the corresponding parts shown in Fig. 1, the section being taken in the plane of the dotted line 6, of Fig. 1, and the flanges of the bearing box being shown in elevation. Fig. 8 shows in perspective parts of the reciprocating rods and of the sleeves, which they respectively reciprocate. Fig. 9 is a diagram illustrating the construction of said groove.

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.

The machine is to have a suitable frame and knives that reciprocate. Such reciprocation is primarily caused by the movement of the wheels, through the agency of a zigzag channel imparting to a roller or stud located in the channel, a reciprocatory movement. This movement is duly communicated to a shank, rod or suitable equivalent means. The knives receive motion from such shank or rod, etc., either directly or through intervening mechanism. Each of the two driving wheels should have a zigzag channel, and in such a construction, one driving wheel through the agency of its channel will operate one set of knives, and the other driving wheel by its zigzag channel will operate the other set of knives, the two sets located the one upon the other after the manner of scissors.

A brief description, in general, of one mode of construction of the parts more immediately operated by the driving wheels will illustrate the functions and uses of the latter; in connection not only with the one construction, but with others to which the driving wheels and their operating parts are obviously applicable.

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. Each disk B is preferably grooved at B^5, and at B^6. These grooves confer strength upon the disk. At the center of the disk B is located a journal B^7 with which the shaft D rotates. In the present illustrative instance it is in a separate piece from the disk B and is preferably so.

At the rear there are two reciprocating rods, viz.: rod M and rod N. Rod M carries a channeled plate M^2, and the latter carries the lugs M^3. Rod M would slip within the channeled plate M^2, but a set screw M^4 is provided whereby the channeled plate M^2 is compelled to move with rod M, until this screw is intentionally loosened. The rear end of the shank of the upper knives K is located between the two adjacent lugs M^3.

The blade K^2 of each knife having a suitable shank, one kind of which is shown and designated by the character K^3 is pivoted to the cross bar A^3 by a pivot, preferably by a screw K^4, 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 moves back and forth, it will reciprocate the channeled plate M^2, and will move the rear ends of the knives K back and forth, and thus cause the knives to oscillate on their respective pivots K^4. Thus the blades K^2 of these knives will oscillate edgewise.

Rod N carries a channeled plate N^2, and the latter has the lugs N^3. Rod N is prevented from slipping within the channeled plate N^2 by means of a set screw N^4. Thus the rod N and the channeled plate N^2 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 N^3. The blade L^2 of each knife L is pivoted to the cross bar A^3 by a pivot, preferably such as a screw K^4, whose shank above the screw thread is the pivot bearing. The head of the screw prevents the blade L^2 from coming off the pivot. The shanks of screws K^4 when used with blades K^2 are longer than when used with blades L^2. Thus when the channeled plate N^2 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 K^4. Thereby the blades L^2 of the knives L will oscillate edgewise.

To conveniently enable the upper knives to work in a desired plane above the plane in which the lower knives operate, the channeled plate M^2 is elevated relatively to the channeled plate N^2. The cover for the knives may be hinged at V to the main frame of the machine.

The knives shown herein and their immediate connections are of my invention, but as they are the subject of an application now pending, and from which this was divided, they are not particularly herein described. 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 suitable manner. In each of the guideways G, 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 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, at the lower part of one driving wheel, the end portion of the rod M is connected and to the other carriage Q at the lower part of 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 guide space Q^5, and in this, the end part of the other knife moving rod M or N, as the case may be, slides along side of its companion rod. This construction is fully illustrated in Figs. 6 and 7. Thus each carriage serves also as a guideway and the two rods M and N with their respective channeled plates M^2 and N^2 carrying their respective sets of knives move 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 are as follows:—Each driving wheel contains a zigzag 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 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.

To assist in the better understanding of the guideways G, I submit the following drawing, see Fig. 9. I do not carry the groove R to the point Y. A circle described from the point Y^2, which is the intersection of the central lines R^2, R^2 of meeting divisions is shown by dotted lines, and indicated by Y^3. This circle I reject as the boundary line of the groove. But I strike a circle ZC from the summit point Z, viz.: the intersection of the lines R^3, R^3, as a center. That portion of the circle ZC between the points O, O, I adopt as the boundary of the groove toward the point Y. Hence all of the space between this point Y and the said portion of the circle ZC between the points O, O, is solid. By this combination of pitch lines and this consequent formation of the groove

R in its united divisions, much lost motion is taken up and the roller studs Q^4 in passing the points Z, Y^3, pass rapidly without lost motion. The knives do not pause any length of time, as the rollers Q^4 in their guideways R pass from one zigzag to the other, but pass rapidly from one to the other. By this construction, I am enabled to overcome the difficulty heretofore experienced in the operation of the knives of lawn mowers, and analogous machines, where, while the knives are pausing, the grass gathers in bunches, and is unevenly cut. By this feature of my invention, my knives are more continually cutting, and the grass is more evenly cut, and the lawn after being mowed does not have a wavy appearance. The diameter of each stud Q^4 is such that it fits snugly the groove by whose walls it is reciprocated. One thirty second of an inch play is ample. But as the machine is used, the necessary wear of the parts will slightly increase this play. Nevertheless the stud will do effective work when its diameter is somewhat less than the width of the groove by the thirty second part of an inch. The angle of the divisions to one another may be greater or smaller and the speed of the knives relatively to the revolution of the wheels will likewise be determined by the degree of said angle.

The construction of the driving wheel is of my invention, to wit: first, as to the preferred structure for holding the guideway R. I first turn a band or cylinder F, see particularly Fig. 5. This blank is without and recess or groove. I next provide the groove R composed of zigzag divisions therein, substantially as heretofore described. When the cylinder F is composed of sheet metal, the sides R^2, R^3 of the groove will preferably be in the shape of flanges, as will be well understood by those accustomed to work in such metal. The wheel frame E is preferably formed out of a flat metal blank. Its peripheral face E^3 extends out so as to form the tread and also extends beyond so as thereafter to form the flange E^4 as hereinafter mentioned. It is recessed in the side E^5 so as to have additional strength and rigidity. Thus I have recessed it at E^2, and such recessing makes a portion adapted to be united to the bearing or sleeve D^2, which latter fits on the axle D. The cylinder F is now located within the wheel as shown. Then the inner free edge of the peripheral part of the wheel is turned toward the axle, and over the adjacent edge of cylinder F, and when so bent constitutes the flange E^4. The wheel and its accompaniments are now completed. Each wheel is duly fixed to the axle D, preferably by means of a split key D^3, passing through the bearing D^2 of the bearing wheel E. The axle turns within the disks B. The wheels fixed to the mechanism for operating the knives always rotate together, and to the same extent. The operation of the wheel provided with these grooves and the functions of the latter in operating the knives as heretofore fully described, will be readily understood.

It will be perceived that the construction of the wheel and its cylinder F is very advantageous. They are made of sheet metal, which is a material easily and cheaply worked. They are very light, and thus economize in the power required to move the machine over the grass, etc.

It is to be understood that the disks turn loosely on the shaft or axle. The driving wheels E are duly fixed to the axle and turn with it.

While the knives are cutting the grass, a brush T through the agency of a driving wheel, operates to sweep that cut grass which falls on the machine backward and off of the machine. It is journaled in a bearing in each disk, in a suitable manner. Appropriate means between the shaft of the brush, and the driving wheels operate to cause the driving wheels when rotated to likewise rotate the brush. A suitable construction also enables the brush to be set in position or to be removed therefrom. As the brush and the said means for its rotation, and for holding it in place, are no part of the invention covered by the present specification and claims, a detailed description of the same is omitted. Suffice it to say, both operations of cutting and of sweeping are and can be carried on simultaneously.

The mowing machine will be provided with a suitable handle. One form of such handle is shown, and consists of the parts respectively marked C, C^2, C^3, C^4 and C^5. The studs C^4, C^4, are adapted to respectively enter any one of the holes B^2, B^3, of the respective disks B, B; these holes being made at suitable places on said disks to permit of the handle being located so as to hold the mowing machine in a position for cutting the grass, or in a reversed position for brushing the cut grass, etc.

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

1. In a wheel for a lawn mower, the combination of an external wheel shell having a side E^5 and a peripheral tread E^3, and a flange extending down from that edge of the peripheral tread which is opposite to said side E^5, and a separate cylinder provided with a groove having divisions, forming a zigzag course, said cylinder located in the groove formed by the periphery and the side and the flange of said wheel, substantially as and for the purposes specified.

2. In a mechanism for lawn mowers, the combination of an external wheel shell having a side E^5 and a peripheral tread E^3, and a flange extending down from that edge of the

peripheral tread, which is opposite to said side E^5, and a separate cylinder provided with a groove having divisions, forming a zigzag course, the cylinder located in the groove formed by the periphery and the side and the flange of said wheel, and the stationary disk located at the open side of the wheel, substantially as and for the purposes specified.

3. In a wheel for a lawn mower, the combination of an external wheel shell having a side E^5 and a peripheral tread E^3 and a flange extending down from that edge of the peripheral tread which is opposite to said side E^5, and a separate cylinder provided with a groove having divisions, forming a zigzag course, said cylinder located in the groove formed by the periphery and the side and the flange of said wheel, the central portion of the side of the wheel being inclined inwardly and then bent out as a flange, substantially as and for the purposes specified.

4. In a lawn mower, the combination of an external wheel shell having side E^5 and a peripheral tread E^3, and a flange extending down from that edge of the peripheral tread which is opposite to said side E^5, and a separate cylinder provided with a groove having divisions, forming a zigzag course, said cylinder located in the groove formed by the periphery and the side and the flange of said wheel, and the disk B located at the open side of the wheel, the wheel having a central flange and the bearing B^7, fixed to the central flange of the wheel, and constituting the rotatory journal upon which said disk rests, substantially as and for the purposes specified.

5. In a lawn mower, the combination of an external wheel having a side E^5, formed with a central flange, and a peripheral tread E^3, and a flange extending down from that edge of the peripheral tread which is opposite to said side E^5, knives, and mechanism for operating the same, a stud Q^4 connected to said mechanism, a separate cylinder provided with a groove having divisions, forming a zigzag path for the stud Q^4 received in said groove, said cylinder located in the groove formed by the periphery and the side and the flange of said wheel, a disk B centrally inclined outwardly and then provided with a horizontal bearing flange, and the journal B^7 fixed within and to the central flange of the side E^5, and rotated within the horizontal bearing flange of the disk B, substantially as and for the purposes specified.

6. In a lawn mower having cutting knives, a wheel consisting of a side E^5, a peripheral tread E^3, a flange extending out from that edge of the periphery which is opposite the side E^5, and a cylinder having provision for operating the cutting knives, said cylinder having a flange extending radially toward its axis from that edge of its periphery which is next to the said flange of the said wheel, said cylinder being located in the groove formed by the periphery and the side and the flange of said wheel, the said flange of said cylinder extending toward the axis of the wheel beyond the flange of the wheel, the disk B concentrically located on the shaft D and arranged to bear against the said flange of said cylinder.

7. In a mowing machine, a driving wheel having a peripheral tread and having an inner flange and an outer plate, struck up in combination with a cylinder carrying a zigzag groove, the said cylinder being located within the driving wheel and next to the peripheral tread, the tread of the wheel in one with the outer plate, the said flange E^4 bent over the edge of the cylinder, an inner plate or disk, a bearing sleeve D^2 located centrally within the said outer plate of the driving wheel and the said inner plate, and a shaft fixed thereto, substantially as and for the purposes specified.

8. In a lawn mower, a frame, cutting knives, a cylinder having provision for operating the mower cutting knives, a wheel consisting of a side E^5, a peripheral tread E^3 and a flange extending down from that edge of the periphery which is opposite to the side E^5, said cylinder being located in the said groove thus formed, the central portion of the side of the wheel being inclined inwardly and then bent out as a flange, and an axle constituting a support for the wheel in connection with this flange, substantially as and for the purposes specified.

9. In a lawn mower, a frame, cutting knives, a cylinder having provision for operating the mower cutting knives, a wheel consisting of a side E^5, a peripheral tread E^3 and a flange extending down from that edge of the periphery which is opposite the side E^5, said cylinder being located in the said groove thus formed, a disk located at the open side of the wheel, and fastened to the frame, a shaft, a sleeve embracing the shaft both the wheel and the disk being centrally inclined toward the central radial plane of the wheel and then bent at a right angle, and there combined with the sleeve embracing the shaft said sleeve being fixed to the shaft and to the wheel, substantially as and for the purposes specified.

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