No 799,041. PATENTED SEPT. 12, 1905.

G. W. GAGE & A. H. KAEHLER.

LAWN MOWER.

APPLICATION FILED APR. 25, 1904.

2 SHEETS—SHEET 1.

Fig. 1.

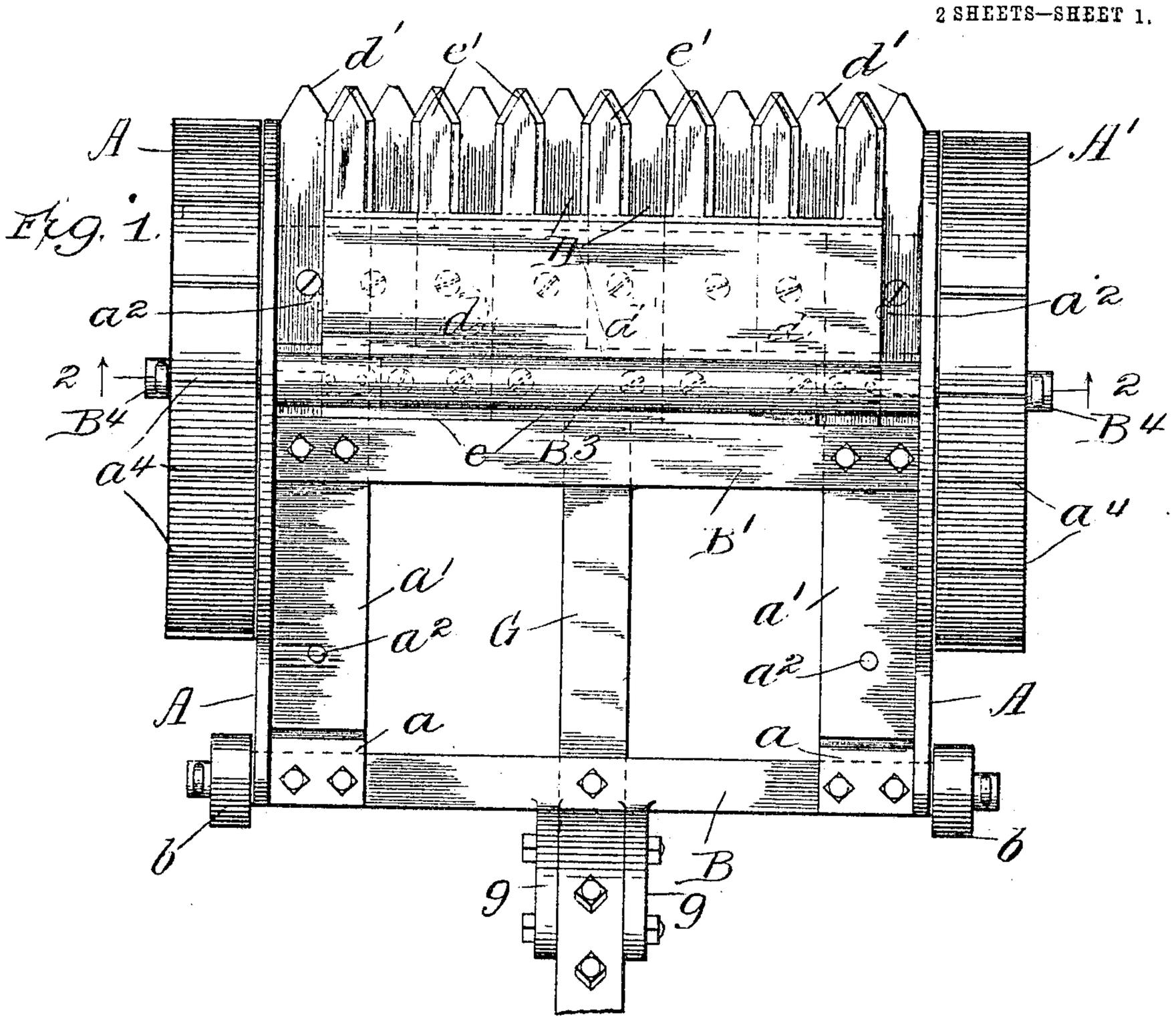
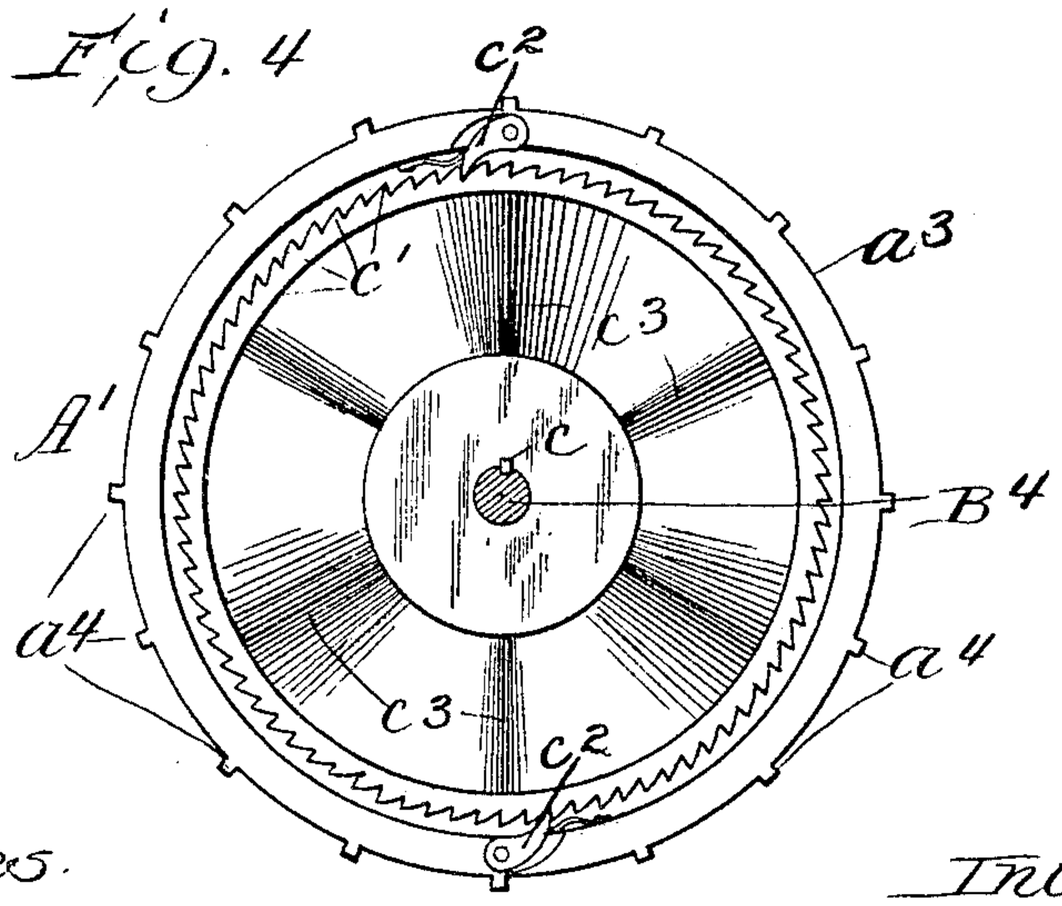


Fig. 4



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2 SHEETS—SHEET 2.

Fig. 2

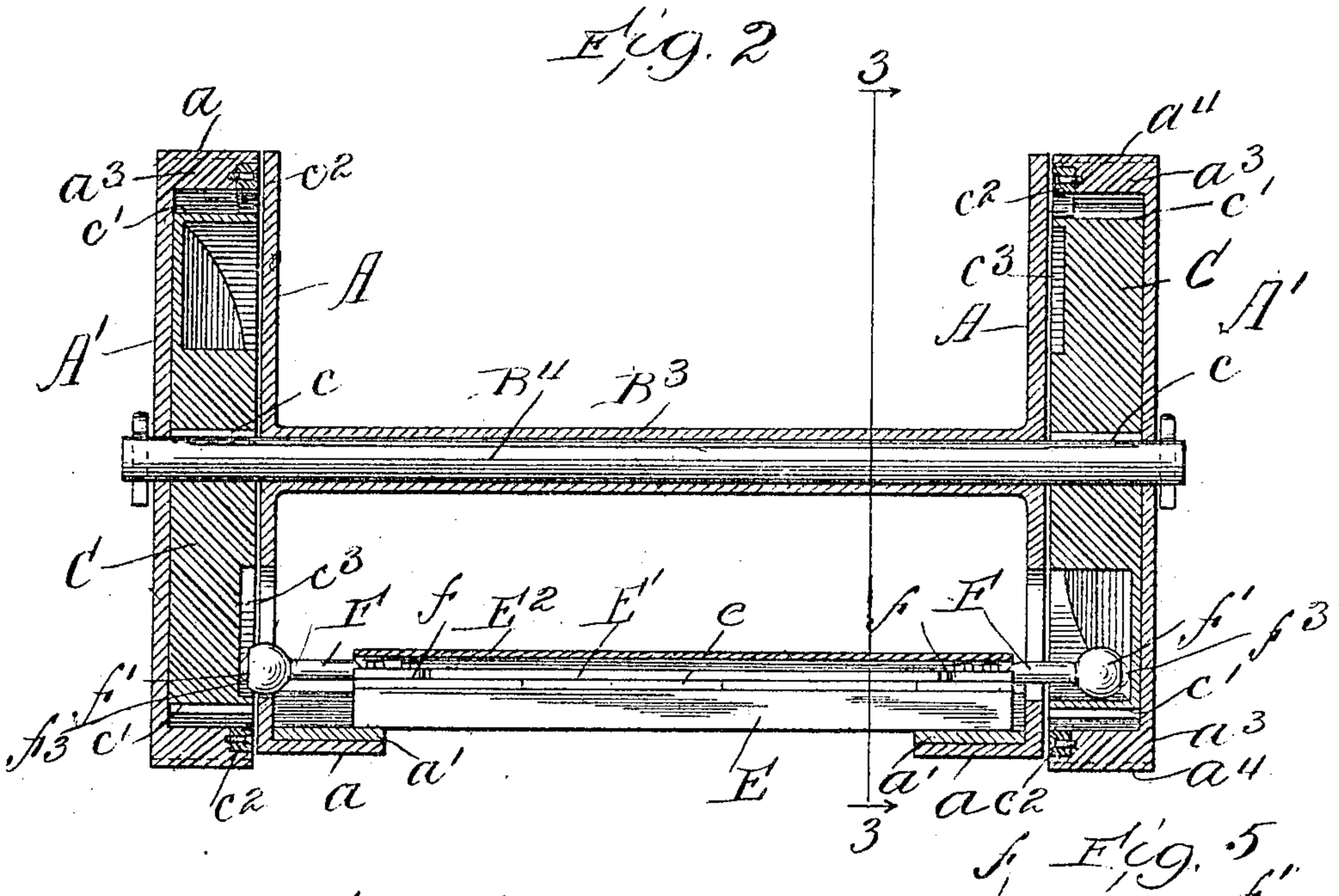


Fig. 3.

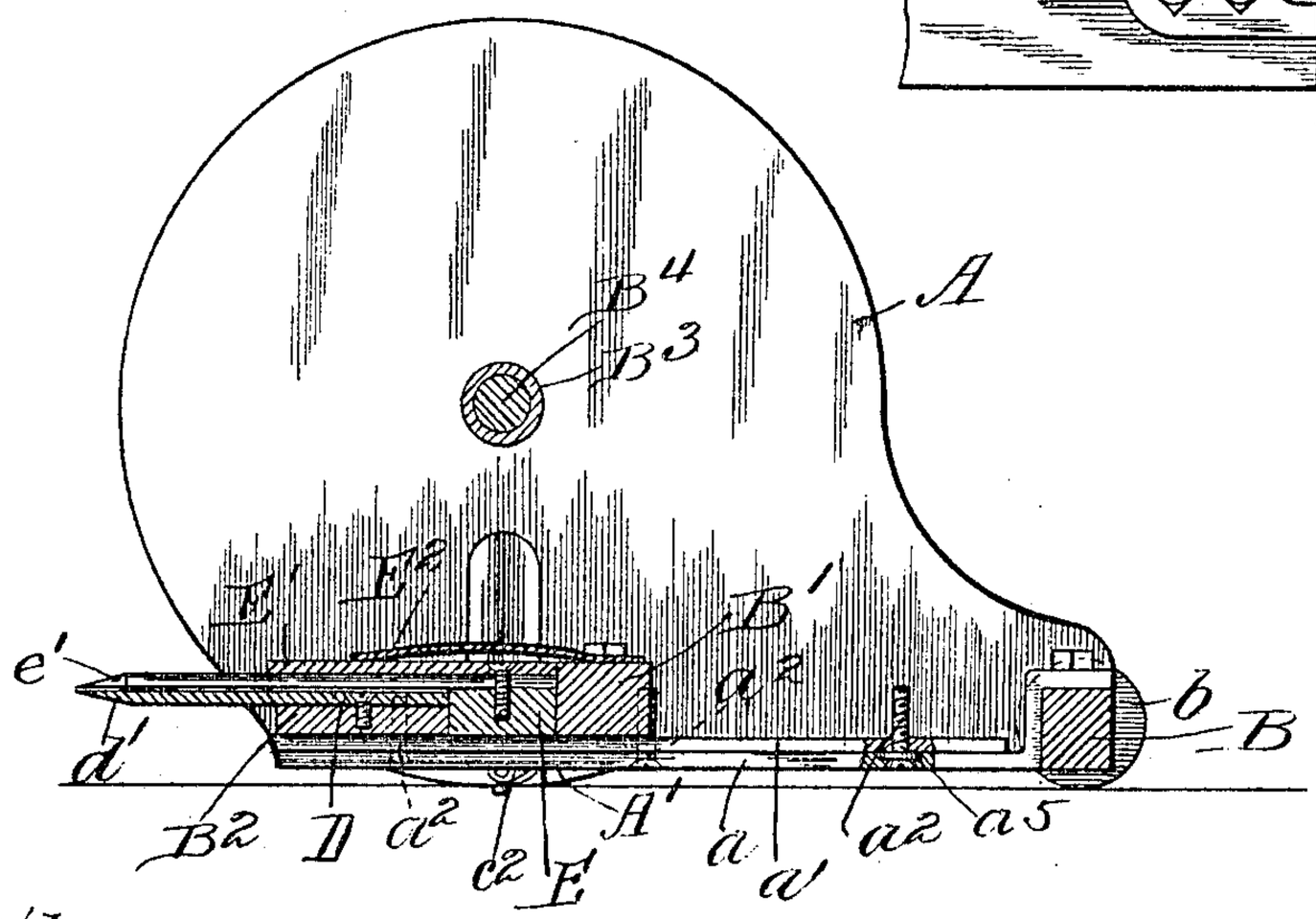
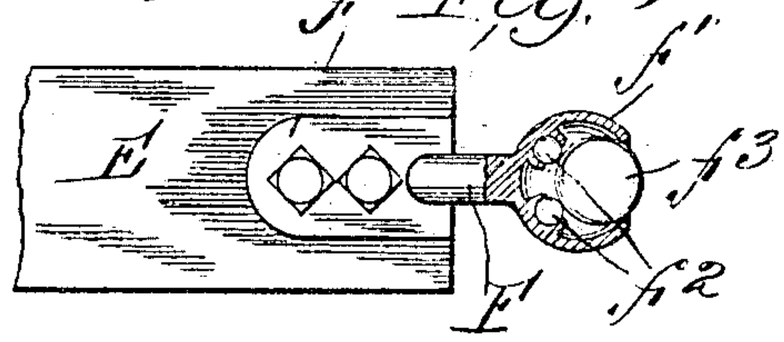


Fig. 5



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UNITED STATES PATENT OFFICE.

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LAWN-MOWER.

No. 799,041. Specification of Letters Patent. Patented Sept. 12, 1905.

Application filed April 25, 1904. Serial No. 204,679.

To all whom it may concern:

Be it known that we, GEORGE W. GAGE, residing at Kenilworth, and ALBERT H. KAEHLER, residing at Chicago, Illinois, citizens of the United States, have invented certain new and useful Improvements in Lawn-Mowers; and we do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates more particularly to means for converting rotary motion into reciprocatory motion and is shown applied in a gearless lawn-mower, though obviously capable of many other useful applications. Heretofore many devices of this kind have been comparatively short lived, owing in great part to the excessive wear of the operating mechanism. This is especially true in mowers of all classes, inasmuch as the mechanism is somewhat complex and operates at high speed.

The object of this invention is primarily to provide a simple and effective mechanism of cheap yet durable construction adapted to convert rotary into reciprocatory motion without the use of gearing, thus reducing the internal resistance to a minimum, and thereby greatly prolonging the life of the same.

It is also an object of the invention to provide a simple, light-operating, and durable mower or lawn-mower embodying our invention.

The invention consists in the matters hereinafter described, and more fully pointed out and defined in the appended claims.

In the drawings, Figure 1 is a top plan view, partly broken, of a device embodying our invention and with parts thereof removed. Fig. 2 is a section taken on line 2 2 of Fig. 1, showing parts in elevation. Fig. 3 is a section taken on line 3 3 of Fig. 2. Fig. 4 is an elevation of the inner or face side of one of the driving-wheels, showing the driving-shaft in section. Fig. 5 illustrates a detail of construction of the reciprocating bar.

As shown in said drawings, the invention is applied to a lawn-mower the body-frame of which comprises side members or plates A A, which are metallic or of other suitable material and the upper portion of each of which is circular in form and extend approximately to the top of the drive-wheels A′, though obviously said frame members may be of any desired form and construction. Said frame members or plates A are straight on their lower sides and the edges are turned inwardly to provide flanges *a a*, which are offset upwardly at their rear ends to provide means for attaching the rear axle B, which, as shown, is rigidly engaged thereto by means of bolting or any desired manner. On the ends of said axle B outside the frame members or plates A are journaled the rear supporting wheels or rollers *b*, secured by cotter-pins or other suitable means. As shown, the inturned flanges *a* are reinforced by metallic plates *a′*, which are rigidly held in place by means of bolts a^2, extending through said flange and plate. The plates *a′* are preferably formed of steel, thereby greatly stiffening the frame and providing wear-plates or bearings for the cutting mechanism. A frame member B′ is rigidly engaged at its ends on said flanges transversely of the frame and centrally thereof, and at the forward end of said frame is the transverse frame member B^2, (more clearly shown in Fig. 3,) which, as shown, is comparatively broad and of less thickness than the frame member B′. Said side frame members or plates A A are also connected centrally by the sleeve B^3, which, as shown, is formed integrally therewith and forms an elongated bearing for the frame upon the axle B^4, on the outer ends of which, without said frame members, are journaled the drive-wheels A′.

The drive-wheels A′ as herein shown are cored on their inner side and comprise each a metallic disk provided with an inwardly-directed peripheral flange a^3, on the outer surface of which are the usual transverse calks or lugs a^4 to enable the wheels to obtain a firm grip upon the ground and prevent slipping. Rigidly secured on said shaft B^4 within the wheels A′ by means of a key *c* are the cam-wheels C, as herein shown of a thickness approximately equal to the depth of the flange a^3 on the drive-wheels. Said cam-wheels C are provided on their peripheries with a plurality of ratchet-teeth *c′*, adapted to be engaged by the spring-controlled detents c^2, pivotally engaged in the inner peripheries of the flanges a^3. Said detents and ratchet-teeth are so disposed as to interlock when the machine is driven forwardly, thus rotating the cam-wheels. Said cam-wheels C C are

provided on their inner faces with a concentric groove within which is a compound cam-surface comprising, as shown, a plurality of radial undulations or corrugations c^3, the apexes of which, as shown, are nearly flush with the inner faces of said wheels, and the depressions between the same are of a depth equal to the desired length of stroke of the reciprocating element, in this instance a sickle-bar E. Said cam-wheels C are secured on said shaft B^4 so that the undulation or corrugation of opposite cam-wheels are disposed alternately, or, in other words, so that the apexes of the undulations on one wheel are in direct alinement with the depressions in the opposite wheel, as shown more clearly in Fig. 2.

Any desired kind of cutting means may be used. As shown, however, lower knives D, comprising a plurality of sections d, are rigidly engaged upon the transverse frame member B^2 by means, as shown, of screws, though obviously they may be engaged thereon by any desired means. Each section is provided with two forwardly-projecting double-edged knives d', which are tapered at their forward ends in the usual or any desired form and are plane on their upper surface and beveled under on the lower surface to afford a cutting edge. Closely fitted and adapted to reciprocate between the frame members B' and B^2 is a sickle-bar E, the top of which is flush with the top of the lower knives and upon which are secured the knife-sections e, which may be of any desired form, but, as herein shown, are similar to the sections d, each section being provided with forwardly-directed teeth e', tapered at their forward ends and provided with cutting edges which coact with the tapered ends and cutting edges of the knives d'. A plate E' is rigidly secured on the sickle-bar and extends longitudinally thereof and projects forwardly approximately to the front edge of the transverse frame member B^2 and bears upon the knife-sections e', thereby greatly stiffening the knife-sections and keeping them in cutting relation with the lower knife-sections.

The frame members A A are provided adjacent the ends of said sickle-bar E with a vertical slot, and on each end of said sickle-bar is an outwardly-directed stud-shaft F, integral with a plate F, by means of which it is rigidly engaged upon said sickle-bar. The outer ends of said stud-shafts are provided with a socket f', on the inner side of which in suitable recesses or bearing-seats are balls f^2, against which is seated a larger ball f^3, the outer side of which protrudes from said socket. Said ball f^3 may be secured in said socket when the socket is formed, or the outer edges of said socket may be spun or pressed inwardly in position to prevent the removal of said ball. The combined length of the sickle-bar and stud-shafts F F is such that the balls f^3 are always in positive contact with the cam-surfaces of the cam-wheels C C, as shown in Fig. 2.

As shown in Figs. 2 and 3, an upwardly-curved bearing-plate E^2 is rigidly engaged upon the frame member B' and extends forwardly with the front edge thereof engaging upon the plate E' and serves to hold the same in cutting relation.

As shown in Fig. 1, the mower is adapted to be manually operated and is provided with a handle G, which, as shown, is rigidly secured beneath the frame members B and B' and the upper end of which (not shown) extends upwardly and rearwardly from the frame member B. Rearwardly-projecting lugs g, integral with said frame member B, extend on either side of said handle and afford means rigidly bracing the same, though obviously said handle may be secured in any desired manner or may be omitted and the device propelled by other than manual power.

As shown in Fig. 3, the screws a^2 are seated in the flange a of the frame and extend upwardly through and have threaded engagement in the reinforcing-plate a' and afford means for elevating, lowering, or tilting the knives, as preferred, inasmuch as said screws have each a bearing-washer a^5 shrunk or otherwise secured thereon and rotation of the screws serve to move said reinforcing-plate up or down, as preferred.

The operation of our device is as follows: Inasmuch as the cam-wheels are oppositely disposed with the end of the reciprocating element engaged in each, it is obvious that rotation of the cam-wheels act to reciprocate said reciprocatory element, and as the inclines in the cam-wheels are long and gradual there is but little, if any, loss of power.

In the particular application of this invention (namely, the lawn-mower) where the mower is driven forwardly the cam-wheels C are locked to the drive-wheels A by means of the detents c^2 engaging in the teeth c' of said cam-wheels and caused to revolve therewith. The cam-surfaces of the opposite wheels being arranged with their apexes staggering with each other and in engagement with the balls f^3 at the outer ends of the sickle-bar E cause said sickle-bar to be reciprocated transversely of the frame and the cutting edges thereon to coact with the lower knives. Obviously the number of reciprocations of the cutter-bar to a revolution of the wheels A' A' will depend upon the number of undulations upon the cam-surface, and the speed may be readily changed by changing said cam-wheels for those having greater or less number of undulations, as desired. The inner faces of said wheels A' A' come in close relation with the frame members A, which thereby prevent dirt or obstacles from entering said wheels. By the means of the ratchet connections between the wheels A' A' and the cam-wheels

C C the wheels A′ A′ may turn in opposite directions, as in turning a corner, or one wheel may stand still and the other turn when mowing around a curve and the knife will be driven by the wheel moving forwardly. Obviously many details of construction may be varied without departing from the principles of our invention.

We claim as our invention—

1. In a device of the class described, the combination with oppositely-disposed drive-wheels, of a cam on the inner face of each comprising radial corrugations, outwardly-directed teeth on said cam, detents pivoted in the wheels and adapted to engage said teeth and rotate the cams with said wheels in one direction, a reciprocating cutter-bar and ball-bearings on the ends thereof in operative engagement with said cam-surfaces.

2. A device of the class described comprising two rotative, oppositely-disposed inwardly-recessed wheels, independently-rotatable cam-wheels in said recesses, locking means engaging the periphery of said cam-wheels, an elongated bearing for said wheels, a plate at each end thereof in close proximity to the inner faces of said wheels, inwardly-directed bearing-plates thereon, a cutter-bar slidably engaged on said plates, an outwardly-directed arm on each end thereof and ball-bearings thereon adapted to engage said cams and reciprocate the knife-bar.

3. In a device of the class described, the combination with a pair of inwardly-recessed drive-wheels, a shaft journaled in said wheels, a cam-wheel rigidly engaged on each end thereof within said recesses, teeth on the peripheries thereof, detents pivoted in said wheels adapted to engage said cam-wheels, a cam-surface on the inner faces of said cam-wheels, an elongated bearing for said shaft, inwardly-flanged plates thereon, a cutter-bar slidably engaged on said flanges, ball-bearings at each end thereof adapted to engage said cam-surfaces and knives on said cutter-bar each comprising a plurality of blades.

4. In a device of the class described, the combination with a frame, of upwardly-directed plates thereon, an elongated bearing connecting said plates, a shaft journaled therein, recessed drive-wheels on the ends of said shaft, independently-revoluble cams therein, means for locking said cams to said wheels, a cutter-bar slidably engaged on said frame and arm on each end thereof, a ball-bearing on each arm adapted to engage said cams, a plurality of plates on said cutter-bar and a plurality of knives on each plate.

5. In a device of the class described, a frame comprising vertically-disposed plates, an elongated bearing connecting said plates, an inwardly-directed flange on each of said plates, wearing-plates thereon, means for adjusting said wearing-plates, transverse beams on said wearing-plates, a cutter-bar slidably engaged intermediate the same, ball-bearings on the ends of said bar, wheels journaled on the ends of said shaft and cam-wheels rigidly engaged on said shaft adapted to engage said ball-bearings and reciprocate said bar.

6. In a device of the class described, a pair of vertical side frame members having inwardly-directed flanges on the lower margins thereof, a bearing-sleeve connecting said frame members, a shaft journaled therein, drive-wheels journaled upon the ends of said shaft, a bar slidably supported on said flanges and cams rigidly engaged on said shaft and adapted to actuate said bar and means on said wheels adapted to drive the cams in one direction.

7. In a device of the class described, the combination with oppositely-disposed drive-wheels having inwardly-directed peripheral flanges thereon, of a shaft journaled in said wheels, a cam-wheel rigidly engaged on said shaft in each wheel, detents pivoted in the flanges of said wheels and adapted to lock the cam thereto when rotated in one direction, a plate adjacent the inner face of each wheel, a bearing-sleeve thereon for said shaft, inwardly-directed flanges on said plates, adjustable wearing-plates on said flanges, knife-bars slidably engaged thereon and ball-bearings on the ends of said bar adapted to engage said cam-wheels.

8. In a lawn-mower, a rigid frame, a shaft journaled transversely therein, drive-wheels each having a recess in its inner face and journaled on said shaft, a cam-wheel in the recess of each drive-wheel and rigidly engaged upon said shaft, a plurality of peripheral teeth on said cam-wheels a detent on each drive-wheel acting to lock said drive-wheels to the cam-wheels when rotated in one direction, a sickle-bar slidably engaged on said frame and antifriction-bearings thereon adapted to engage the cam-faces of said cam-wheels thereby reciprocating said sickle-bar by the rotation of said wheels.

9. In a device of the class described the combination with a rigid frame of a shaft journaled therein, drive-wheels upon the ends of said shaft each having a recess in the inner face thereof adapted to be closed by said frame, inwardly-directed bearing-plates carried on said frame, means for adjusting said plates vertically a cam-wheel in each drive-wheel and rigidly engaged upon said shaft, means for locking said cam-wheel to the drive-wheel, a plurality of cam-surfaces on said cam-wheel arranged alternately on opposite wheels, a sickle-bar slidably engaged on said plates, an outwardly-directed arm on each end thereof and ball-bearings on said shaft adapted to engage said cam-surfaces whereby the sickle-bar is reciprocated by rotation of the wheels.

10. In a device of the class described, a pair of oppositely-disposed drive-wheels, shafts journaled therein, a rigid frame supported on

said shaft, a cam in each wheel, means for driving said cams in one direction with said wheels, inwardly-directed flanges on said frame, wearing-plates thereon, a knife-bar slidably engaged on said plates adapted to be operated by said cams and means adapted to tilt the rear end of said plates.

11. In a device of the class described, the combination with a pair of vertical frame members, provided with laterally-directed flanges, of an elongated bearing rigidly connecting said frame members, a shaft journaled in said bearing, an inwardly-recessed wheel on each end thereof, a cam in each recess rigidly engaged on said shaft, means for rotating said cams with the wheels in one direction and releasing them therefrom in the other, a sickle-bar slidably engaged on said flanges and a ball-bearing on each end thereof adapted to engage said cams.

In testimony whereof we have hereunto subscribed our names in the presence of two subscribing witnesses.

GEORGE W. GAGE.
ALBERT H. KAEHLER.

In presence of—
W. W. WITHENBURY,
HJALMAR S. RUDD.