No. 834,320. PATENTED OCT. 30, 1906.

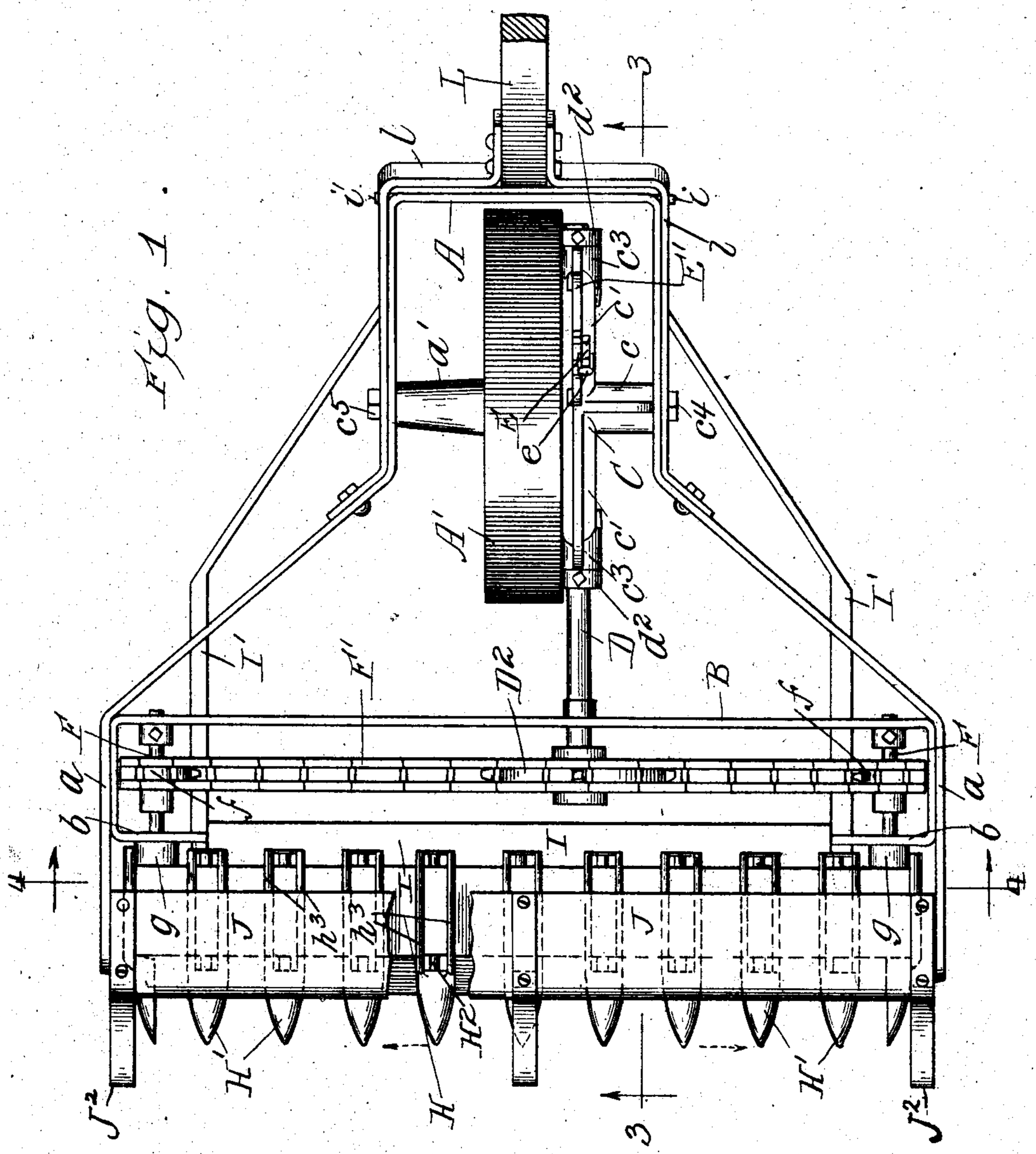
A. PFUND.

MOWER.

APPLICATION FILED MAY 17, 1905.

4 SHEETS—SHEET 1.

Fig. 1.



Witnesses:

Harry R. L. White.

Ray White.

Inventor:

Adolph Pfund.

By Charles D. Lilly Atty.

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4 SHEETS—SHEET 2.

Fig. 2.

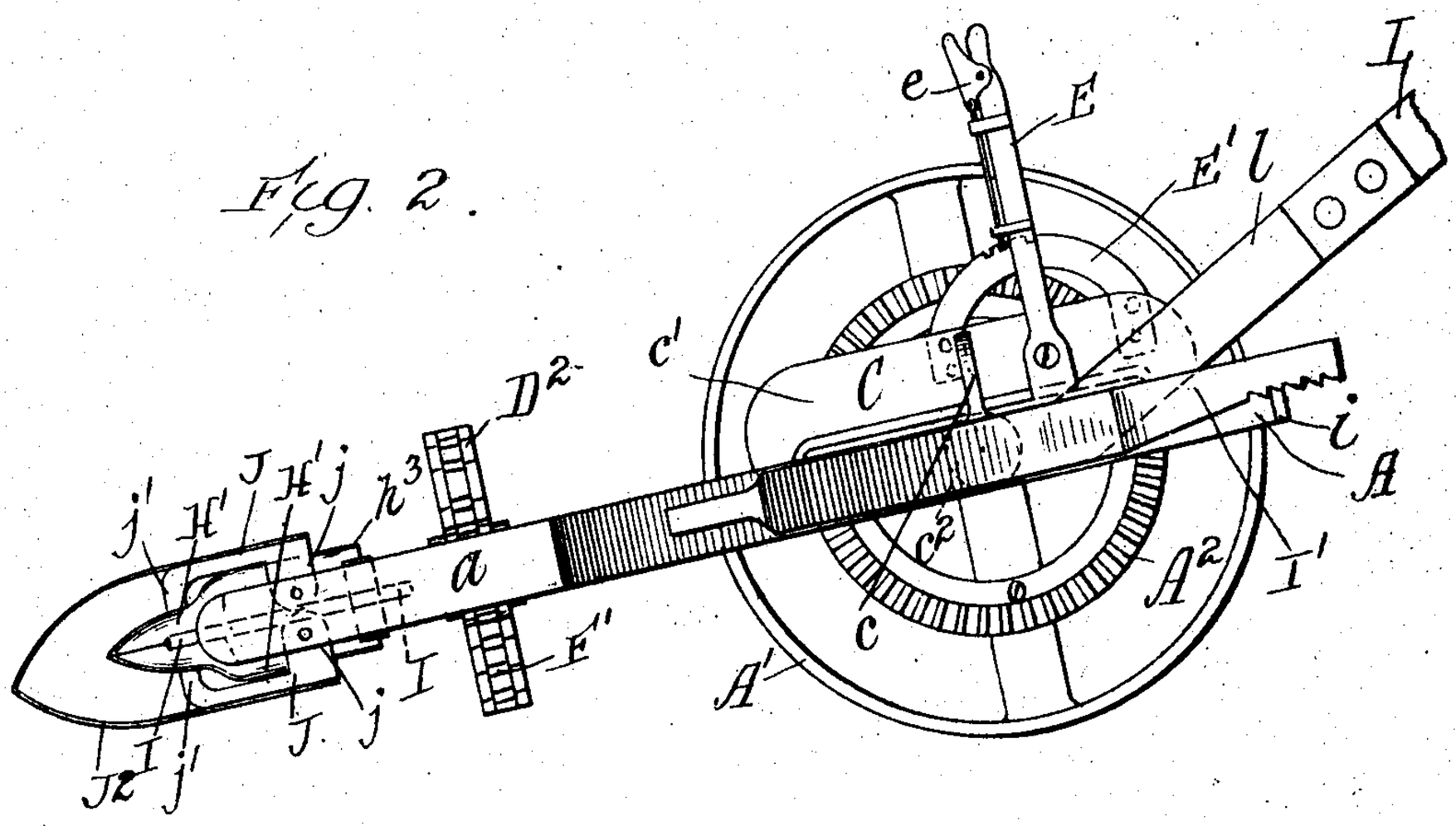
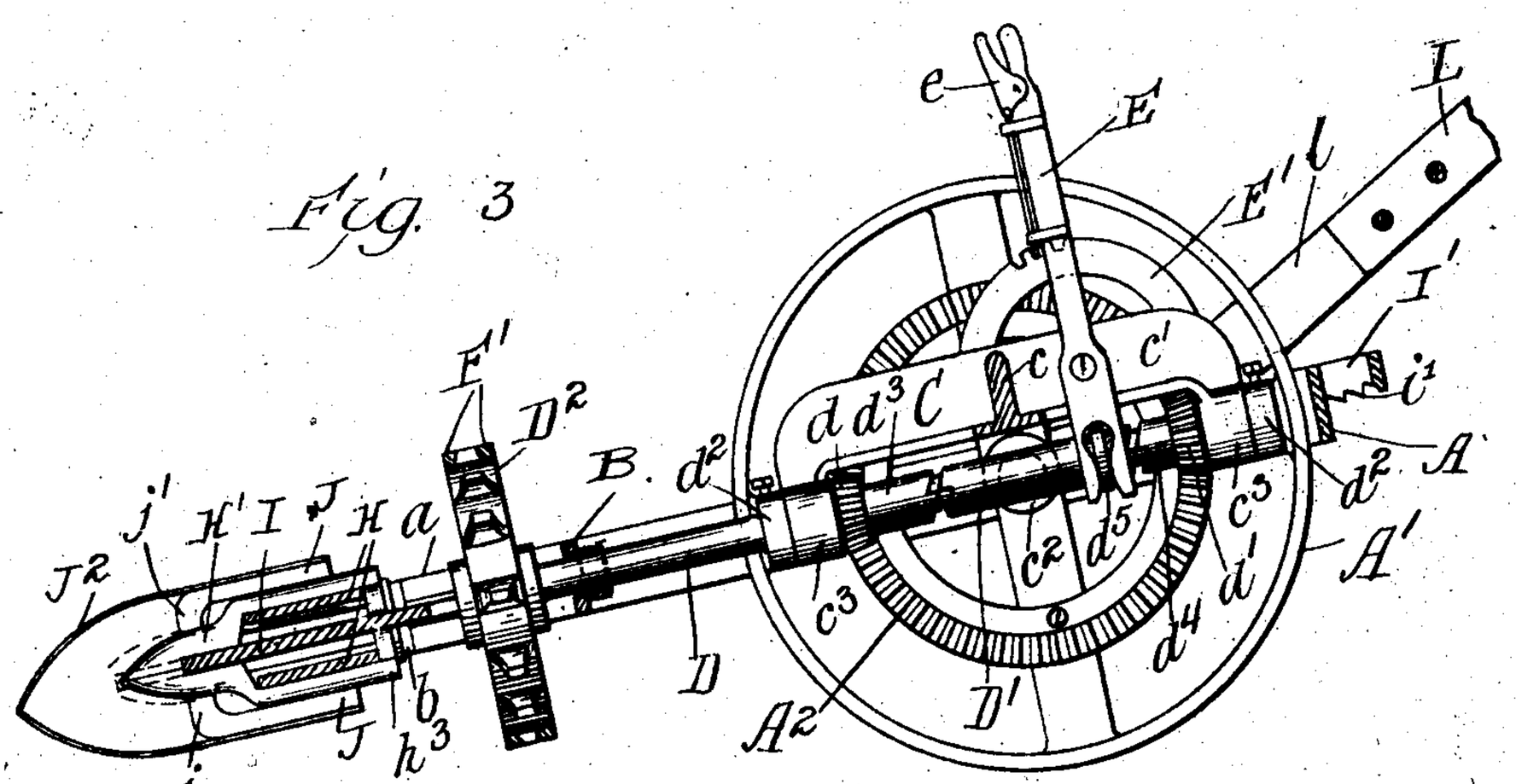


Fig. 3



Witnesses:

Harry R. Whitte

Ray White.

Inventor:

Adolph Pfund

By Charles D. Hills Atty.

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4 SHEETS—SHEET 3.

Fig. 4.

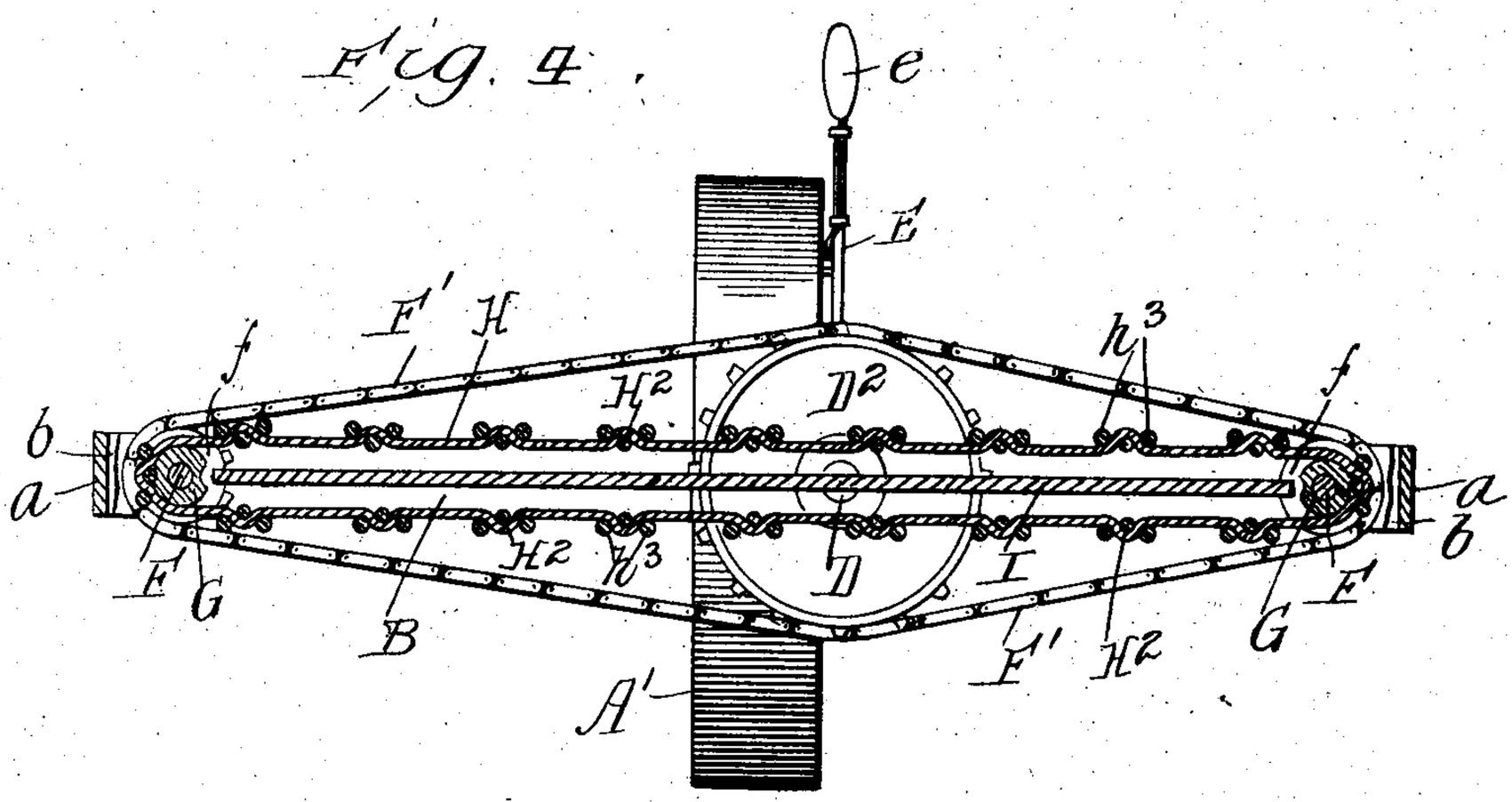


Fig. 7.

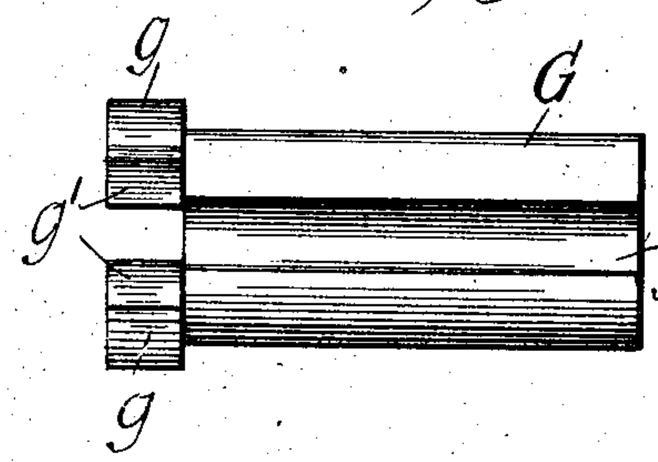


Fig. 5.

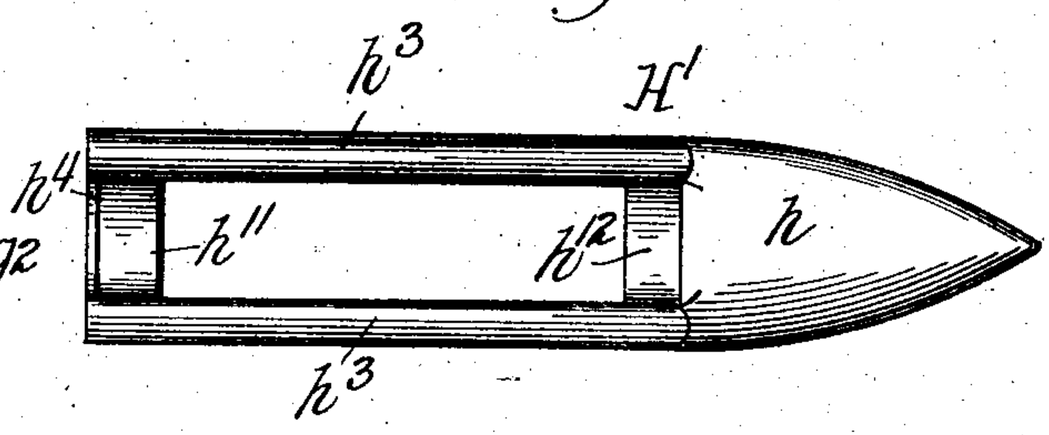


Fig. 8.

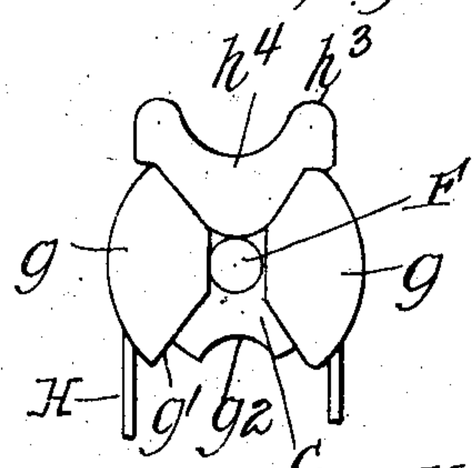


Fig. 9.

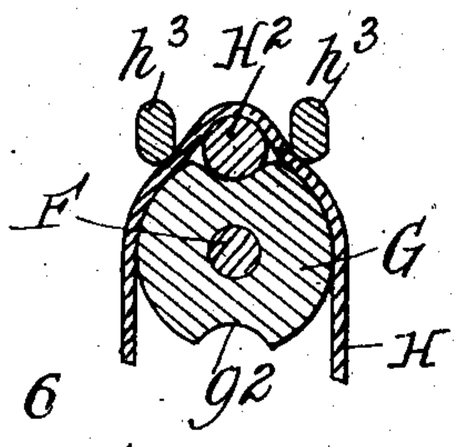
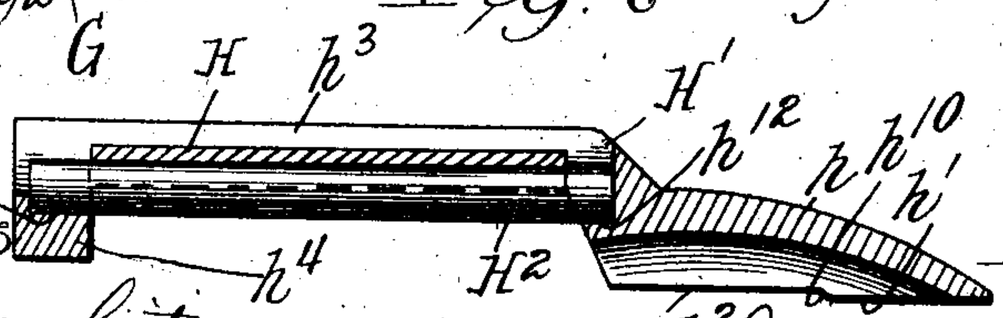


Fig. 6.



Witnesses
Harry R. L. White
Ray White.

Inventor
Adolph Pfund
By Charles D. Rees Atty.

No. 834,320. PATENTED OCT. 30, 1906.

A. PFUND.

MOWER.

APPLICATION FILED MAY 17, 1905.

4 SHEETS—SHEET 4.

Fig. 10

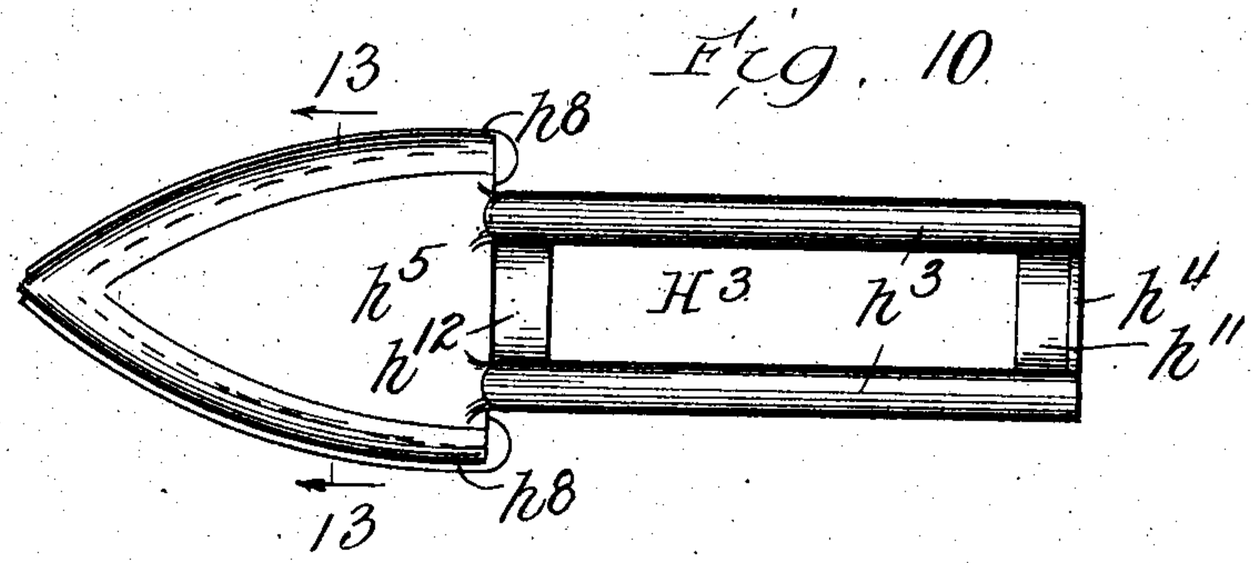


Fig. 12

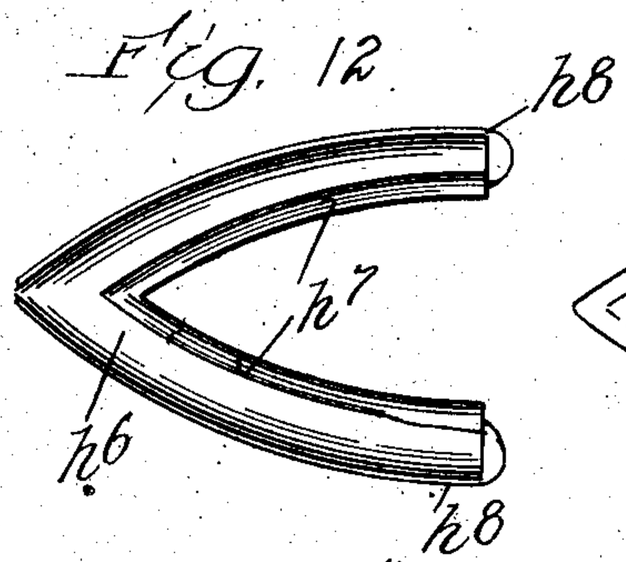


Fig. 11

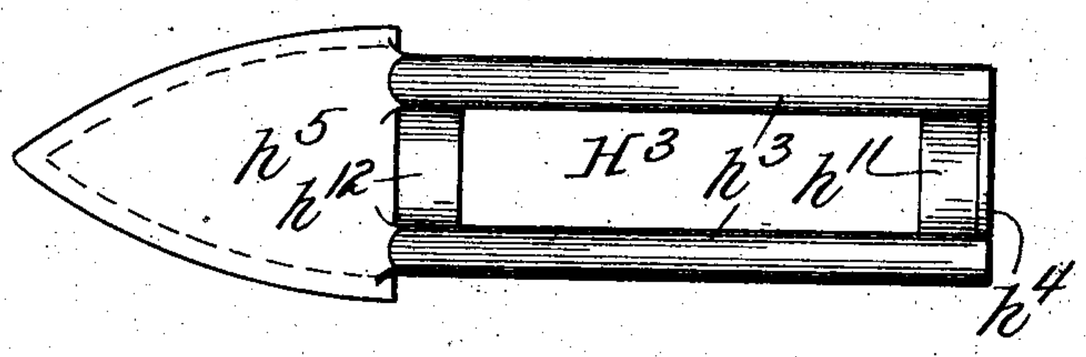


Fig. 14

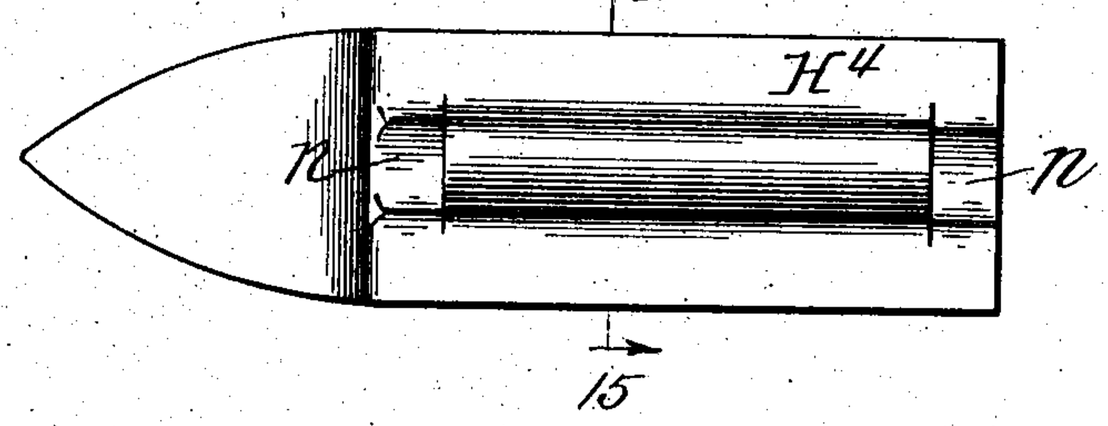


Fig. 13

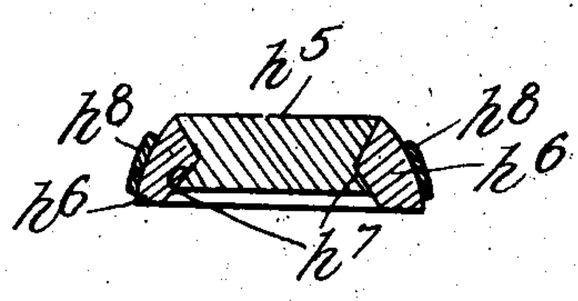


Fig. 16

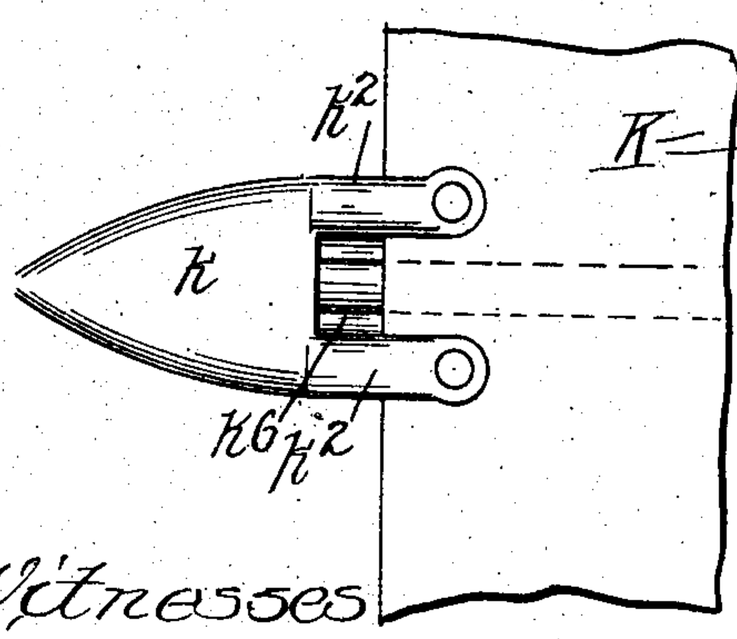
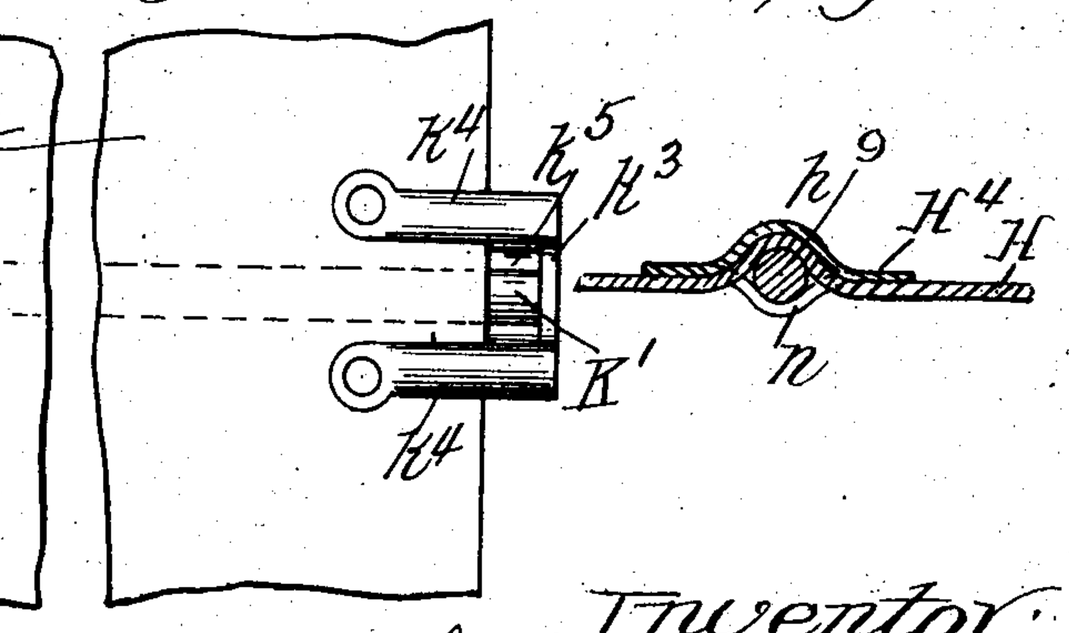


Fig. 15



Witnesses

Harry R. Ludlow

Ray White.

Inventor.

Adolph Pfund

By Charles A. Hellwig

Atty

UNITED STATES PATENT OFFICE.

ADOLPH PFUND, OF BELVIDERE, ILLINOIS.

MOWER.

No. 834,320. Specification of Letters Patent. Patented Oct. 30, 1906.

Application filed May 17, 1905. Serial No. 260,742.

To all whom it may concern:

Be it known that I, ADOLPH PFUND, a citizen of the United States, and a resident of the city of Belvidere, county of Boone, and State of Illinois, have invented certain new and useful Improvements in Mowers; and I do hereby declare that the following is a full, clear, and exact description of the same, 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 to improvements in mowers, and more particularly to a mower provided with a continuously transversely-moving and self-sharpening cutting mechanism and is shown as embodied in a lawn-mower, though obviously it may be embodied in many other similar devices.

Heretofore it has usually been customary in devices of this class to provide either a reciprocating cutting mechanism or, as in the case of some lawn-mowers, a revolving cutting mechanism comprising a plurality of spirally-curved knives. In the former case the friction and wear of the parts occasioned by the reciprocating movement of the cutting mechanism has been a serious objection, necessitating constant repairs, and in the latter case the small amount of cutting edge of each knife which is presented at a time to the grass or other material being cut has necessitated such high speed of the knives as to require a great amount of power to operate the machine.

The object of this invention is to provide a mower in which the knives shall have a continuous transverse movement, thereby reducing to a great extent the wear upon the cutting mechanism and which is adapted to be operated at a minimum rate of speed.

A further object of this invention is to provide a cheap, simple, yet durable construction which will not easily get out of repair and in which the knives are adapted to be self-sharpening.

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 of a device embodying my invention. Fig. 2 is a side elevation of the same. Fig. 3 is a section taken on line 3 3 of Fig. 1. Fig. 4 is a section taken on line 4 4 of Fig. 1. Fig. 5 is a plan view of the outer face of one form of the knives. Fig. 6 is a longitudinal section of one of the knives assembled on the knife-carrier. Fig. 7 is a side elevation of one of the carrier-sprocket pulleys. Fig. 8 is a rear end elevation of one of the knives and carrier-sprocket pulleys. Fig. 9 is a transverse section of the same. Fig. 10 is a plan view of a modified form of the cutting-knives. Fig. 11 is a similar view of the shank therefor. Fig. 12 is a plan view of the removable head for the same. Fig. 13 is a section taken on line 13 13 of Fig. 10. Fig. 14 is a view similar to Fig. 5, but illustrating a further modification of the cutting-knives. Fig. 15 is a section taken on line 15 15 of Fig. 14. Fig. 16 illustrates a still further modification of the cutting-knives.

As shown in said drawings, A represents the body-frame of the machine comprising a casting or strap, of iron or other preferred material, forming integral side members which at the rear portion of the frame extend parallel to each other and are relatively close together, affording a support for the drive or traction wheel A′ of the machine. At a point forward of the bearings for said wheel said side members, as shown, diverge outwardly to points distant from each other approximately equal to the length of cut desired and then extend forwardly, affording parallel side members *a a*, adapted to support the cutting mechanism. At the inner end of said parallel portions *a a* is rigidly connected a transverse beam B of any preferred construction, but which, as shown, comprises a metal strap bent adjacent its ends at approximately right angles therewith, affording means for rigidly engaging the beam to said side members *a*, and then inwardly approximately parallel with the beam, affording bearing-arms *b b*.

A bearing member or bracket C, which, as shown, comprises a casting having laterally and longitudinally directed arms *c* and *c′*, respectively, which are provided with downturned apertured ends affording sleeves or collars c^2 and c^3, is rigidly engaged on the rear portion of said frame A by means of bolts c^4 and c^5, which engage at their outer ends through the side frame members and at their inner ends in the sleeves or collars c^2 of said casting.

The drive-wheel A′ is journaled upon the bolt or shaft c^5 and bears with one face against the inner sleeve c^2 and is provided on the op-

posite face with an elongated bearing-sleeve a', which bears at its outer end against the side of the frame A, thereby holding the wheel from lateral movement.

A drive-shaft D is journaled at the side of the wheel A′ in the bearing-sleeves c^3 c^3 and in the beam B and is held from longitudinal movement by means of collars d^2 d^2, adjustably engaged on said shaft at the outer sides of said sleeves. Carried on said drive-wheel A′ and concentric therewith is a beveled gear A^2, which may be secured thereon in any preferred manner and is adapted to mesh with beveled pinions d d', rigidly engaged upon the drive-shaft D intermediate the bearing-sleeves c^3 c^3. Said pinions d d' are provided, respectively, with inwardly-directed sleeves d^3 d^4, each forming one member of oppositely-acting clutches, the other members of which are afforded by a sleeve D′, slidably, but non-rotatively, engaged upon said shaft and shaped at each end complementally with the adjacent ends of said sleeves d^3 d^4. Said sleeve D′ is of sufficient length so that when in its central position it is out of contact with each of the clutch members formed by the sleeves d^3 and d^4, thereby throwing the shaft out of gear; but when adjusted into engagement with either of said clutch members it acts to drive the shaft in either direction dependent upon which member it is in engagement with. For the purpose of adjusting said sleeve D′ it is provided with a peripheral flange d^5, adapted to be engaged by the forked end of the operating-lever E, which, as shown, is pivoted on the bearing member or bracket C and extends upwardly therefrom and is provided with a detent e, adapted to engage a toothed segment E′, rigidly engaged on said bearing member C opposite from the lever E.

The drive from the wheel A′ is transmitted from the drive-shaft D to the cutting mechanism by means of transmission-shafts F F, journaled in the beam B and the bearing-arms b adjacent each side of the frame and provided with sprocket-wheels f f, adapted to receive the sprocket-chain F′, which is also engaged on and driven by the sprocket-wheel D^2, rigidly engaged upon the forward end of the drive-shaft D.

Rigidly engaged on the forward end of each transmission-shaft F is a carrier sprocket-pulley G, which, as shown more clearly in Figs. 7, 8, and 9, comprises an elongated pulley or roller provided on its end adjacent the bearing-arms b b with oppositely-disposed lugs or cogs g g, projecting both beyond the end and beyond the periphery of the pulley. The outer surface of said lugs or cogs is concentric with the periphery of the pulley, and the adjacent faces g' thereof are inclined inwardly radially of the pulley, forming diametrically opposed recesses between said lugs. Said pulleys are also provided with longitudinal grooves g^2 on diametrically opposite sides of the same and arranged centrally between said lugs g g.

The cutting mechanism is adapted to be driven by said pulleys G G and comprises, as shown, a knife-carrier belt H, which is carried on said pulleys and has engaged thereon at equally-spaced distances throughout its length cutting-knives H′, which on opposite laps of the belt travel oppositely and coact with a shearing movement. As shown more clearly in Figs. 5 and 6, each of said knives comprises a spoon-shaped head h, the forward portion h' of the lateral edges of which forms the cutting edge of the knife, and the rear portion h^2 thereof is cut away or reduced in width, forming a bearing-surface on each edge of the knife separated from the cutting edge by an inclined shoulder h^{10}.

Extending rearwardly from said knife-head is a shank comprising parallel rods or bars h^3, which, as shown, are offset from the knife-head and are united at their rear ends by an inwardly-curved connection or lug h^4, forming a cog adapted to engage in the recesses between the lugs g g of the carrier-sprocket pulleys. Said cog h^4 is recessed on its side adjacent the knife-head to afford a seat h^{11} complemental with a similar seat h^{12} in the rear end of said head h, and in said seats is a pin H^2, by means of which the knives are engaged to the belt or carrier H, as shown more clearly in Figs. 4, 6, and 9.

A bearing or wear plate I, of sheet steel or other desired material, extends longitudinally of the cutting mechanism between the laps of the belt H and, as shown more clearly in Figs. 2 and 3, forms a bearing upon which the bearing-faces h^2 and lugs or cogs h^4 of said knives run. Said plate is of a thickness to permit the cutting edges h' of the knives of one lap of the belt to contact with those of the other when in operation, thereby providing a shearing movement for said knives across each other, which acts to keep them always sharp. A rearwardly-directed arm I′ is connected on each end of said plate and each extends through a slot in the end of the adjacent bearing-arm b and through suitable apertures in the beam B and in the side members of the frame A and is turned inwardly into close proximity with the frame A and integrally connected at its rear end with the other by a transverse end member. Said arms normally rest upon laterally-directed lugs i at the rear end of said frame A, as shown more clearly in Fig. 2, and are provided with rearwardly-directed teeth i', adapted to engage on said lugs and prevent the plate I from moving rearwardly, while permitting the same to be forced inwardly between the cutting edges of the knives, as shown in dotted lines in Fig. 3, and to be held in said position by said notches or teeth until released. For the purpose of holding said knives upon the bearing-

plate, with the cutting edges of the knives of the upper and lower laps of the belt H in engagement with each other when in operation, upper and lower tension-plates J are provided which extend the entire length of the cutting mechanism and are provided at their ends with apertured lugs or ears *j j*, which are pivoted on the side members *a* of the frame, thereby allowing the forward portion of said plates to be turned outwardly. The forward edges of said plates are each provided with an inturned flange *j'*, which engages upon the backs of the knives H', and curved springs J^2 are secured at their ends to said plates and act normally to force the same into compressing relation with the knives.

If preferred, knives H^3, having a removable cutting edge, may be provided, in which case the heads h^5 thereof are grooved, as shown in dotted lines in Fig. 11, to receive the beads h^7 on the inner side of the removable edge h^6. Springs h^8 are engaged on the outer sides of said removable cutting edge and at the rear end thereof are turned inwardly to engage over the rear end of the knife-head and securely hold said edge in place.

If preferred, the knives may be stamped out of sheet metal, as shown in Figs. 14 and 15, in which the knife H^4 comprises a blank of metal, which at points intermediate its ends is slitted transversely, and the intermediate portion or strip of metal is bent outwardly on the back of the knife and the metal at the opposite sides of said slits forced oppositely on the inner side of the knife, as shown more clearly in Fig. 15, thereby forming seats *n n* for the pin h^9, adapted to engage the knives upon the belt or carrier H, as before described.

Should the belt or carrier K be of considerable width, the knives may be formed in two parts, the forward parts of which comprise a head *k* similar to the head *h* of the knife H' and provided with rearwardly-directed apertured arms k^2, adapted to be riveted or otherwise rigidly engaged to the edge of said belt. On the opposite edge of said belt and in alinement with the head *k* is the bracket k^3, provided with inwardly-directed arms k^4 similar to the arms k^2, adapted to be riveted or otherwise engaged to the edge of the belt. Said bracket and head are provided, respectively, beneath the arms k^2 k^4, with seats k^5 and k^6, adapted to receive the attaching-pin K'.

Any preferred means may be employed for operating the machine; but, as shown, a handle L is engaged to the rear of the frame A by means of the braces *l l* and affords means for propelling the mower.

The operation is as follows: The motion of the drive-wheel A' is transmitted through the drive-shaft D and sprocket-chain F' to the transmission-shafts F on the carrier-pulleys E of which the knife-carrier is hung. When in operation, the knives bear upon the bearing-plate I, with the cutting edges thereof projecting beyond the forward edge of the plate in position for the knives on opposite laps of the carrier to slidingly engage, thereby giving a shearing movement to said knives and causing the wear to keep a good cutting edge thereon. If for any reason it is desired to replace any of the knives, they may be quickly removed by slacking the belt and removing the securing-pins from their seats. Said knives are spaced at such a distance apart on the carrier H that one of the connecting-pins is always engaged in one of the grooves g^2 of the sprocket-pulleys and the lugs or cogs h^4 on the knives coacting with the cogs *g* act to center said pins in said grooves.

In transporting the mower from place to place the sleeve D' may be thrown out of engagement with the sleeves d^3 d^4 and the wear-plate forced forwardly between the cutting edges of the knives by means of the arms I' and held in said position by the teeth *i'* in engagement with the lugs *i*.

While I have shown my invention as embodied in a lawn-mower, it is obvious that it may be embodied in many similar devices, and I therefore do not desire to be limited in my invention other than as necessitated by the prior art, and, as stated in the claims, as obviously many details of invention may be varied without departing from the principles of the invention.

I claim as my invention—

1. In a device of the class described the combination with driving mechanism of an endless belt driven thereby and a plurality of knives carried on said belt each comprising a head, rearwardly-extending parallel rods, thereon, integrally connected at their rear ends and a removable rod or bolt carried in seats between said parallel rods.

2. In a device of the class described the combination with a driving mechanism, of a cutting mechanism, comprising a carrier, a plurality of double-edged knives thereon adapted to coact with each other in cutting and a bearing-plate between said knives adjustable longitudinally thereof.

3. In a device of the class described the combination with driving mechanisms, of a cutting mechanism actuated thereby comprising a flexible knife-carrier, a plurality of removable knives thereon, an upper and lower spring-pressed plate adapted to hold said knives in cutting relation to each other, a wear-plate between the laps of said carrier and means thereon for forcing said knives out of cutting relation.

4. In a device of the class described the combination with the driving mechanism, of an endless knife-carrier operated thereby, removable knives on said carrier adapted to coact each with the other and an adjustable wear-plate between the laps of the carrier.

5. In a device of the class described the combination with a driving mechanism, of a unitary endless knife-carrier operated thereby, double-edged knives removably engaged thereon, those on one lap of the carrier adapted to coact with those of the other lap, a transversely movable wear-plate between the laps of the carrier and means acting to hold the knives in close engagement therewith.

6. In a device of the class described the combination with the driving mechanism, of an endless knife-carrier operated thereby, coacting knives removably engaged on said carrier, a plate adjustably engaged between the laps of said carrier and pivotally supported tension-plates adapted to hold said knives in engagement with said plate.

7. In a device of the class described the combination with driving mechanism, of a transversely-movable endless knife-carrier operated thereby, knives removably engaged on said carrier, an adjustable wear-plate between the laps of said carrier affording a bearing for said knives, tension-plates above and below the carrier and resilient means on said tension-plates adapted to exert pressure on the backs of the knives.

8. The combination with a frame, of a shaft journaled at each side thereof, means for rotating said shafts, an endless carrier supported on said shafts, a plurality of inwardly-facing knives adjustably engaged on said carrier, an adjustable wear-plate between the laps of said carrier affording a bearing for said knives, means adapted to be engaged by the operator in forcing said plate forwardly between the cutting edges of the knives and resiliently-connected means adapted to hold said knives in operative engagement.

9. The combination with a frame, of parallel shafts journaled therein, means adapted to rotate said shafts, sprocket-pulleys thereon, an endless carrier on said pulleys and knives thereon and securing-pins for said knives adapted to be engaged by said pulleys to drive the carrier.

10. The combination with a frame, of parallel shafts journaled therein, means for rotating said shafts, a sprocket-pulley on each shaft, a knife-carrier engaged on said pulleys, knives removably engaged on said carrier, removable securing-pins on said knives adapted to engage said pulleys and means for operating said carrier in either direction.

11. A knife of the class described comprising a head, having a plurality of cutting edges thereon, an integral shank extending rearwardly therefrom and offset therefrom toward the back of the knife, centrally-disposed seats in the ends of said shank and a removable pin supported in said seats and extending longitudinally of the shank.

12. A cutting mechanism of the class described comprising a flexible belt, a plurality of knives thereon, provided with integral offset shanks, having seats at the ends, openings toward the back of the knife and a pin supported at its ends in said seats and engaging on the opposite side of the belt from said shank.

13. In a device of the class described the combination with a frame, of parallel shafts journaled therein, a sprocket-pulley on each shaft, a flexible carrier driven by said pulleys, a plurality of knives, a rearwardly-directed shank on each, a pin extending longitudinally of the shank and means on the shank whereby the pins are adapted to secure the knife to the belt.

14. In a device of the class described the combination with a frame, of a drive-wheel journaled therein, a drive-shaft operated by said wheel, a clutch mechanism thereon adapted to drive said shaft in either direction, a shaft journaled at each end of said frame, a sprocket-chain carried on said shafts and driven by the drive-shaft, a flexible carrier on said shafts, coacting knives on said carrier and an adjustable wear-plate adapted to force the knives out of cutting relation with each other.

15. A knife of the class described comprising a cutting-head, rearwardly-directed parallel rods thereon, a seat between said rods at each end thereof and a pin in said seat.

16. In a device of the class described the combination with a frame of a shaft journaled at each end thereof, a grooved pulley rigidly engaged on each shaft and provided with cogs at the outer ends thereof, an endless belt-carrier on said pulleys, a plurality of knives on said carrier, longitudinal pins thereon adapted to positively engage in said grooves, a cog on each knife adapted to engage the cogs of said pulleys and means for driving said shafts.

In testimony whereof I have hereunto subscribed my name in the presence of two subscribing witnesses.

ADOLPH PFUND.

Witnesses:
HJALMAR S. RUDD,
W. W. WITHENBURY.