

Jan. 20, 1953

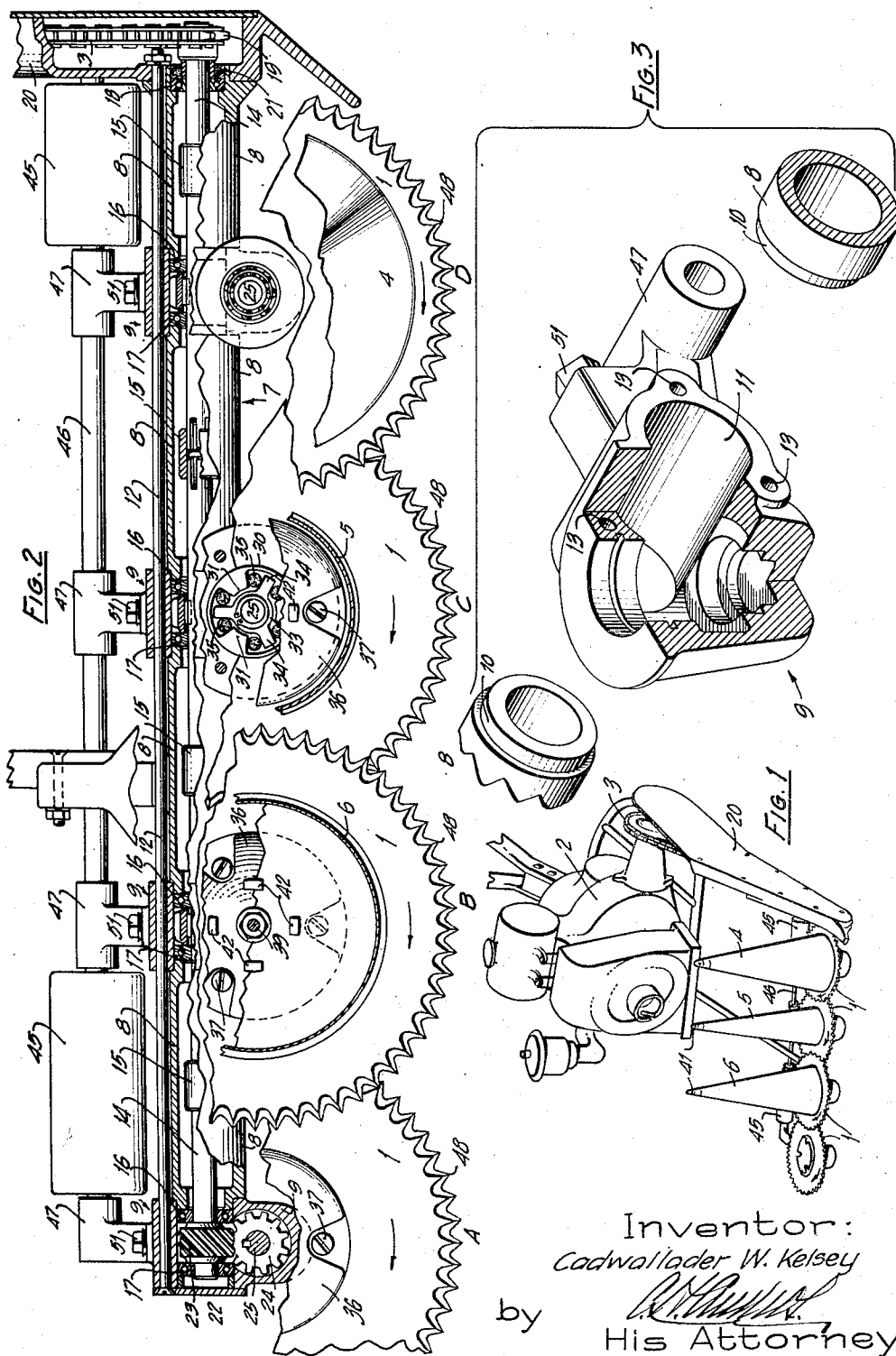
C. W. KELSEY

2,625,784

MULTIPLE WINDROWING DISK TYPE MOWER

Filed Oct. 22, 1948

3 Sheets-Sheet 1



Inventor:
Cedwallader W. Kelsey
by 
His Attorney.

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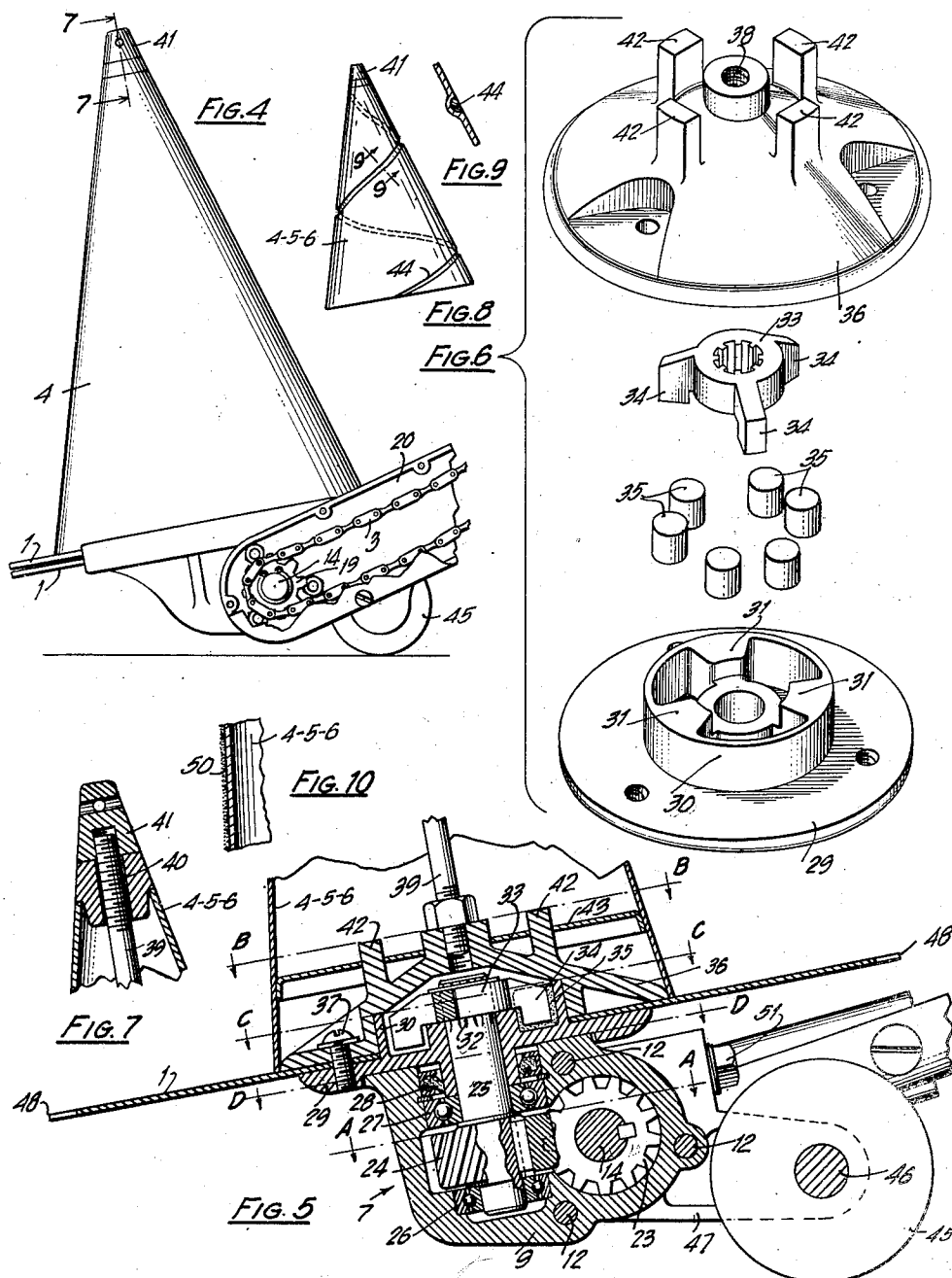
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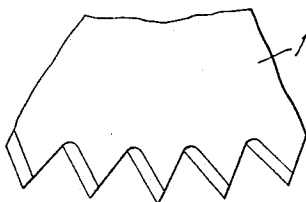
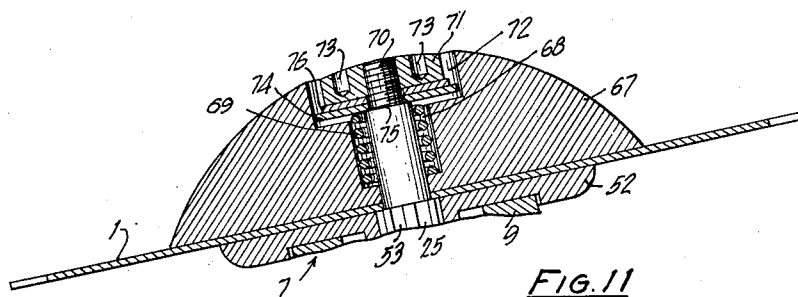
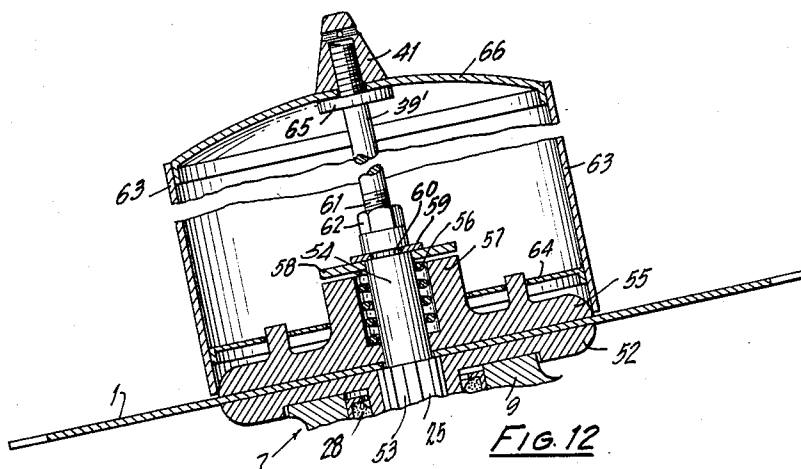


Inventor:
Cadwallader W. Kelsey.
by *[Signature]*
His Attorney.

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3 Sheets-Sheet 3



BY

ATTORNEY

UNITED STATES PATENT OFFICE

2,625,784

MULTIPLE WINDROWING DISK TYPE
MOWER

Cadwallader W. Kelsey, Troy, N. Y.

Application October 22, 1948, Serial No. 55,863

9 Claims. (Cl. 56—192)

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My invention relates to mowing machines and particularly to a cutting mechanism therefor which may be attached to any vehicle for moving it over the ground and for driving the cutters.

The principal object of my invention is to provide a cutting mechanism which is adapted for cutting tall grass, brush, weeds and the like, which will be free from clogging, and which is provided with means whereby the cut material, instead of falling or being deposited in the path traversed by the cutting mechanism, will be deposited in a swath at one side thereof. Another object is to provide a device of this character in which the driving mechanism runs in a bath of oil or grease and which is so constructed that there is little chance, if any, of the lubricant leaking therefrom. Another object is to provide a device of this character in which each individual cutting element is provided with yielding means for cushioning shocks due to encountering material having a tendency to stop the cutting movement of the element. A further object is to provide a device of this character which is provided with means for intercepting the material cut thereby and automatically raising it away from the cutting elements and simultaneously moving it to one side of the machine where it is deposited in a swath.

I accomplish these objects by means of the novel elements and the combinations and arrangements thereof described below and illustrated in the accompanying drawings in which:

Fig. 1 is a small scale perspective view of my cutting mechanism showing it with an internal combustion engine for driving the cutting elements;

Fig. 2 is a fragmentary plan view of the device showing four cutting elements and which is partially in section in four different planes; the portion indicated at A being a section in the plane A—A of Fig. 5; the portion designated as B being a section in the plane B—B of Fig. 5; the portion designated as C being a section in the plane C—C of Fig. 5 and the portion designated as D being a section in the plane D—D of Fig. 5;

Fig. 3 is a fragmentary, exploded, perspective view of a section of the housing or casing which encloses the driving mechanism;

Fig. 4 is a fragmentary, right hand side elevation of the cutting mechanism with a portion thereof broken away;

Fig. 5 is a fragmentary, vertical section through one of the cutting elements showing the driving mechanism therefor to a somewhat larger scale than shown in Fig. 2;

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Fig. 6 is an exploded, perspective view of the shock absorbing device which operatively connects the cutting elements with the driving mechanism;

Fig. 7 is a fragmentary, vertical section through the top of one of the conical elements which intercept the cut material and move it to one side of the device;

Fig. 8 is a small scale elevation view of one of the material moving cones showing a helical groove pressed therein;

Fig. 9 is a section of Fig. 8 in the plane 9—9 drawn to an enlarged scale;

Fig. 10 is a fragmentary, sectional view of one of the cones showing a coating of abrasive material thereon;

Fig. 11 is a fragmentary, vertical section through one of the cutting elements which does not have a cone or cylinder mounted thereon and illustrating a modified form of clutch or shock absorbing drive therefor;

Fig. 12 is a fragmentary section similar to Fig. 11 but showing a cutting element having a cylinder thereon; and

Fig. 13 is a fragmentary plan view of a cutting element.

Referring to the drawings, and first to Fig. 1, my device comprises a plurality of circular saws 1 which are mounted on short, upwardly-extending shafts in closely overlapped relation and which are rotated in the direction of the small arrows shown thereon by mechanism which will be described below; said mechanism being illustrated as driven by an internal combustion engine 2 through a chain drive 3. The saws when viewed from above, all rotate in a clockwise direction and, secured to and rotating with each of the saws, except the saw at the extreme left of the machine, is an upstanding, conical element such as shown at 4, 5 and 6. The term "conical" is used in its broadest sense and is to be understood as including cylindrical elements. These elements intercept the material cut by the advancing edges of the saws 1 and move the material both upwardly away from the saws and also to the left, as viewed in Fig. 1, so that it is deposited in a swath at the left of the machine.

Referring next to the other figures of the drawing, except Figs. 11, 12 and 13, my device comprises a housing represented generally at 7 and which is formed from a plurality of cylindrical, tubular elements 8 and a plurality of other elements represented generally at 9 and best shown in Figs. 3 and 5. The tubular elements 8 are provided at each end with portions 10 of reduced

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diameter, as shown in Fig. 3, which closely interfit with the cylindrical bore 11 of the elements 9. The tubular elements 8 serve to space apart the elements 9 in the assembled casing, and the elements 8 and 9 are secured together in assembled relation by means of three tie rods 12, which extend through the passages 13 in the element 9.

Within the casing 7 and extending longitudinally thereof through the tubular members 8 and the elements 9, is a main drive shaft 14 which is made up of a plurality of separate sections having splined ends and which are connected together between each of the elements 9 by splined collars 15. Within the elements 9, the main drive shaft 14 is supported in two ball-bearings 16 and 17, and a ball bearing 18 is also provided within the housing to support the main drive shaft at the right hand end thereof, as viewed in Fig. 2. A sprocket 19 is fixed to the right hand end of the shaft 14 and cooperates with the drive chain 3 which is preferably enclosed in a suitable housing 20. Where the shaft 14 emerges from the housing at the right hand end, as viewed in Fig. 2, an oil seal 21 is provided, and at the other end, the housing is closed by a plate 22.

Between each of the bearings 16 and 17 a spiral gear 23 is keyed to the shaft 14, as shown at the left hand end of Fig. 2 and also in Fig. 5. Co-operating with each of the spiral gears 23 within each of the elements 9 is a second spiral gear 24 which is secured to a short, upwardly-extending shaft 25 rotatably mounted in bearings 26 and 27 (see Fig. 5) in said elements. Above the bearing 27 and adjacent the top of the element 9 is an oil seal 28.

Rotatably mounted on each of the shafts 25 is a circular plate 29 (see also Fig. 6) having a vertically-extending collar 30 on the top thereof. Extending radially inwardly from the inside of the collar 30 are three equiangularly-spaced abutments 31 and fixed to the splined end 32 of each of the shafts 25 is a driving element 33 having spaced, radially-extending projections 34 which depend therefrom and are disposed between and in spaced relation to the abutments 31 in the plate 29. Disposed in the spaces between the abutments 31 and on each side of each of the projections 34, is a cylindrical block of rubber 35 forming a yielding and resilient driving connection between the driving element 33 and the plate 29 which is driven thereby.

Secured to the plates 29 by means of the caps 36 and screws 37 are the circular saws 1. On the top, each of the caps 36 is provided with a centrally-disposed threaded passage 38 adapted to receive a rod 39 which is also threaded at the top, as shown at 40 in Fig. 7. The sheet metal cones 4, 5 and 6 are secured to the saws and to the parts that rotate therewith by means of nuts 41 which cooperate with the threaded tops of the rods 39, as best shown in Fig. 7. In order to insure that the conical elements 4, 5 and 6 will be positively driven, the caps 36 are provided with upwardly-extending lugs or projections 42 which extend through openings in diaphragms 43 which are secured to the insides of the cones.

From the foregoing it will be apparent that, when the main drive shaft 14 is turning, all of the saws 1 and the conical elements 4, 5 and 6 extending upwardly therefrom, will be rotated in the same direction and, as the cutting mechanism is moved over the ground, grass, weeds, brush and other materials encountered by the saws and cut thereby will be intercepted by the conical elements 4, 5 and 6. Since these elements

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are all rotating in the same direction, they will tend to brush, or otherwise sweep the cut material towards the left side of the machine, as viewed in Fig. 1; the material intercepted by the cone 4, for example, being passed progressively to the cones 5 and 6. Furthermore, since the elements 4, 5 and 6 are conical and the mechanism is moved forwardly, the conical elements will impart to the material intercepted thereby not only a component of motion to the left of the machine, as viewed from the front thereof, but also an upward component which will carry the material upwardly and away from the cutting edges of the saws.

The surfaces of the conical elements 4, 5 and 6 should not be so smooth that they cannot impart a lateral movement to the cut material by frictional contact therewith. On the other hand, the surfaces of these elements should not have projections thereon or be so rough that grass and other like materials coming in contact therewith will be wound around them. Therefore, in order to provide some degree of roughness to the surfaces of the conical elements, a coating 50 (see Fig. 10) of abrasive material, such as may be formed by mixing No. 60 abrasive material with a suitable enamel, may be applied thereto. Alternately, or in combination with the abrasive coated surface, a helical groove, such as shown at 44 in Figs. 8 and 9, or a helical projection, may be pressed into the conical elements. The direction (clockwise or counter-clockwise) in which the helical groove or projection rises on the conical elements is, of course, such that material intercepted by the cones will tend to be raised by the rotation of the cones.

In order to maintain the cutting edges of the saws in spaced relation to the ground, rollers 45 are mounted on a shaft 46 which is held in the brackets 47 forming part of the elements 9.

The shape of the teeth 48 on the saws 1 is quite important if the device is to operate properly without clogging. These teeth should be radially-disposed.

Furthermore, the saws should be downwardly inclined, about as shown in the direction of vehicle motion, because there is less tendency for them to blow the grass over than when they rotate in horizontal planes. The saws are driven at comparatively high speed, about 800 R. P. M. for small machines and about 1500 R. P. M. for large machines.

From a consideration of Fig. 2, it will be apparent that clogging of the saws is substantially impossible because if a stick, or any other similar material is caught between the teeth of one of the saws it will be forced out by the teeth on the next adjacent saw in the zone where the advancing edges of the saws begin to overlap. It will also be apparent that, since the cutting edges of the teeth are disposed rearwardly of the points of the teeth, these edges will be protected to a considerable degree from contact with stones and the like by the points of the teeth which are in advance thereof.

While the conical elements 4, 5 and 6 may be all of the same size, I prefer to make the bases of the cones which are on the upper saws substantially larger than the bases of the cones on the lower saws which must, of course, clear the teeth on the upper saws. Oil or grease may be introduced into the shaft and gear housing through openings in the elements 9 which are normally closed by the plugs 51 and, since the housing is sealed by oil or grease retainers where

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the shafts pass therethrough, escape of lubricant from the housing is practically impossible.

In Figs. 11 and 12 I have illustrated a modified type of shock absorbing means which is particularly but not exclusively adapted for use on larger machines, such as those having saws of a diameter of the order of twenty inches, which is about twice the size of the saws of smaller machines.

Instead of using a resilient, shock-absorbing drive, as illustrated in Fig. 6, the saws are frictionally driven through a clutch which cooperates directly with the saw. Thus, referring first particularly to Fig. 12, the driving plate or clutch member 52 is rigidly connected to the splined portion 53 of the shaft 25. The saw 1 is rotatably mounted on the reduced portion 54 of shaft 25 and simply rests on the plate 52. The upper plate or clutch member 55 is also rotatably mounted on shaft 25 and is held in frictional engagement with the upper surface of the saw by the helical spring 56. The spring is housed in the hub 57 of member 55 and compressed between the member 55 and the washer 53 which is held in spaced relation to the top of the hub by the lock ring 59 in groove 60 of shaft 25.

The upper end of the shaft 25 has an axially-extending threaded recess therein (not shown) to receive the threaded end 61 of rod 39' which is held therein by lock nut 62. The rod 39 is also threaded at the upper end to receive the nut 41.

While conical elements, such as 4, 5 and 6 described above, and having their vertices at finite distances from their bases may be used, I have here illustrated a conical sheet metal element 63 having its vertex at an infinite distance from its base so that it is substantially cylindrical. It is secured to the shaft 25 by rod 39 and nut 41 and is driven by said shaft. It has a stiffening diaphragm 64 in the bottom which is shown as provided with openings through which the lugs 42 pass freely and serve, with the hub 51, merely to maintain the element 63 approximately centered at the bottom. As illustrated, the peripheral edge of the member 55 also serves as a centering means and, where a cylindrical element 63 of larger diameter than that shown in Fig. 12 is employed, the diameter of the member 55 may be increased to conform approximately to the interior diameter of said element.

Since the saw must rise slightly relative to the shaft 25 and member 52 in order to slip when the teeth thereof are obstructed so that it cannot turn, a little clearance must be provided between the bottom of the cylinder 63 and the upper surface of the saw. To maintain this clearance, the rod 39' is provided at the top with an enlarged section 65 against which the top 66 of the cylinder is held by the nut 41.

In Fig. 11, I have illustrated a clutch similar to that shown in Fig. 12 for use on the end saw, such as shown at the left end of the row of saws in Fig. 1, and which carries no conical element. In order to prevent the cut material from catching in the clutch, the upper surface thereof must be smooth. For this reason the upper clutch 67 may be made a portion of a sphere which is rotatably mounted on the shaft 25 and is provided with a centrally disposed recess 68 adapted to contain the clutch spring 69. The upper end of the shaft 25 is threaded, as shown at 70, to receive the nut 71 which is recessed within the counter-bore 72 in the top of the clutch member 67. The nut 71 is provided with recesses 73 in the top thereof to receive a spanner. The washer 74 is seated on the shoulder 75 on shaft 25 and bears

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against the top of the spring 69, and the lock washer 76 is provided between nut 71 and the washer 74.

From the foregoing it will be apparent that if the saw shown in either Fig. 11 or Fig. 12 encounters an obstruction which will prevent it from turning, it will slip between the clutch members 52 and 55 in Fig. 12 or the clutch members 52 and 67 in Fig. 11.

While I have described my invention in its preferred embodiment, it is to be understood that the words which I have used are words of description rather than of limitation and that changes, within the purview of the appended claims, may be made without departing from the true scope and spirit of my invention in its broader aspects.

What I claim is:

1. In a cutting element for a field mower of the character described, the combination with a plurality of circular saws, of separate, vertically-extending shafts to which said saws are secured in closely overlapped relation spaced transversely across the front of said mower, means operatively connected to said saws including a transversely-extending shaft and gears for rotating all of said saws in the same direction, vertically-extending conical elements coaxial with some of said saws which are adjacent each other and extending upwardly therefrom, and means securing said elements to said saws to rotate therewith; whereby material cut by said saws will be intercepted by said rotating conical elements and swept transversely of and deposited at one side of the path of said cutting element.

2. The structure set forth in claim 1 in which the exterior surfaces of said conical elements are provided with means for merely frictionally engaging said cut material, without catching or holding it, to facilitate the sweeping of said material to and depositing it at one side of the path of said cutting element.

3. A cutting element for a field mower comprising a driving shaft, a plurality of vertically-extending, transversely-spaced, driven shafts, cooperating gears on said driving and driven shafts, a circular saw rotatably mounted on each of said driven shafts in closely spaced, overlapped relation to the saws on the next adjacent driven shafts, separate, shock absorbing means for driving each of said saws, including a driving element fixed to each of said driven shafts, a driven element fixed to each of said saws, and yielding means interposed between and drivingly connecting said driving and driven elements, and upright conical elements secured to and rotatable with at least some of said saws for intercepting material cut by said saws and moving it to and depositing it at one side of the path of said cutting element.

4. The structure set forth in claim 3 in which the exterior surfaces of said conical elements are provided with means for merely frictionally engaging said cut material, without catching or holding it, to facilitate the sweeping of said material to and depositing it at one side of the path of said cutting element.

5. A cutting mechanism for a field mower comprising an elongated housing, a driving shaft within and extending longitudinally of said housing, a plurality of longitudinally-spaced, vertically-extending, driven shafts rotatably mounted in said housing and projecting through the top thereof, cooperating gears on said driving and said driven shafts for rotating all of said driven

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shafts in the same direction, a saw clamping means coaxial with and rotatably mounted on each of said driven shafts, a circular saw secured in each of said clamping means coaxial therewith; the saws on adjacent shafts being disposed in closely overlapped relation; a driving element coaxial with and fixed to each of said driven shafts, resilient means cooperating with each of said driving elements and the clamping means coaxial therewith and forming a yielding, torque-transmitting medium between the two, and an upright conical element coaxial with and secured to each of a plurality of said saws to rotate therewith for intercepting material cut by said saws and simultaneously elevating it and sweeping it to one side of the path of said cutting mechanism by frictional contact therewith.

6. The structure set forth in claim 5 in which the exterior surfaces of said conical elements are provided with means for merely frictionally engaging said cut material, without catching or holding it, to facilitate the sweeping of said material to and depositing it at one side of the path of said cutting element.

7. In a cutting element for a field mower of the character described, the combination with a plurality of rotatable, spaced, but slightly overlapping, circular saws extending transversely across the front of said mower and having their edges disposed to cut upstanding grass, weeds and the like with which said edges are brought in contact, of a plurality of rotatable means upstanding above said saws and spaced rearwardly from the edges thereof for intercepting the material cut by said saws, moving it progressively across the front of said mower and depositing it at one side thereof, and means for driving all of said saws and said intercepting means in the same direction.

8. In a cutting element for a field mower of the character described, the combination with a plurality of rotatable, spaced, but slightly overlapping, circular saws extending transversely across the front of said mower and having their edges disposed to cut upstanding grass, weeds, and the like with which said edges are brought in contact, of a plurality of rotatable means upstanding above said saws and coaxial with and

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spaced rearwardly from the edges thereof for intercepting the material cut by said saws, moving it progressively across the front of said mower and depositing it at one side thereof, and means for driving all of said saws and said intercepting means in the same direction.

9. A cutting element for a field mower comprising a plurality of circular saws, a gear housing, a driving shaft in said housing, a plurality of spaced, transversely aligned, driven shafts rotatably mounted in said housing on which said saws are mounted in closely overlapped relation, cooperating gears on said driving shaft and said driven shafts for driving all of said driven shafts in the same direction, rotatable means extending upwardly from at least some of said saws to the rear of the advancing edges thereof for intercepting material cut by said saws, and means operatively connecting said intercepting means to said driven shafts to be rotated thereby in the same direction as said saws for moving said cut material transversely across said element and depositing it in a swath at one side of said element.

CADWALLADER W. KELSEY.

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