

April 17, 1962

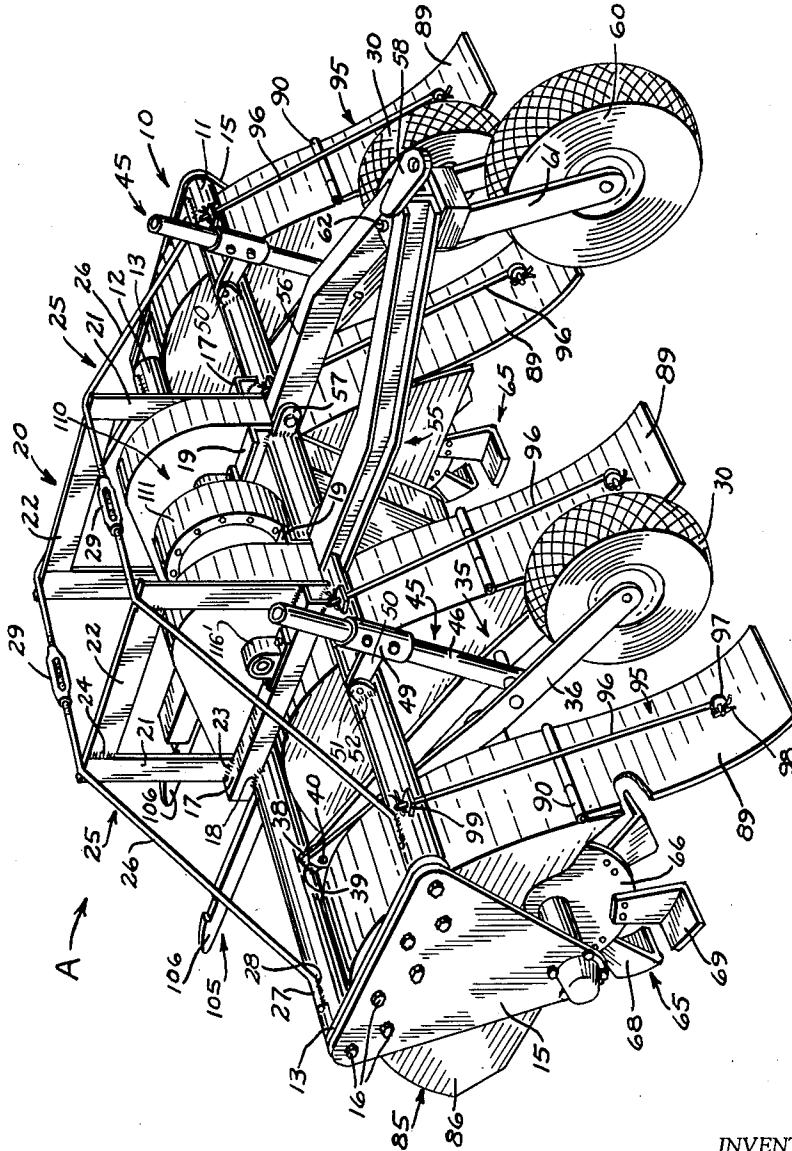
LE ROY WELLS, JR
GROUND MULCHING MACHINE

3,029,879

Filed Oct. 21, 1959

3 Sheets-Sheet 1

Fig. 1.



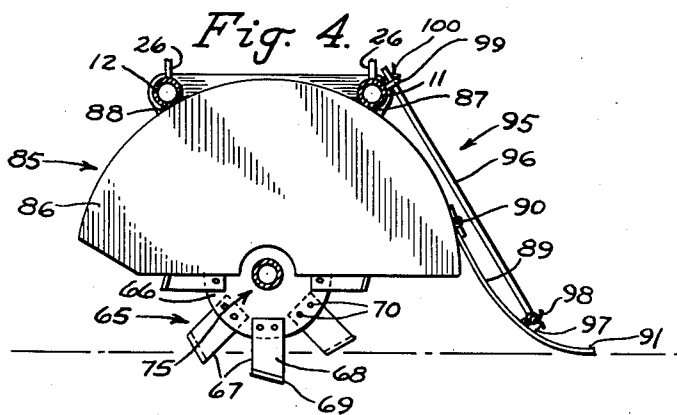
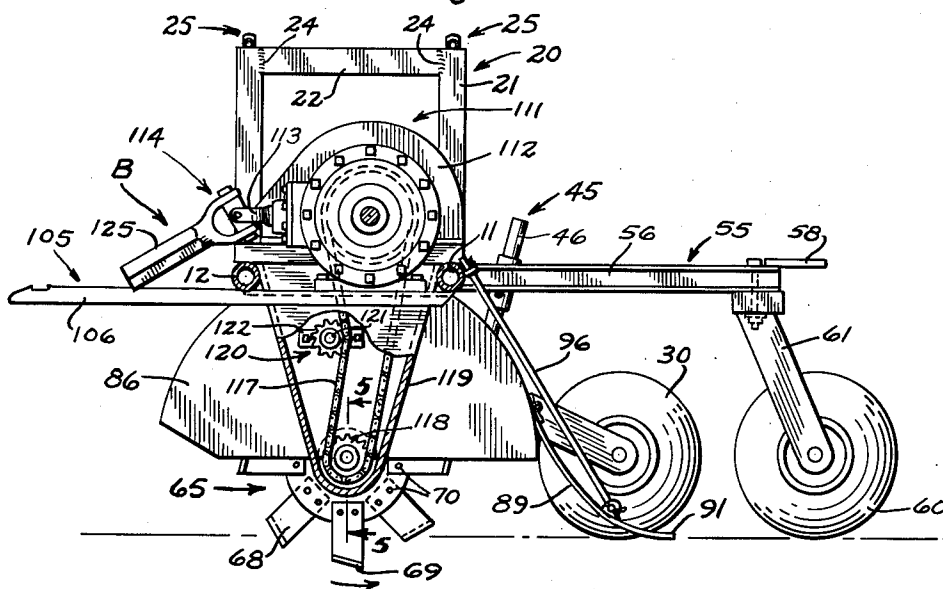
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Fig. 3.



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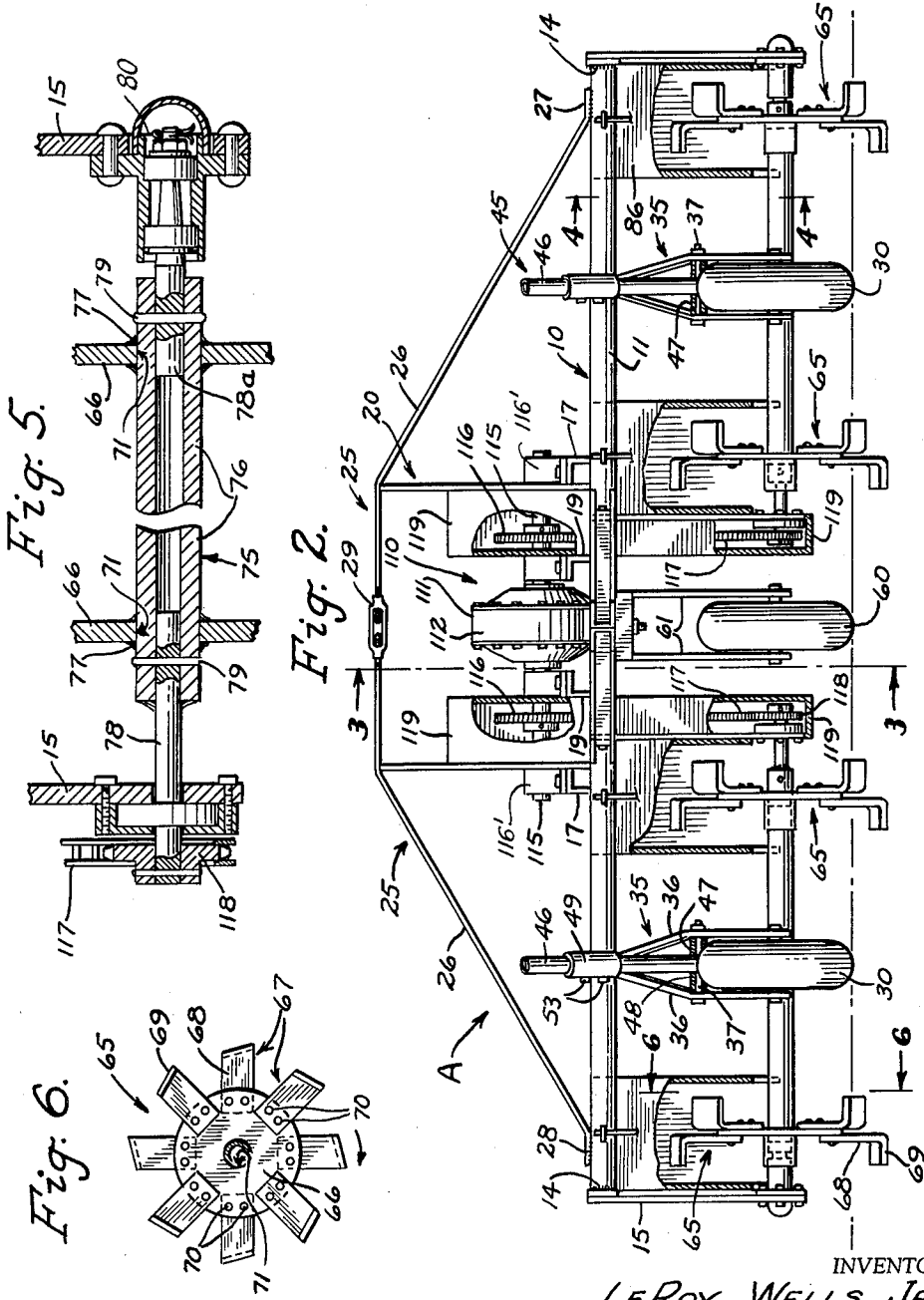
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3 Sheets-Sheet 3



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GROUND MULCHING MACHINE
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1 Claim. (Cl. 172-78)

This machine relates to ground mulching machines and more specifically to such machines equipped with drive means for mulching-tool blades movable with respect to a cyclically driven carrier.

An important object of the invention is to provide a machine as identified above which minimizes drag caused by movement of mulching tools through the ground and contact of associated blade shields with the ground.

Another important object is to provide blade shields which additionally function as ground levellers.

A further important object is to provide a mulching machine which will simultaneously mulch a plurality of strips or rows, such as, for example, four strips or rows, substantially a foot wide, with forty inch centers.

An additional important object is to provide a soil mulching machine which will mulch the soil coarse or fine, as required.

Other objects and advantages of the invention will be apparent during the course of the following detailed description of the invention, taken in connection with the following drawings, forming portions of this disclosure, and in which drawings:

FIG. 1 is a perspective view of an embodiment of the mulching machine as viewed from the rear thereof.

FIG. 2 is mostly a rear elevational view, with portions of the structure in vertical section so as to better disclose other portions of the machine.

FIGS. 3, 4 and 6 are vertical sectional views substantially on their respective lines of FIG. 2.

FIG. 5 is a fragmentary vertical longitudinal sectional view of shaft bearings and associated structures of the machine.

In the drawings, wherein for the purpose of illustration is shown a preferred embodiment of the invention and wherein similar reference characters designate corresponding parts throughout the several views, the letter A designates the mulching machine and B a conventional power take-off of a tractor.

The mulching machine includes a main metallic frame, generally designated 10, comprising two substantially parallel elongated horizontal cross members 11 and 12, the first being the rear cross member and the latter being the front cross member, connected together by a pair of substantially parallel horizontal end plates 13 which may be welded to the end faces of the cross members 11 and 12, as indicated at 14 in FIG. 2 for one of the cross members and the pair of end plates. Secured to each end plate 13 is a vertical bracket 15 which is preferably substantially triangular with a like apex portion of each pointing downwardly and adapted to support bearing means 20 to be subsequently described. These brackets are preferably secured to the end plates 13 as by conventional bolt means 16 with the shanks of the bolts extending through suitable axially aligning openings through the end plates 13 and brackets 15. Extending transversely of the longitudinal axes of the cross members 11 and 12 are two spaced-apart relatively short horizontal outer cross braces 17 which, in addition to functioning as braces, each supports a pair of uprights 21 to be described, as well as a pair of bearings 116' to be later described, with the end portions of the cross braces preferably welded as at 18 to the associated cross members 11 and 12. These cross braces are preferably inverted L-shaped in transverse section (angle irons). Inwardly of and paralleling the cross braces 17 are inner cross braces

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19, shown in FIG. 2 for supporting a differential housing 112 to be described.

Mounted upon the main frame 10 is a sub-frame 20 which preferably comprises spaced apart pairs of uprights 21 and a horizontal brace member 22 for each pair of uprights. The uprights may be secured at their lower end portions to the cross braces 17 as by welds 23 and the brace members 22 may be welded, at their end portions to the upper end portions of the uprights. This sub-frame 10 is adapted to protect the structure contained therein against tree branches and the like. In order to more firmly secure the sub frame 20 I prefer to provide heavy wire or rod brace means 25 consisting of two pair of elongated wires or rods which may be anchored to the cross members 11 and preferably at the end portions or feet 27 of the former, as by welds 28. The wires or rods extend upwardly and inwardly from these feet portions thereof and over the intermediate portions of the upper edges of the uprights 21 in good firm contact with the uprights. At the inner end portions of each companion wire or rod is a tightening means, as turnbuckles 29. These braces 25 also provide additional protection for the mechanism housed within the sub frame 20.

The main and sub frames 10 and 20 respectively are mounted upon a plurality of ground wheels 30 which are preferably rubber tired, and disposed adjacent the rear portion of the machine, as may be seen in FIG. 1. I have discovered that this location is important for the purpose of proper functioning of the combined blades shielding and ground levelling means 85 to be later described.

Strut assemblies 35 rotatably support the ground wheels 30 on conventional axles and each assembly preferably comprises a pair of downwardly and rearwardly extending elongated bars 36 bowed at their intermediate portions where each of a pair supports a horizontal cross pin 47 bridging the pair of bars 36. The upper forward end portions of the pairs of bars 36 are pivotally supported by an ear or projection 38 secured to the front cross member 12 in any approved way as being welded, as at 39 to the cross member intermediate the ends thereof. The ears or projections 38 and the forward end portions of the bars 36 support suitable horizontal pivot pins 40, whereby the strut assemblies 35 may pivot up and down on the pivot pins.

Means 45 to prevent undesirable side play of the companion bars 36, may be an upwardly and downwardly reciprocable and adjustable cylindrical rod 46 for each strut assembly 35, with the lower end portion of the rod pivotally mounted upon, for example, the central portion of a cross pin 47 which may be comprised of the shank of a bolt 37 carried by the intermediate portions of two companion bars 36, and sleeves 48 mounted upon this shank with one edge face of a sleeve contacting the periphery of the rod 46 and the other edge face of the sleeve contacting the inner adjacent face of the bar 36. The rod 46 is adjustably secured, intermediate its ends to a sleeve 49, encircling the rod and which sleeve 49 is provided with a forwardly-extending arm 50 pivoted at its forward end portion to a projection or ear 51 secured, as by welding at 52, to the rear cross member 11 intermediate the ends of the latter. The sleeve 49 may be adjustably secured to the rod 46 by set screws 53 or the like, rotatably carried by the sleeve 49 to bear, at their free end against the rod 46, for adjustment of the rod with respect to the sleeve and thus adjust the height of the ground wheels 30 with respect to the mulching means 65 to be described.

Extending rearwardly from and pivoted to the intermediate portion of the rear cross member 11 is means 55 for coupling a vehicle (not shown) to the rear of the

mulching machine. Such a vehicle may be, for example, a conventional mechanical seed planter to trail the mulching machine. The means 55 may be a normally horizontal yoke 56, as of channel iron construction, pivotally at its forward end portions to pivot pins carried by suitable ears or projections 57 welded, as are the ears 51, to the rear cross member 11. The rear end portion of the yoke may carry a conventional eyed coupling member 58 for the trailing vehicle (not shown).

The rear end portion of the yoke is supported upon a suitable castor wheel 60, commonly termed a "crazy wheel" which may be rubber tired and is pivotally carried by a bifurcated strut 61, the upper end portion of which receives the lower part of a pivot pin 62 carried by the rear end portion of the yoke. Thus the wheel may move as does a conventional castor.

Referring now to the ground or soil mulching means 65, one of which is shown particularly in FIG. 6, but four of them in FIG. 2, for example, each comprises a circular disc 66 of rigid metal with a plurality of blades 67 rigidly mounted radially thereon to project well beyond the periphery of the disc. Each blade 67 is of somewhat L-shape, as may be appreciated from FIG. 2, and comprises a leg portion 68 and foot portion 69 with the planes of the faces of the foot portion inclined with respect to the longitudinal axis of the leg portion 68. For proper mulching I prefer to mount the blades on disc 66 in staggered relation substantially as shown in FIG. 6, with all the feet portions extending outwardly, as in FIG. 1, and with substantially two-thirds of the leg portion projecting outwardly from the periphery of the disc. The blades may be bolted or riveted to the disc. In the example shown, they are riveted as at 70. Each disc 66 has an axial opening 71 (FIG. 5) for mounting in preferably spaced-apart pairs on axle means 75.

There are, in the example shown, two axle means 75, each including a sleeve axle 76 to each of which, in the example shown, two discs 66 are welded, as at 77, in spaced-apart relation, at the walls of the axial opening 71 of the disc. Each sleeve axle is fixedly secured to two stub axles 78 and 78^a, as by pins 79 with the stub axles extending outwardly of the opposite ends of the sleeve axle.

Considering the showing in FIG. 5 as of the right-hand axle assembly of FIG. 2, the right hand stub axle of FIG. 5 is conventionally rotatably supported by bearing means 80 carried by the adjacent triangular bracket 15, while the other stub axle 78 is rotatably supported by the lower end portion of a lower chain and sprocket housing 119 to be detailed, and which contains a conventional bearing means for the stub axle.

Referring next to the specific combined blades shielding and ground levelling means 85, best shown in FIGS. 1 and 4, but also shown in FIG. 3, the same includes a hood or housing 86 having an open lower end and is adapted to overhang the upper part of a ground or soil mulching means 65. Preferably this housing extends downwardly with most of its lower edge, defining the mouth, disposed at about the axis of rotation of the axle means 75. The housing may be secured as by weldings 87 and 88 (FIG. 4) to the cross members 11 and 12 respectively. Each of the four housings 86 supports the upper end portion of a flexible sheet 89, which may be of heavy leather or rubber, normally arched longitudinally substantially as shown in FIGS. 3 and 4, to display a concave contour as viewed from above. The connections of the sheets 89 to the housings 86 may be hinged, by the use of conventional hinges 90 with their axes of rotation horizontal. The lower edges 91 of the sheets 89 are adapted to contact and move over the mulched ground and tend to smooth and disintegrate the broken up ground.

In order to effect the proper contact of the lower or free end portions of the sheets 89 with the mulched ground, I provide weight and guide means 95 for each

sheet. This means comprises a rod or bar 95 having enough weight to cause the lower free end portion of the sheet to firmly engage the ground but, in order that this lower free end portion or, in fact, any part of the sheet, will not be damaged, such as coming in contact with a rock or root in its path, the rod or bar 96 is adapted to reciprocate, although it is, of course, pivotally secured at its lower end, to the lower end portion of the sheet 89, as by an eyed portion 97 extending upwardly from that lower end portion to receive a bent over terminal portion of the rod or bar, with the former held in place with a cotter pin 98 or the like. Reciprocation of the rod or bar 96 is permitted by an eyed lug 99 secured to and projecting from the rear cross member 11, through which the upper end portion of the rod or bar may slide. A cotter pin 100, extending through that portion of the rod or bar projecting upwardly from the lug 99 prevents detachment of the former from the latter.

A conventional two-point hitch means 105 for detachably coupling the mulching machine to a tractor (not shown in detail) at the conventional drawbar of the latter may comprise the two horizontal notched bars 106, shown in FIGS. 1 and 3 with their rearward end portions suitably secured to the cross members 11 and 12 by bolts and nut assemblies, welding, or the like.

For positive rotation of the discs 66 of the mulching means 65, I provide operating means 110 for operative connection with the conventional power take-off shaft 125 of a conventional power take-off B of a tractor (not shown). The means 110 includes a conventional differential, generally designed as 111, and including a housing 112 mounted upon the inner cross braces 19, as may be seen in FIG. 2, being preferably bolted thereto. The power take-off drive shaft 125 may be coupled to the driven shaft 113 of the differential 111 by a conventional universal joint 114. Since the four mulching means 65 are mounted so that the discs thereof will rotate in pairs, the differential 111 contains two drive shafts 115 rotatable in bearings 116' mounted upon the cross braces 17. Each drive shaft 115 fixedly mounts an upper sprocket wheel 116 upon which is wound a sprocket chain 117 which meshes with a lower sprocket wheel 118 fixedly mounted upon the stub axles 78 and thus rotation of these axles 78 and the discs 66 mounted thereon is effected. Housings 119 for each of the sprocket chains 117 and wheels 116 and 118 may be provided and may be welded to the cross members 11 and 12 to extend upwardly into the sub frame 20 and downwardly to below the sprocket wheels 118. Sprocket chain tightening means 120 (FIG. 3) comprises a sprocket wheel 121 in mesh with the sprocket chain 117 and rotatably supported by a horizontally movable adjustable slide 122 which is, in turn, carried by the housing 119 and provided with two longitudinal slots through which the shanks of bolts may extend to receive nuts for tightening against the slide, an expedient well known in the art.

In the operation of the mulching machine, the machine may be hitched to a suitable vehicle, as preferably a tractor, utilizing the notched bar 106 of the hitch means 105 to effect coupling with the conventional draw bar of a tractor. The shaft 125 of the conventional power take-off B of the tractor is now operatively connected to the driven shaft 113 of the differential 111, utilizing the universal joint 114. If desired, a trailing vehicle, as a mechanical seed planter, may be coupled to the mulching machine A, by the means 55, through use of the eyed coupling 58. The depth of the penetration of the ground blades 67 of the mulching means 65 may be adjusted by loosening the set screws 53 and moving the cylindrical rods 46 in the sleeves 49 until the ground wheels 30 are so disposed with reference to the mulching means 65 that proper penetration of the blades will be possible whereupon the set screws may be tightened. Of course, raising of the rods 46 upwardly will cause more penetration of the ground by the blades 67, and lowering

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of the rods 46 will cause less penetration. The tractor or like vehicle may now be started to operate and as the mulching means 65 starts to function, causing rotation of the discs 66 and penetration of the ground by the blades, the mulching machine moves over the ground. Driving the mulching machine fast will tend to mulch the ground finer and slower driving will tend to cause coarser mulching.

The shape of the blades 67 taken with their staggered disposition on both faces of the discs 66 causes a penetration of the ground, then a shearing action thereon, next a raising of the sheared ground, then sliding of the raised ground along the feet portions 69, which raised ground thereupon drops off the lower ends of the feet and in so doing tends to disintegrate. Being staggered, there is not the jerky operation of the mulching means which is encountered when the blades are not staggered but are spaced apart.

By mounting the ground wheels 30 and the castor wheel 60 at the rear end portion of the machine A to project outwardly and rearwardly of the frame 10, the mulching means 65 are well forwardly of these wheels and adjacent the forward end of the frame 10.

Furthermore, the weight of a conventional differential apparatus, together with its housing is considerable and, as the differential 111 and its housing 112 is directly above the mulching means 65, this disposition of the former also tends to effect positive penetration of the blades 67.

Various changes may be made to the size and arrangement of parts of this invention without departing from the spirit of the invention or the scope of the claim.

What is claimed is:

In a mulching machine, a main frame consisting of two elongate substantially parallel and horizontally disposed front and rear cross members, end plates carried by the end portions of said cross members, a substantially vertically disposed bracket extending downwardly from and secured to each of said end plates, and cross brace means for said cross members carried by said cross

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members inwardly of said end plates and brackets; differential means mounted upon said cross brace means; two spaced-apart substantially vertically disposed housings carried by said cross members beneath said cross brace means and extending downwardly therefrom; rotatable ground mulching means carried by said brackets and housings, including two substantially horizontally disposed stub axles; rotatable operative connection means between said differential means and said stub axles and disposed within said housings; hoods carried by said cross members, each disposed between an end plate and a housing and extending downwardly over portions of said ground mulching means; and spaced-apart ground engaging wheels carried by the front cross member, each projecting rearwardly of the vertical plane of said frame and disposed between the vertical planes of one of said end plates and one of said housings.

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