Dec. 11, 1923. 1,476,917

J. F. M. PATITZ

ROTARY TILLER

Original Filed May 27, 1918

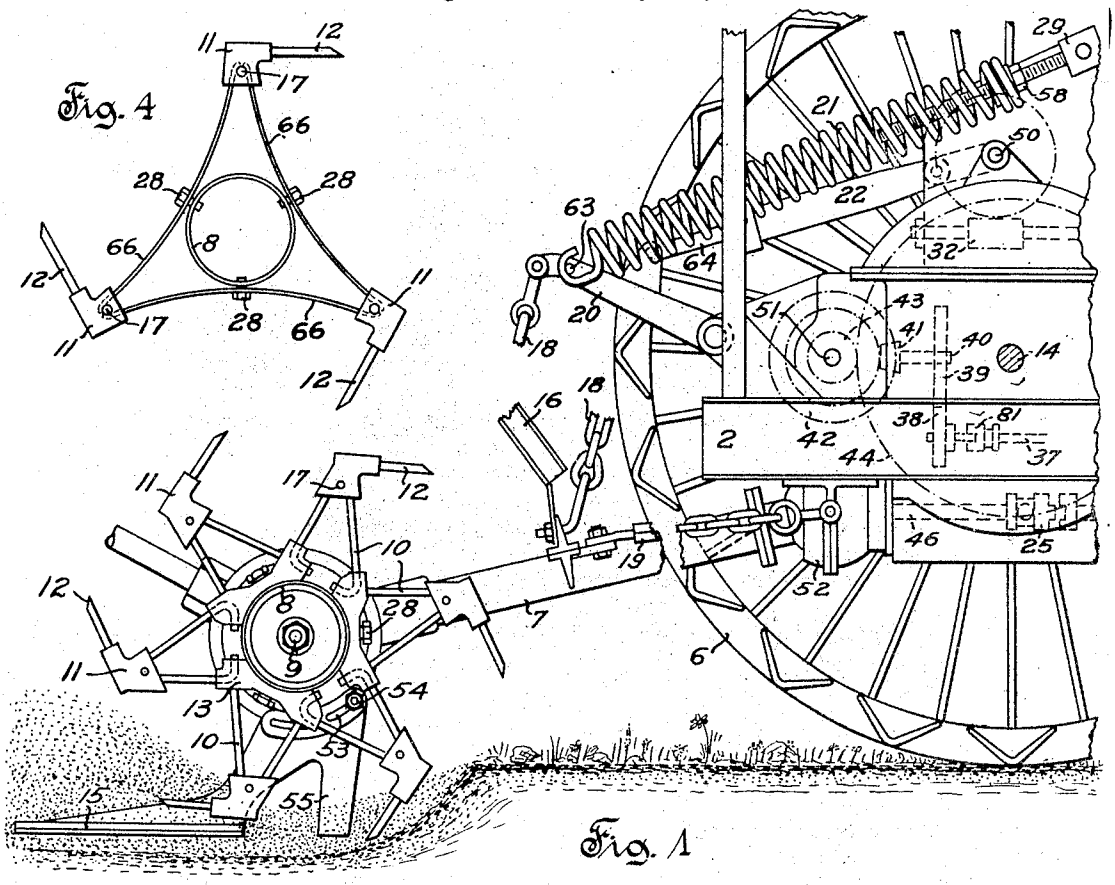


Fig. 1

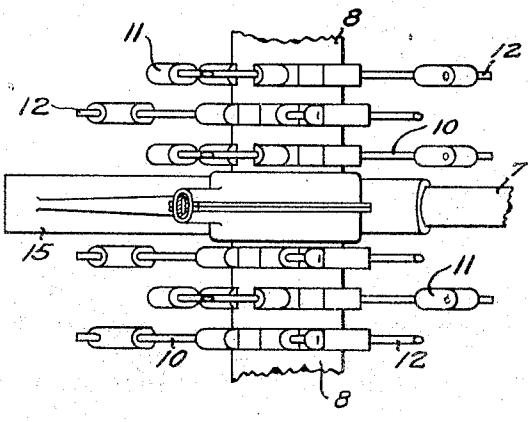


Fig. 3

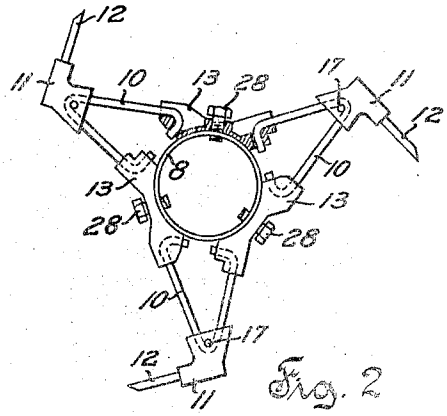


Fig. 2

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Patented Dec. 11, 1923. 1,476,917

UNITED STATES PATENT OFFICE.

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ROTARY TILLER.

Original application filed May 27, 1918, Serial No. 237,359. Divided and this application filed June 3, 1921. Serial No. 474,712.

To all whom it may concern:

Be it known that JOHANN FRIEDRICH MAX PATITZ, a citizen of the United States, residing at Milwaukee, in the county of Milwaukee and State of Wisconsin, has invented a certain new and useful Improved Rotary Tiller, of which the following is a specification.

This invention relates in general to improvements in the construction and operation of agricultural appliances, and relates more specifically to improvements in soil tilling machines and implements.

A general object of the invention is to provide a soil tiller which is simple in construction and efficient in operation.

One of the more specific objects is to provide an improved construction of disintregrating element for rotary tillers, which is simple and compact in construction and which will not be readily damaged by impact with abnormally hard substances in the soil. It has heretofore been proposed to construct a rotary tiller with a plurality of flexible wire hooks secured to a rotating drum and adapted for angular displacement relatively to the drum and around the axis of rotation thereof. With this prior structure if an abnormally hard substance was encountered by one of the hooks, the obstructed hook would swing inwardly toward the drum and around the axis of rotation thereof, in order to permit the rotor to pass over such obstruction. It has been found that in order to provide sufficient stiffness in these wire hooks, to effectively till the soil, the hooks must be formed of relatively heavy wire which will not readily submit to distortion by obstructions and which will, in many cases, break rather than bend. In order to overcome the objections of this prior device, it has been proposed to utilize a disintegrating element which, in order to provide sufficient rigidity for tilling, is fixed against angular displacement about the rotor axis, but which will automatically move laterally out of its normal plane of rotation and thus avoid injury to the rotor in case an obstruction is encountered. While this laterally movable device eliminates the objections encountered with the preceding spring hooks the structure is expensive from a manufacturing standpoint due to the fact that comparatively complicated means are employed for returning the disintegrating elements after displacement. The present invention therefore contemplates an improvement over the laterally movable disintegrating element structure, whereby the cost of construction may be reduced to a minimum without sacrificing efficiency.

Another specific object is to provide means for accurately and readily gaging the depth of tillage. It has heretofore been proposed to utilize a gaging shoe eccentrically pivoted to the tiller rotor at a medial portion thereof. The shoe of this prior gaging device was provided with a leading edge inclined upwardly and rearwardly away from the ground similar to the ordinary plowshare. It has been found that this prior device while providing relatively efficient gaging means, was objectionable in that it collected and carried large quantities of débris along the surface of the soil, thus interfering with the adjacent tilling hooks. The present invention contemplates elimination of this objectionable feature of the prior art device, by providing a gaging shoe which is adjustable to different positions around the axis of the rotor as a center, and which has a cutting member in advance thereof which disintegrates the débris and thus prevents accumulation. The gaging shoe itself has a leading edge which is inclined downwardly and rearwardly toward the ground, whereby débris is forced into the tilled soil as the machine advances.

A further specific object is to provide various improvements in details of tiller structure, whereby a tiller of maximum capacity results and one which is readily controlled by a single attendant. The present application is a division of application Serial No. 237,359 filed May 27, 1918.

A clear conception of an embodiment of the invention may be had by referring to the drawing accompanying and forming a part of this specification, in which like reference characters designate the same or similar parts in the various views.

Fig. 1 is a fragmentary side elevation of a motor-driven soil tiller showing the same in operating position with respect to the ground.

Fig. 2 is a part sectional side elevation of

one set of three disintegrating elements showing the same secured to the rotor drum.

Fig. 3 is a fragmentary top view of the medial portion of the tiller rotor showing the depth gaging mechanism.

Fig. 4 is a side elevation of one set of three disintegrating elements of modified construction.

While the invention is disclosed herein as applied to a motor-driven traction engine, it will be obvious that at least some of the features thereof are not limited to such specific embodiment. The motor-driven tractor which transports the soil tilling and disintegrating element, comprises a main frame 2 mounted upon a pair of rear traction wheels 6 and one or more front steering wheels, not shown. The rear traction wheels 6 are associated with the rear axles 14 and are operatively connected to a main motor or engine located at the front of the machine, through transmission mechanism and clutches of well known structure. Associated with the rear of the vehicle is a rotor supporting column 7 the front end of which is pivotally connected to the frame 2 by means of a universal coupling 52 and the opposite vertically swingable end of which forms a support for the tiller disintegrating element or rotor.

The form of tiller rotor disclosed in Figs. 1, 2 and 3, comprises a centrally divided carrier or drum 8 drivingly connected to a concentric drive shaft 9 which is in turn operatively connected at its medial portion through suitable bevel gearing and shafting not shown, to a drive shaft 46. The carrier or drum 8 has a plurality of disintegrating hooks or elements mounted thereon. Each of the disintegrating elements comprises a substantially triangular spring arm 10, a head 11 locked to the spring arm 10 by means of a transverse locking pin 17, and a renewable point 12 fitted within a tapered hole in the head 11. The ends of each spring arm 10 adjacent to the drum 8, are bent inwardly and engage alined openings in the adjacent bracket 13. The brackets 13 are loosely detachably secured to the drum 8 by means of cap screws 28. These brackets 13 are capable of swinging to a limited extent, about the retaining cap screws 28 as pivots, thereby permitting lateral displacement of the disintegrating elements, when these elements engage abnormal obstructions. the brackets 13 of each annular series however, being normally retained in a plane perpendicular to the axis of the drum 8 and in contact with the drum by the pressure exerted against the brackets by the spring arms 10. It will be noted that during sidewise displacement of one of the hooks of a series, the other two hooks of that series will also be slightly displaced due to the interconnection of the three hooks. The effect of this displacement is however immaterial and all of the three hooks of the series are automatically returned to their normal position as the obstructed hook is released.

The form of tiller rotor disclosed in Fig. 4, comprises a carrier or drum 8 with which a plurality of interconnected disintegrating hooks of modified form are associated. Each disintegrating implement of this modification, comprises a pair of leaf springs 66 having bent ends, a head 11 locked to the spring ends by means of a transverse locking pin 17, and a renewable point 12 fitted within a tapered hole in the head 11. Each of the leaf springs 66, in common to two of the hooks, these leaf springs having their mid-portions loosely connected to the drum 8 by means of cap screws 28, and having their bent ends loosely fitting the heads 11 so as to permit the desired lateral displacement of the individual hooks upon engagement of an abnormal obstruction.

The tiller actuating, adjusting and transporting power is furnished by a common motor, the power being delivered to the tiller actuating and adjusting mechanisms and to the vehicle transmission mechanism through a main shaft 37. From the main shaft 37 the power for propelling the vehicle is transmitted to the rear axles 14 through the vehicle transmission mechanism which comprises coacting spur gears 38, 39, a counter-shaft 40, coacting bevel gears 41, 42, a counter-shaft 51, coacting spur gears 43, 44, and a differential mechanism of ordinary construction, not shown. A clutch 81 associated with the spur gear 38 and with the shaft 37 controls the connection of the transmission mechanism to the main shaft 37, this clutch being manipulable from the operator's seat. From the main shaft 37, the power for operating the tiller rotor, is transmitted to the tiller operating shaft 46, and from thence through a universal joint housed within the coupling 52 and through shafting and gearing housed within the supporting column 7, to the transverse rotor shaft 9. It will thus be observed that both the vehicle transmission mechanism and the tiller actuating mechanism have independent connections to the engine.

The tiller supporting column 7 which is pivotally mounted upon the trailing end of the vehicle frame 2, is restrained against excessive movement out of a vertical plane, by means of guide chains 19, secured to a medial portion of the column 7 and to the side beams of the vehicle frame 2. A protecting hood 16 is also associated with the column 7 at the point of attachment of the chains 19 thereto, this hood extending rearwardly over the tiller rotor so as to prevent material from being thrown by the hooks against the mechanism which is mounted

upon the vehicle. A chain 18 is also connected to the column 7 adjacent to the point of attachment of the chains 19 and hood 16 thereto, this chain 18 extending upwardly and having its upper extremities pivotally connected to the extreme outer end of an adjustable lever 20 which is swingably mounted upon a pivot carried by the vehicle frame 2. The lever 20 is provided at a point intermediate its ends, with a laterally projecting pin 63 to which is secured one end of a coiled spring 21. The opposite end of the spring 21 is adjustably secured by means of a nut 58, to a screw threaded connecting rod which is in turn adjustably secured to a swivel block 29 pivotally mounted upon the vehicle frame 2. A connecting rod 64 is pivotally connected to the lever 20 at a point between the pin 63 and the lever pivot, this connecting rod 64 being provided with a nut and washer coacting with one end of a helical compression spring. This helical compression spring, not shown, is located within a tubular connection 22 and has its end engaging an end of the connection 22 in such a manner that the spring may be compressed by moving the connection 64 to the right longitudinally of the tubular connection 22. The forward end of the connection 22 is pivotally connected to a crank which is rotatable by means of a cross-shaft 50 having a worm-wheel mounted thereon. This worm-wheel meshes with a worm 32 which is adapted to be rotated by the engine. With the aid of the mechanism just described, the tiller rotor may be raised and lowered independently of the vehicle transmission mechanism and of the rotor actuating mechanism.

The drum 8 is provided at its medial portion with a flange or projection to which is adjustably secured a downwardly depending depth gaging shoe 15, see Figs. 1 and 3. The depth gaging shoe 15 is provided with elongated curved slots 53 which permit adjustment of the shoe about the axis of the drum 8 and relatively to the shoe clamping bolts 54. The leading end of the shoe 15 is provided with a depending projection or cutter 55 which serves to form a fissure in the soil in advance of the shoe 15. It will be noted by referring to Fig. 3, that the shoe 15 and the column 7 are located between two annular series of disintegrating elements and occupy approximately the same space measured longitudinally of the drum 8, as is occupied by one set of disintegrating elements.

During normal operation of the machine, the vehicle transmission mechanism may be operated independently of the tiller rotating mechanism and of the tiller lifting mechanism. In order to cause the tiller rotor to revolve, it is necessary only to place the engine in operation and to throw in the clutch 25, whereupon rotary motion is transmitted to the tiller drive shaft 9. The motion transmitted to the tiller drive shaft 9, causes the tiller 8 to revolve in a clockwise direction as viewed in Figs. 1, 2 and 4. The tiller rotor may be lowered into the ground or elevated therefrom, independently of the operation of the vehicle transmission mechanism or of the tiller rotating mechanism.

The depth of tillage is controlled by the position of the depth gaging shoe 15 relatively to the drum 8. If the tiller rotor is lowered toward the ground and the transporting vehicle moves forward, the shoe 15 will always assume a position approximately parallel to the ground surface. This will be apparent from the fact that with the flat portion of the shoe 15 dragging through the soil substantially parallel to the ground surface, the shoe offers less resistance as it advances through the soil than it would in any other position. By loosening the adjusting bolts 54, swinging the gaging shoe 15 about the axis of the drum 8 as a center and refastening the bolts 54, it will be apparent that the depth of the cut may be readily varied. By inclining the leading edge of the shoe downwardly and rearwardly relatively to the tiller rotor, débris accumulated by the leading edge of the gaging shoe will be urged downwardly and forced under the surface of the tilled soil. The cutting projection 55 serves to provide a fissure or groove through which the gaging shoe may readily pass. It will be noted that by bringing the tiller hooks on opposite sides of the gaging shoe as near as possible to this shoe, and providing the shoe with a cutter projection 55, all of the soil within the limits of the tiller rotor, is effectively disintegrated.

The disintegrating hooks will readily move transversely of the rotor, when abnormally hard substances are encountered, and will automatically return to their normal positions after the obstruction has been passed. If an obstruction is of such size that the hooks can not move transversely of the rotor a sufficient amount to clear the obstruction, the entire rotor will be lifted by the obstructing hook or hooks and will again assume its normal operating position when the obstruction has been passed. The disintegrating hooks are of relatively simple construction and may be readily replaced when necessary.

It should be understood that it is not desired to limit the invention to the exact details of construction herein shown and described, for various modifications may occur to persons skilled in the art.

It is claimed and desired to secure by Letters Patent:

1. In a tiller, a carrier movable about an axis, a member loosely attached to said car-

rier by means of a pivot extending transversely of said axis, and a plurality of disintegrating elements associated with said loosely attached member.

2. In a tiller, a carrier rotatable about an axis, a member loosely pivotally attached to said carrier by means of a pivot intersecting said axis, and a plurality of disintegrating elements attached to said member.

3. In a tiller, a carrier, a member pivotally attached to and lying in a plane extending transversely of said carrier, and a plurality of disintegrating elements associated with said member and restraining the same against movement out of said plane.

4. In a tiller, a carrier, a member pivotally attached to said carrier, and a plurality of disintegrating elements having spring arms for urging said member and said elements into a common plane.

5. In a tiller, a carrier, a plurality of members lying in a plane transversely of said carrier, and a plurality of disintegrating elements directly connecting said members, said members and said elements completely encircling said carrier.

6. In a tiller, a carrier, a series of members spaced about and pivotally attached to said carrier, and disintegrating elements in the spaces between said members, said elements having spring arms for urging adjacent members toward each other.

7. In a tiller, a vehicle, a downwardly movable disintegrating rotor associated with said vehicle, and means for predetermining the extent of downward movement of said rotor, said means comprising an element adjustable to different positions around the axis of said rotor as a center.

8. In a tiller, a downwardly movable disintegrating rotor, and gaging means for predetermining the extent of downward movement of said rotor, said means comprising a shoe adjustable to different positions around the axis of said rotor as a center.

9. In a tiller, a vehicle, a downwardly movable disintegrating rotor associated with said vehicle, and means for predetermining the extent of downward movement of said rotor, said means comprising a cutting member having a substantially vertical leading edge, and a shoe member trailing behind said cutting member.

10. In a tiller, a vehicle, a downwardly movable disintegrating rotor associated with said vehicle, and means for predetermining the extent of downward movement of said rotor, said means comprising a shoe member having a leading edge sloping downwardly and rearwardly with reference to said rotor.

11. In a tiller, a vehicle, a member pivoted upon said vehicle to swing in a vertical plane, a disintegrating rotor carried by said member, and gaging means associated with said rotor for predetermining the extent of downward swing of said member, said gaging means comprising a shoe adjustable to different positions around the axis of said rotor as a center.

12. In a tiller, a carrier movable about an axis, a plurality of members pivoted in a plane transverse to said axis, and a plurality of disintegrating elements directly connecting said members, said members and said elements completely encircling said carrier and said elements being constructed to urge said members toward said plane about their pivots.

13. In a tiller, a carrier rotatable about an axis, a plurality of members coacting with said carrier and movable about pivots extending transversely of said carrier axis, and a plurality of disintegrating elements having spring arms directly connecting said members, said members and said elements completely encircling said carrier and said spring arms restraining said members against movement about said pivots.

14. In a tiller, a carrier rotatable about an axis, a plurality of members loosely associated with said carrier by means of pivots having axes which intersect said carrier axis, and a plurality of disintegrating elements directly connecting and cooperating with said members to completely encircle said carrier, said elements restraining said members against movement about said pivots.

In testimony whereof, the signature of the inventor is affixed hereto.

JOHANN FRIEDRICH MAX PATITZ.