Aug. 9, 1938. M. M. BRODERSEN 2,126,446

DISK HARROW

Original Filed June 10, 1936 3 Sheets-Sheet 1

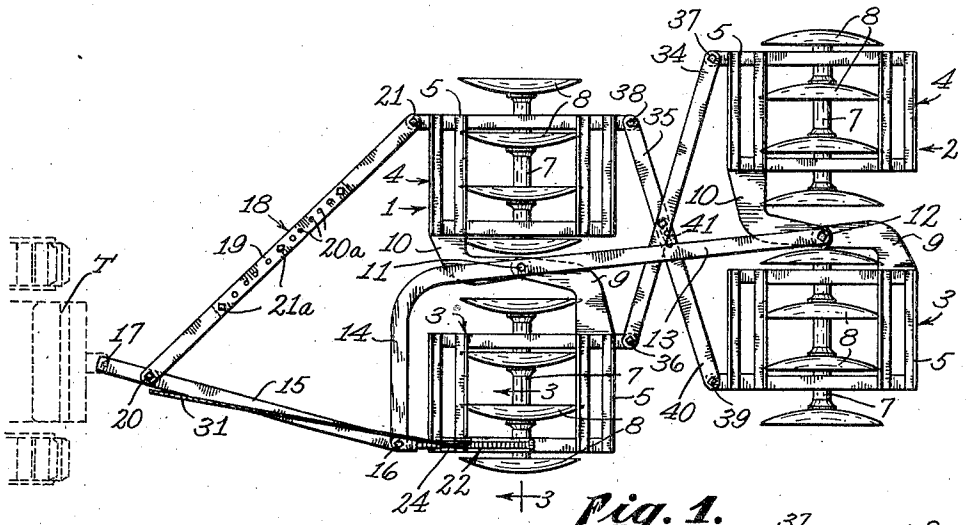


Fig. 1.

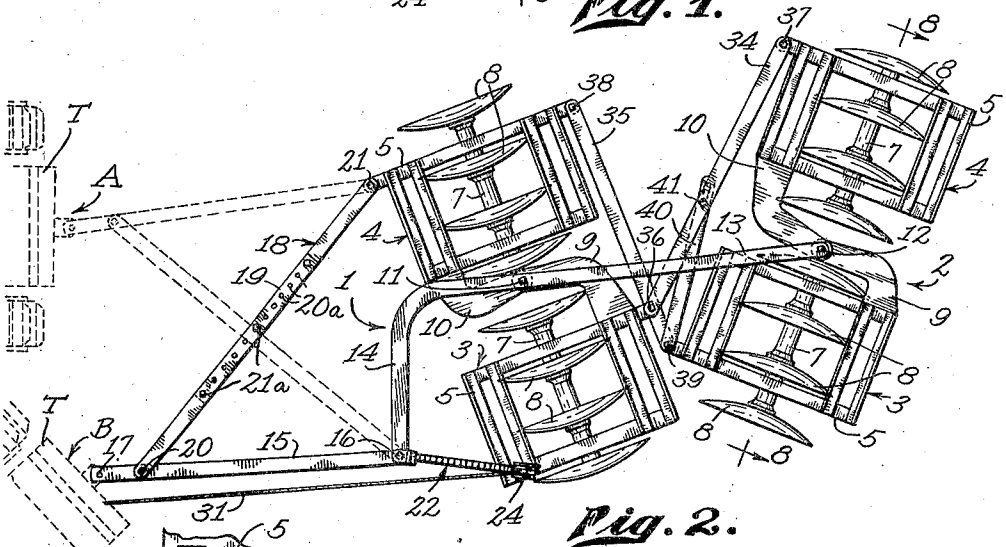


Fig. 2.

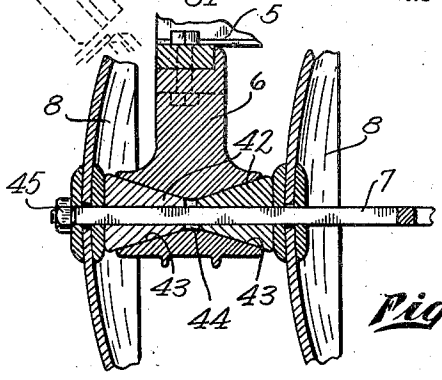


Fig. 3.

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DISK HARROW

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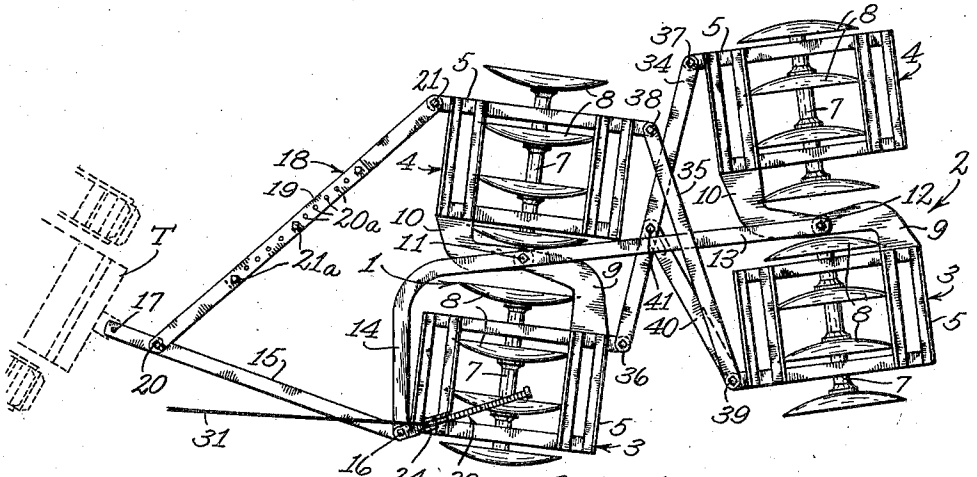


Fig. 4.

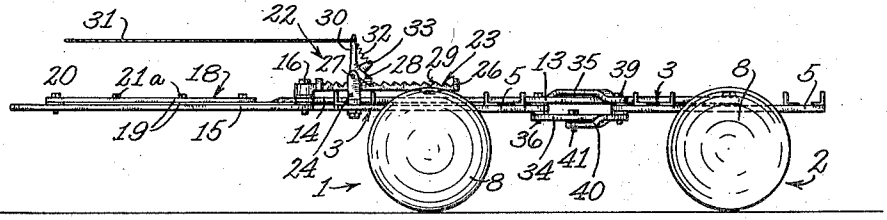


Fig. 5.

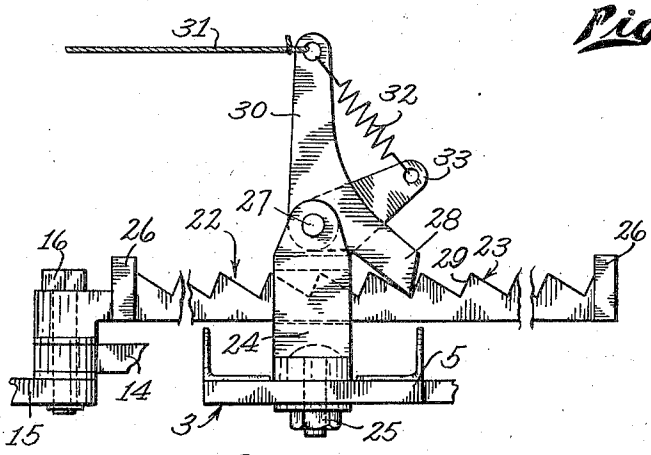


Fig. 6.

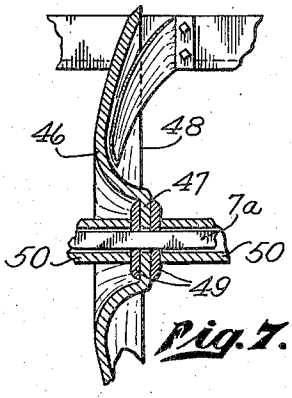


Fig. 7.

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DISK HARROW

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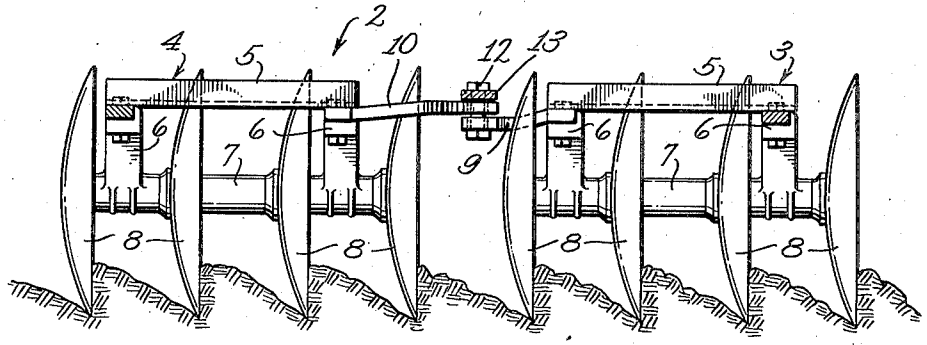


Fig. 8.

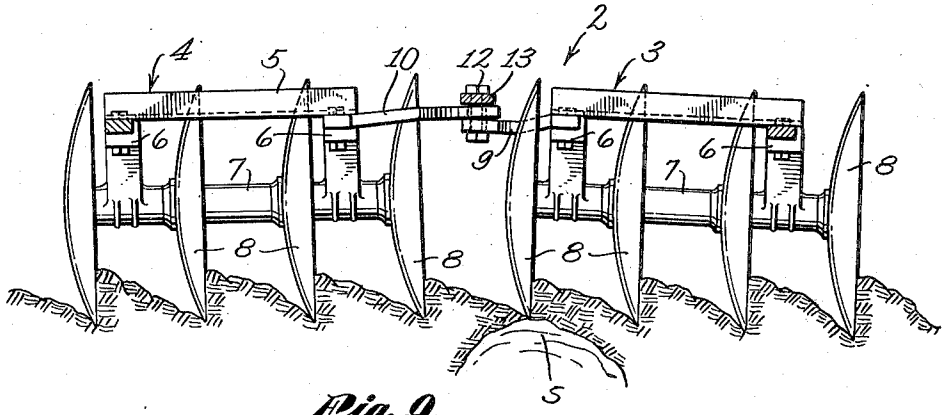


Fig. 9.

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UNITED STATES PATENT OFFICE

2,126,446

DISK HARROW

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Application June 10, 1936, Serial No. 84,486
Renewed January 24, 1938

12 Claims. (Cl. 55—83)

This invention relates to disk harrows and particularly to disk harrows of what is known as the tandem offset type, including a forward and rearward gang of disks.

The principal difficulty heretofore encountered with the tandem disk harrow, especially the type having the disks mounted on a rigid axle or frame, is in maintaining a uniform depth of penetration of the disks when turning to either direction in relation to the direction of travel, because the natural forces exerted on the disks when going around a curve tend to raise the outer end of the gangs, which travels around the greatest arc, out of the ground. Also on a straight run when rocks, hard pan, etc., are encountered even by one of the disks the entire gang is tilted upwardly thereby decreasing the depth of operation.

It is therefore an object of this invention to provide a disk harrow in which the disks will operate at a substantially uniform degree of depth when turning either to left or right.

Another object is to provide a disk harrow in which each gang of disks is divided into a plurality of sections flexibly linked together to facilitate maintenance of a substantially uniform degree of penetration when turning corners, working around trees, etc., and when working rocky soil or a ground surface of varying degree of hardness.

A further object is to provide bearings for the disk axles which may be taken up for wear thereby increasing the utility period of said bearings considerably.

Another object is to provide a disk in which the support for mountng same on an axle is positioned on the same plane as the cutting edge so that the radial load is taken directly on the support thereby decreasing twisting and bending strains on the disk and the axle to a minimum.

As a further object it provides a simple and compact yet substantial disk harrow in which the front and rear gangs may be selectively maintained in the open position or angled either to left or right and the implement may be turned to either side with respect to the line of travel at the same time maintaining the disks at a substantially uniform depth of operation.

With these and other objects in view the invention consists in the combination, correlation and construction of parts, members and features which will be described in the specification and will be finally pointed out in the claims.

Referring to the drawings:

Figure 1 is a plan view of a disk harrow embodying my invention.

Figure 2 is a plan view of the harrow showing the angled relation of the front and rear disk gangs when turning to the left.

Figure 3 is a section on line 3—3 in Figure 1 illustrating the construction of the disk axle bearings.

Figure 4 is a plan view of the harrow showing the angled relation of the front and rear disk gangs when turning to the right.

Figure 5 is a side elevation of Figure 1.

Figure 6 is a fragmentary detail of the adjustable limiting means.

Figure 7 is a fragmentary section of a modified form of disk construction.

Figure 8 is a section on line 8—8 in Figure 2 illustrating the position of the disks when going around a curve.

Figure 9 is a section similar to Figure 8 showing the position of the disks when working in rocky soil.

The objects outlined above are attained by the practical form of embodiment shown in the drawings, which in a generic sense consists of a disk harrow of the tandem type comprising front and rear disk gangs, each front and rear disk gang consisting of two sections flexibly connected together thereby minimizing the effect of the forces tending to raise the disks out of the ground during various phases of operation.

In a more specific sense, the invention exemplified in the accompanying drawings is shown as a tandem offset disk harrow comprising front and rear gangs 1 and 2, respectively. Each of the gangs 1 and 2 consists of two sections 3 and 4 and each section comprises a rectangular frame structure 5 on which are mounted bearings 6 having journaled therein axles 7 on which in turn are mounted disks 8.

The sections 3 and 4 of gangs 1 and 2 are provided with arms 9 and 10, respectively, which are connected together at the ends by means of a loose fitting pin 11 and 12, respectively, to permit a universally flexible connection. The gangs 1 and 2 are spaced apart longitudinally by means of a bar 13 which is pivotally connected to said gangs through the pins 11 and 12.

The bar 13 projects forwardly beyond the disk gang 1 and is bent to the left, as shown at 14, then pivotally connected at the end to the draft bar 15, as shown at 16. The draft bar 15 is in turn connected to the tractor T, as at 17.

Aligning link 18 of an expansible and contractable nature is interposed between the harrow and the draft bar. The link 18 comprises a pair of over lapping bars 19 one of which is pivotally

connected, as at 20, to the draft bar 15 near the forward end thereof and the other, as at 21, to the forward right corner of section 4 of disk gang 1. The pair of bars 19 are provided with a series of holes 20a in their over lapping portions for retracting or expanding link 18 by passing bolts 21a through the selected holes. As is well known in the art, the link 18 is expanded or retracted to offset the harrow to the left or the right.

Interposed between the pivotal connection 16 on draft bar 15 and the forward left hand corner on section 3 of gang 1 is an angling ratchet generally indicated at 22, which comprises a ratchet bar 23 pivotally connected to spacing bar 14 and draft bar 15 by means of the pin 16. On the forward left hand corner of section 3 of disk gang 1, a yoke 24 is pivotally supported by means of the bolt 25. The ratchet bar 23 passes slidably through the yoke 24 and has at its ends stop members 26 which contact yoke 24 for limiting the extreme movement in both directions. Interposed between the upper ends of yoke 24 and pivotally secured thereto, as at 27, is a pawl 28 adapted to engage the ratchet teeth 29 on the bar 23. The pawl 28 is provided with an arm 30 to which a cable 31 is connected for manual releasing of the pawl. A tension spring 32 is interposed between arm 30 of pawl 28 and an extension 33 on one of the side members of yoke 24 for maintaining pawl 28 in engagement with ratchet bar 23.

For automatically controlling the proper alignment of disk gangs 1 and 2 with respect to each other during the performance of various classes of work, cross bars 34 and 35 are interconnected between the gangs 1 and 2 in the following manner: Cross bar 34 is pivotally connected at one end to the rear right hand corner of section 3 in gang 1, as at 36, and at the other end to the front right hand corner of section 4 in gang 2, as at 37. Cross bar 35 is pivotally connected at one end to the rear right hand corner of section 4 in gang 1, as at 38, and at the other end to the front left hand corner of section 3 in gang 2, as at 39.

A limiting link 40 is pivotally connected at one end to the section 3 of gang 2, as at 39, and at the other end through a pin and slot connection 41 is attached to the cross bar 34 intermediate the ends thereof.

It will be noted that the pivot pins 11 and 12, connecting sections 3 and 4 of the gangs 1 and 2, to the spacing bar 13 are offset so that pivot 11 in gang 1 is positioned to the right of the longitudinal center and pivot 12 in gang 2 to the left of its longitudinal center. Thus an over balanced pull is exerted on the disk gangs which through ground friction causes gang 1 to angle in one direction by swinging section 3 to the rear, and gang 2 to angle in the opposite direction by swinging section 4 to the rear.

Thus when it is desired to angle the disk gangs for a straight run, as shown by dotted lines A in Figure 2, or for a left hand curve, as shown by dotted lines B in Figure 2, cable 31 is pulled to release pawl 28 thereby permitting the left side of gang 1 and right side of gang 2 to swing rearward. Cross bars 34 and 35 maintain the gangs in complementary angles with respect to the transverse plane, during a straight run and maintain both gangs aligned radially with respect to the turning point when going around a curve.

Link 40 limits the extreme angling movement of the gang sections. The disk gangs may be retained in any desired degree of angle within the predetermined limits by simply allowing pawl 28 to engage the proper ratchet teeth on the bar 23.

In Figure 4 the disk gangs are shown in the angled position assumed while making a right hand turn.

As has been pointed out above, the sections 3 and 4 of each disk gang are connected together by means of the loose fitting, vertically positioned, bolts 11 and 12. This construction permits a slight swinging movement of the gang sections 3 and 4 relative to each other in the vertical plane and also provides pivotal connections for the spacer bar 13, thus permitting a transverse swinging movement of the bar 13 in the horizontal plane relative to the disk gangs.

It is a known fact in the art that as a disk harrow having rigid disk gangs operates around a curve the resultant torsional forces cause the end of the gangs traversing the smaller arc to dig into the ground and the opposite end traversing the larger arc to be raised out of the ground, also in general operation when even one disk strikes a hard surface such as a stone, hard pan, etc., the disk gang becomes tilted so that one end is raised out of the ground, this of course results in uneven penetration.

By making the disk gangs in two sections flexibly connected together the weight of the outer section will tend to hold the outer end of the inner section in the ground when working on a curve, thereby maintaining uniform penetration, as illustrated in Figure 8.

When working rocky soil, see Figure 9, when one of the disks strikes a stone, as at S, the disk gang will buckle slightly in the center while both of the ends are still maintained at the desired depth of penetration.

Inasmuch as the bearings in which the disk axles are journalled tend to wear out quicker than any other part of the disk harrow a special type of bearing is provided which comprises opposed cones 42 slidably mounted on disk axles 7 and journaled in conical sockets 43 in bearing blocks 6. A clearance 44 is provided between the cones 42 so that by tightening nut 45 on axle 7, see Figure 3, any loose fit resulting from wear may be taken up.

In Figure 7 an improved form of disk is shown in which the disk 46 is of the usual concave type except that the central portion 47 is formed so that the point of support is on the same plane as the cutting edge 48. The central portion is reinforced in the usual manner by means of disk plates 49 welded thereto. The disk 46 is mounted on axle 7a and retained in position by spacers 50. By supporting the disk on the same plane as the cutting edge the radial load is taken directly on the support thereby decreasing twisting and bending strains on the disk and the axle to a minimum.

Having thus described my invention I claim:

1. In a disk harrow comprising leading and following disk units, means for offsetting said disk units, means for releasably holding said disk units in the desired offset position, each of said disk units comprising two sections pivotally connected together for vertical swinging movement with respect to each other.

2. A disk harrow having a plurality of tandem disk units, said disk units comprising two sections each, flexible means for connecting said sections together for vertical swinging movement with respect to each other.

3. In a harrow of the character described, the

combination of leading and following disk units, each of said disk units comprising a right and a left section, means for flexibly connecting said right and left sections together for vertical swinging movement relative to each other.

4. In a disk harrow, the combination of a front and a rear disk gang, each of said disk gangs comprising left and right frame sections pivotally connected together, axles pivotally mounted on said frame sections, disks on said axles, means for maintaining said disc gangs in a spaced apart relation, means between said disk gangs for maintaining same in complementary relation to each other, draft means on said harrow for connection to a tractor.

5. In a disk harrow the combination of a front and a rear disk gang, each of said disk gangs comprising left and right sections, draft means for said harrow, universally flexible means for connecting the left and right sections of the front disk gang to said draft means at a point offset to the right of the longitudinal center, and universally flexible means for connecting the left and right sections of the rear disk gang to said draft means at a point offset to the left of the longitudinal center, means between said disk gangs for maintaining them in relative complementary relation.

6. In a disk harrow the combination of a front and a rear disk gang, each gang comprising left and right sections, connected together for vertical swinging movement relative to each other, draft means for said harrow, pivotal means for connecting said disk gangs in a spaced apart relation to said draft means, said pivotal means being offset to the right of the longitudinal center in the front disk gang and to the left of the longitudinal center in the rear disk gang, means interposed between said disk gangs for maintaining same in complementary relation to each other, selective locking means between said draft means and the front disk gang for holding said disk gangs in set position.

7. A harrow of the character described, including: draft means, a leading disk gang and a following disk gang, each of said disk gangs comprising two sections pivotally connected to said draft means, said pivotal connections permitting vertically swinging movement of said sections relative to each other, means for maintaining said sections in line transversely.

8. A harrow of the character described, including: draft means, a leading disk gang and a following disk gang, each of said disk gangs comprising two transversely aligned sections pivotally connected together for relative vertically swinging movement, said pivotal connections also associated with the draft means for maintaining said disk gangs in a spaced apart relation.

9. A harrow of the character described, including: draft means, a leading disk gang and a following disk gang, each of said disk gangs comprising two transversely aligned sections pivotally connected to said draft means to permit vertically swinging movement of said sections relative to each other and to permit both said sections in each gang to be swung from closed to angled relation together as a unit, means associated with said disc gangs for maintaining same in relative complementary degree of angle.

10. A harrow of the character described, including: draft means, a leading disk gang and a following disk gang, each of said disk gangs comprising two transversely aligned sections pivotally connected to said draft means to permit vertically swinging movement of said sections relative to each other and to permit both said sections in each gang to be swung from closed to angled relation together as a unit, said pivotal connections being transversely offset from the longitudinal center of said disk gangs to effect an unbalanced pull for angling said gangs, means for selectively holding said gangs in opened and angled positions, and means for maintaining said gangs in relative complementary degree of angle.

11. In a disk harrow of the character described in claim 10, in which the means for maintaining the disk gangs in relative complementary degree of angle comprises a pair of cross bars interposed between said disk gangs and a link associated with said cross bars for limiting the extreme angling movement of said disk gangs.

12. In a disk harrow including a leading disk gang and a following disk gang, means for pivotally maintaining said disk gangs in a spaced apart relation, means for angling said disk gangs, cross bars interposed between said disk gangs for maintaining said gangs in relative complementary degree of angle, a link associated with said cross bars for limiting the extreme angling movement of said disk gangs.

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