June 13, 1944. A. E. RUTTER 2,351,369

DISK PLOW

Filed Oct. 16, 1941 4 Sheets-Sheet 1

Fig. 1.

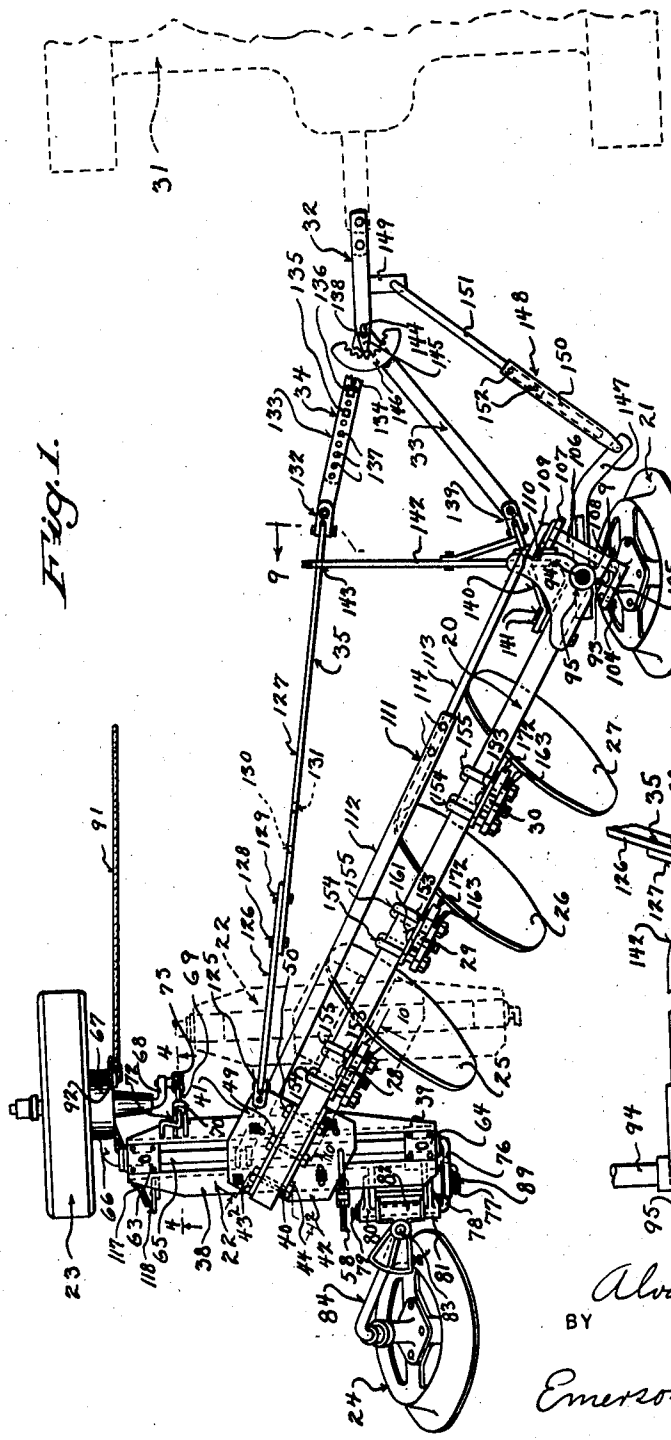
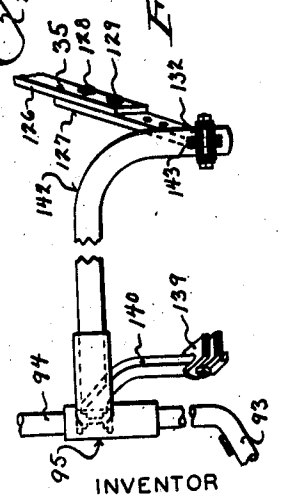


Fig. 9.



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Fig. 2.

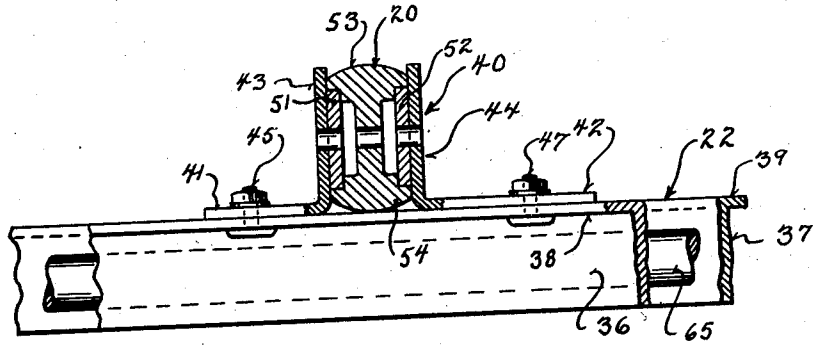
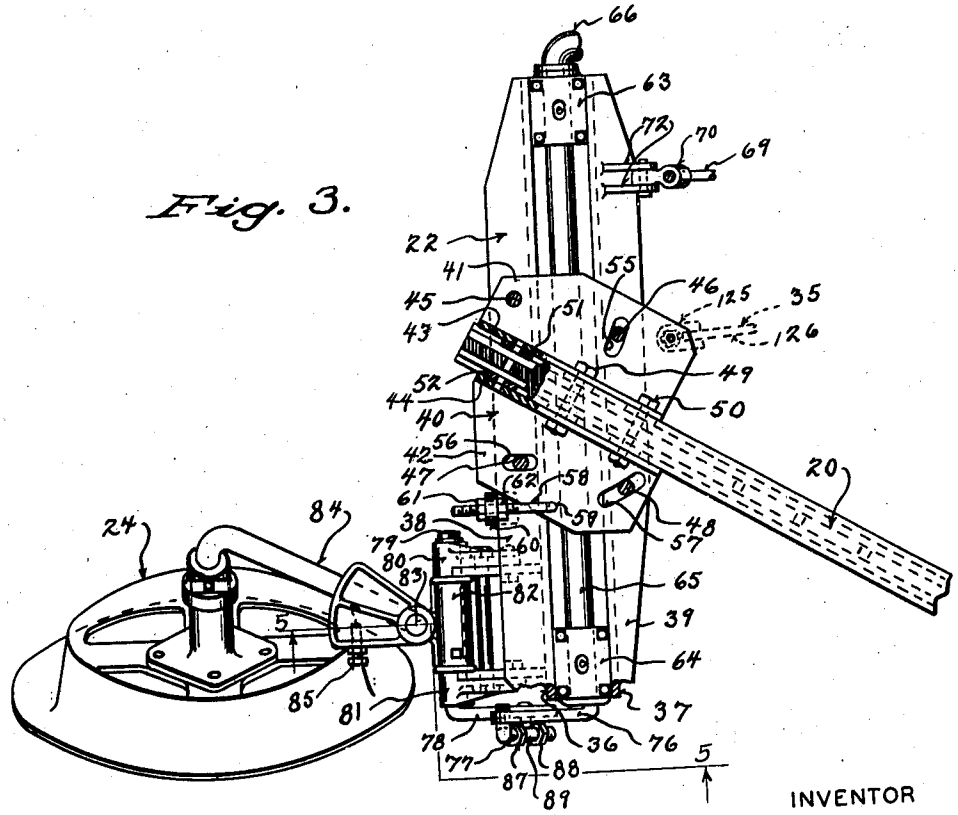



Fig. 3.




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Fig. 4.

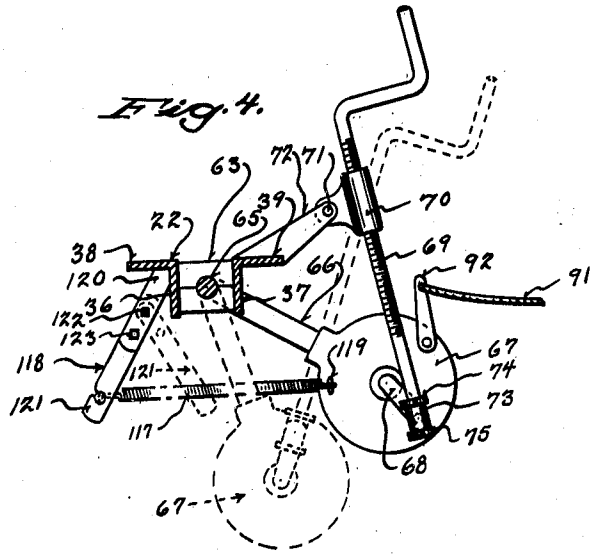



Fig. 5.

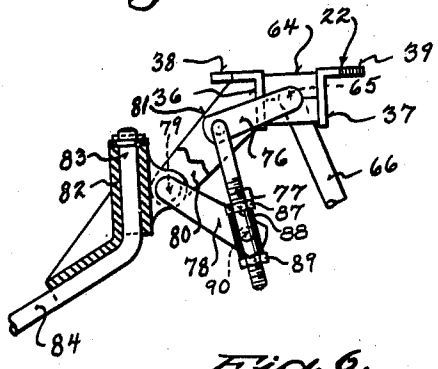
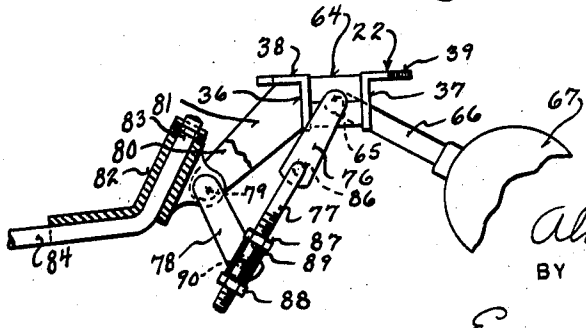



Fig. 6.




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DISK PLOW

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Fig. 8.

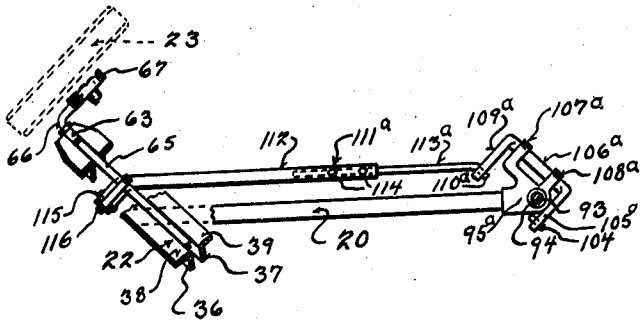
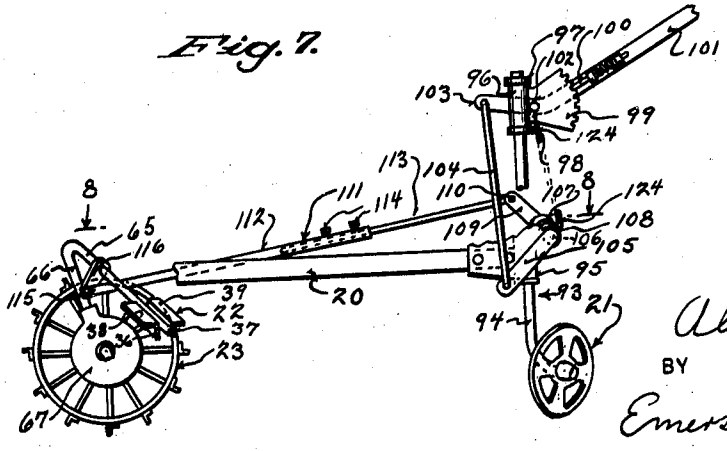



Fig. 7.




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# UNITED STATES PATENT OFFICE

2,351,369

## DISK PLOW

Alvah E. Rutter, Rockford, Ill., assignor to J. I. Case Company, Racine, Wis., a corporation

Application October 16, 1941, Serial No. 415,153

13 Claims. (Cl. 97—53)

The present invention relates to plows and more particularly to disk plows, and an object of the invention is to generally improve the construction and operation of implements of this class. Another object is to improve such a plow in respect to the adjustments thereof. A further object is to improve the power lift in points of simplicity and effectiveness.

A further object is to provide an improved hitch for such a plow and which will provide better draft connections and improve the penetration of the disks.

Further objects are to provide improved expedients for realization of the above objects.

Further objects and advantages will become apparent from the following specification and annexed drawings in which:

Figure 1 is a top plan view of an illustrative embodiment of a disk plow constructed according to the invention, but with certain parts removed.

Fig. 2 is a vertical sectional view taken on the line 2—2 of Fig. 1.

Fig. 3 is a top plan view of a portion of Fig. 1 with parts removed and other parts broken away.

Fig. 4 is a vertical sectional view on the line 4—4 of Fig. 1 with parts removed.

Fig. 5 is a right side elevation of a portion shown in Fig. 1 with parts removed and partly in section on the line 5—5 of Fig. 3.

Fig. 6 is a similar view showing the parts in a different position.

Fig. 7 is a right side elevation of the machine diagrammatic in character showing certain operative elements of the power lift, the major part of the rest of the structure being omitted.

Fig. 8 is a plan view of a slightly modified arrangement similar to Fig. 7.

Fig. 9 is a vertical section taken on the line 9—9 of Fig. 1.

As seen in Fig. 1 the plow illustrative of the invention includes a beam 20 supported at the front by a furrow wheel generally designated as 21 and at the rear by a rear truck or support generally designated as 22 carried by a land wheel 23 and a rear furrow wheel 24. Beam 20 carries disks 25, 26 and 27 united with the beam by standards 28, 29 and 30, and the whole is drawn by a tractor or the like generally designated as 31 coupled to a draw bar 32 connected with the plow structure through draw elements, members or links 33, 34 and 35.

Plows of this character are operated at times with one or more disks 25 and 26 removed, because of ground conditions, available power or otherwise, and in this event it is necessary to move rear truck 22 to a new position on beam 20 in order to bring furrow wheel 24 into correct relation with the remaining disk or disks. In prior constructions, it has been necessary to disassemble the structure and reassemble it with truck 22 properly located. The parts are heavy and this operation accordingly required the use of powerful jacks, the help of several men and was generally inconvenient. In the present instance truck 22 may be shifted on beam 20 without destroying its supporting relation thereto, whereby disk 25 for example can be removed and the truck moved to the dotted position in Fig. 1 without the use of jacks or extra help.

As seen in Figs. 2 and 3, beam 20 is formed of suitable configuration, in the present instance roughly an I-beam so as to provide guiding channels in the sides thereof. Truck 22 is preferably formed of angle plates having downwardly extended flanges 36 and 37 and upper horizontal flanges 38 and 39. Engaged with flanges 38 and 39 is a unit or clamping means generally designated as 40 and comprising in the present instance a pair of angle plates having lower horizontal flanges 41 and 42 and vertical flanges 43 and 44 respectively. Flange 41 is attached to flanges 38 and 39, respectively by bolts 45 and 46, flange 42 being united with flanges 38 and 39 by bolts 47 and 48. Flanges 43 and 44 extend upwardly along the sides of beam 20 and may be clamped against the beam as by bolts 49 and 50 engaged in aligned holes in flanges 43, 44 and beam 20. Flanges 43 and 44 have bosses, inserts or guide members 51 and 52 preferably welded or otherwise united therewith for sliding engagement between the upper and lower flanges 53 and 54 of I-beam 20. When the clamping pressure of bolts 49 and 50 is relaxed or removed, inserts 51 and 52 maintain clamping portion 40 substantially in correct relation with beam 20 so that truck 22 may still carry the weight of the rear end of the beam even though it can be moved endwise of the beam to a new position. Holes are preferably provided for bolts 49 and 50 at various points in beam 20 so that member 40 can be positively secured to the beam in the desired position.

Other methods of clamping member 40 to beam 20 are contemplated and it is not intended to limit the invention to the particular method described or in any manner except as defined by the claims.

Truck 22 may be changed also in its angular relation to beam 20 which adjustment is neces-

sary under certain conditions, in the present instance bolts 46, 47 and 48 passing through slots 55, 56 and 57 in flanges 41 and 42, the slots in the present instance extending generally in the direction of arcs struck about bolt 45 as a center. With bolts 46, 47 and 48 loose, truck 22 may be turned about bolt 45 until the desired angle is obtained after which the bolts may again be tightened for maintaining the adjustment.

To facilitate such turning and to positively maintain such adjustment, a bolt or the like 58 is pivotally connected at 59 to flange 42 and extends rearwardly over flange 38 of trunk 22. An ear 60 suitably united with flange 38 extends upwardly and is traversed by bolt 58. Nuts 61 and 62 are preferably arranged on bolt 58 on either side of ear 60 through the manipulation of which bolt 58 may be caused either to push or pull on flange 42 to cause the desired swinging movement of truck 22. Tightening of both nuts 61 and 62 against ear 60 will lock the parts against appreciable displacement.

Flanges 36 and 37 carry between them bearings of any suitable or well-known type 63 and 64 in which a journal portion 65 of a crank axle having an arm 66 is rotatably engaged. Arm 66, as more particularly shown in Fig. 1, extends to a power lift clutch of suitable or well-known form generally designated as 67, clutch 67 being supported and actuated by above mentioned land wheel 23.

Power lift clutch 67 includes a crank 68 to which is connected a strut 69 as more particularly shown in Fig. 4 in the present instance threaded and engaged in a nut 70 pivoted at 71 to a bifurcated or other suitable arm 72 fixed with upper flange 39. Strut 69 engages a block 73 suitably pivoted to crank 68 and is precluded from relative longitudinal movement by collars 74 and 75. Adjustment of strut 69 in nut 70 will accordingly change the position of arm 66 and accordingly, in well-known manner, the depth of plowing. Journal portion 65, as seen in Figs. 1, 5 and 6 has an arm 76 connected by a link 77 with an arm 78 fixed on or constituting part of a pintle 79 journaled in brackets 80 and 81 extending rearwardly from truck 22 and in the present instance welded or suitably fixed with flanges 36 and 38. Pintle 79 carries a fitting 82 in which is journaled a portion 83 of a crank axle 84 supported by above mentioned rear furrow wheel 24. Crank axle 84 may caster in fitting 82 but can be adjusted as by a set screw 85 to limit its movement in a counter-clockwise direction as seen in Figs. 1 and 3.

As seen in Fig. 6, link 77 has a pintle portion 86 engaged in above mentioned arm 76 and is threaded for reception of adjusting nuts 87 and 88 engaged at either end of a fitting 89 having a stud or journal portion 90 engaged in arm 78. Thus, as seen in Figs. 5 and 6, rotation of journal portion 65 caused by power lift 78 as above described, will cause opposite rotation of pintle 79 through arms 76 and 78 and link 77.

The position and dimensions of arms 76 and 78 are so chosen that arm 76 and link 77 are substantially in dead center relation when axle 65—66 is in the up or plowing position. Any reaction on axle 84 will therefore have no appreciable effect on axle 65—66. In other words, axle 84 is in effect locked in position when the implement is plowing. Furthermore, it is noted that it is necessary when the plow goes from transport to plowing position for wheel 23 to rise a distance equivalent to the clearance of the disks above the ground plus the desired depth of plowing, whereas in general, furrow wheel 24 needs to rise only a distance equivalent to the clearance of the disks above the ground. This is so because wheel 24 runs on the bottom of the last furrow formed by the disks. Owing to the dead center relation above described, this is automatically effected, since an appreciable change in the position of arm 76 for varying the plowing depth, as seen in Fig. 6, will have no appreciable effect on arm 78 or furrow wheel 24. Thus the plowing depth adjustment can be made by means of crank 69 without necessitating any adjustment of link 77.

An initial adjustment of link 77 to compensate for unavoidable slight inequalities in manufacture, for leveling the plow, or for other reasons, can be obtained by manipulating nuts 87 and 88 whereby link 77 may be clamped in various positions relatively to fitting 89.

Power lift 67 may be tripped in well-known manner by a rope 91 leading to the tractor and connecting at its other end with an arm 92.

Front furrow wheel 21 is controlled from axle 65 as follows.

Referring to Fig. 7, wheel 21 is journaled on an axle element generally designated as 92 and having an upright shaft or spindle portion 94. Portion 94 is slidably journaled in a fitting 95 suitably united with beam 20. At a point above fitting 95, a bearing 96 is journaled on portion 94 and prevented from moving axially by collars or the like 97 and 98 suitably fixed with portion 94. Bearing 96 has a quadrant 99 engaged by a detent 100 carried by a lever 101 of suitable or well-known type for adjusting the position of wheel 21. Lever 101 is fulcrumed at 102 on bearing 96 and has an arm 103 connected by a link 104 with a crank arm 105 fixed on a journal portion 106 rockable in bearings 107 and 108 on fitting 95. Journal 106 has an arm 109 extending generally upwardly from portion 106 and pivotally connected at 110 with a link or pull rod member generally designated as 111 actuated from axle 65 as will appear.

In the slightly modified embodiment of Fig. 8, an arm $109^a$ moves in a plane oblique to beam 20 while a member $111^a$ moves generally in a plane parallel to beam 20. However, it may be considered that arm $109^a$ has a component of movement in the direction of member $111^a$ so that longitudinal movement of member $111^a$ will cause swinging of arm $109^a$ and rocking of journal portion $106^a$. This, as will be apparent, will cause swinging of arm $105^a$ and raising or lowering of axle portion 94 through link 104, lever arm 103 and bearing 96, as in the case of the embodiment of Fig. 7. The difference in the paths of movement may cause a change in angularity between member $111^a$ and arm $109^a$ but which can be accommodated in any well-known manner, in the present instance by providing a loose fit between rod $111^a$ and arm $109^a$ at pivot $110^a$.

Rod member 111 is preferably made extensible in any suitable manner, in the present instance comprising a pipe 112 within which is slidably disposed a rod portion 113, the pipe and rod being locked together by suitable means as set screws 114—114.

Rod 111 is pivoted at 115 as particularly shown in Figs. 7 and 8, to an arm 116 fixed with and extending in the present instance downwardly from axle portion 65 so that rocking of axle portion 65, as when the plow is passing from transport to

working position or vice versa, will cause arm 116 to push or pull on rod 111. It will be noted that arm 116 moves in a plane oblique to rod 111 which extends generally in a plane parallel to beam 20. The movement of arm 116 accordingly may be considered to have a component in the direction of rod 111 and another component at right angles thereto. The movement imparted to rod 111, in the direction of its length, will be merely that of the first mentioned component and not the total movement of the arm 116, or rather the pivotal point 115 on arm 116. For this reason, arm 116 has a "leverage" over rod 111 which it would not have if it acted in the direction of rod 111. Any change in angularity between rod 116 and rod 111 may be accommodated in any suitable or well-known manner, in the present instance a loose connection at pivot 115 being utilized for this purpose.

Suitable assisting springs are provided for relieving the load on power lift 67. A spring 117, Figs. 1 and 4, anchored on the strut generally designated as 118, is tensioned between strut 118 and an anchorage 119, in the present instance on power lift 67, in such a position that its effective angle relatively to portion 66 decreases as its tension increases. In the present instance strut 118 comprises a bracket portion 120 fixed with flanges 36 and 38 and an arm 121 connected to bracket 120 as by bolts 122 and 123. This construction yields a decided advantage in assembling the powerful spring 117 with the other parts. Thus, with bolt 122 alone in place, arm 121 may be swung to the dotted position indicated and with axle 66 in transport position, as also indicated in dotted lines, spring 117 may be connected in position in a relaxed condition, or without appreciable stretching. It is then a comparatively easy matter to swing arm 121 to its permanent position, as shown, and to insert bolt 123 after which spring 117 has the correct tension in the various desired positions.

A spring 124, Fig. 7, is also tensioned between bearing 96 and any suitable portion on fitting 95, tending to relieve lever 101 and link 104, and also, accordingly, the power lift, of part of the weight of fitting 95 and its connected parts.

Returning to the hitch, member 35, Fig. 1, has a universal connection of any suitable or well-known type as 125, to above mentioned flange 41, and is formed to be extensible in any suitable or well-known manner, in the present instance the member comprising pull rods 126 and 127 united as by bolts 128 and 129, a plurality of holes 130 and 131 being provided, for example, in rod 127 for accommodating bolts 128 and 129 in different positions. Member 35 has a universal connection at 132, with above mentioned link 34. Member 34 is adjustable in length, in the present instance being formed of portions 133 and 134, united as by bolts 135 and 136, a plurality of holes as 137 being provided for bolts 135 and 136 for changing the length of link member 34. Link member 34 is united as by a pin, bolt or the like 138, with above mentioned draw element 33 and above mentioned draw bar 32 also is united with link member 34 and draw element 33 by pin member 138. Draw element 33 has a universal connection of suitable or well-known type as 139 with a bracket 140 united with above mentioned beam 20 as by bolts 141. Bracket 140, as more particularly shown in Fig. 9 extends downwardly, in the present instance to a point substantially on a level with the axle portion 93. In this manner, a desirably low hitch point is obtained for the application of draft force to the plow. A brace, strut, or guide member 142 extends laterally from fitting 95 and then downwardly to substantially the level of above mentioned axle portion 93 and provides an opening 143 through which extends above mentioned pull rod portion 127. This maintains universal connection 132, or in other words, the hitch point of link member 34 in the desired position relatively to draw bar 32.

Because of the fact that universal connection 125 at the rear of the plow is at an elevated position, while connection 132 is at a low point, the parts being otherwise free, the linkage comprising members 34 and 35 is depressed at 132. The draw bar pull tending to straighten this linkage therefore exerts a lifting tendency at opening 143 and a downward pull at connection 125 which forces are desirable in securing proper penetration of the rear of the plow, smooth running and correct balance.

Draw bar 32 provides a slot 144 through which above mentioned pin 138 extends and in normal forward operation pin 138 rests in the rear end of the slot as shown in Fig. 1. If it is necessary to back the outfit, draw bar 32 moves backward freely as permitted by slot 144 until a rear tail portion 145 engages one or more notches in a rack or sector member 146 fixed in the present instance as by welding or otherwise with above mentioned draw element 33. This maintains draw bar 32 in proper relation to element 33 and link member 34 so that there will be no "jackknifing" of the parts in the attempt to back.

Above mentioned axle portion 93 is provided with an arm 147 connected by a link generally designated as 148 with an ear 149 on draw bar 32 so that swinging of draw bar 32 in normal operation will cause turning of axle portion 93 in above mentioned fitting 95 for properly steering front furrow wheel 21. Link 148 is made extensible in any suitable manner, in the present instance comprising a pipe portion 150 having a rod 151 slidable therein and maintained in adjustable position by set screws 152.

The operation of the plow is thought to be clear from the above description, it being noted that rear truck 22 can be shifted along beam 20 by merely removing bolts 49, 50, etc., the supporting relation between the truck and beam 20 being maintained by the sliding engagement between flanges 43 and 44 and beam 20, together with the interlocking of portions 51 and 52 with flanges 53 and 54 of the beam. Also rocking movement of axle portion 65 caused by the power lift actuates the front furrow wheel axle through mechanism which is considerably less complicated and not known to the prior art and which is especially effective because of the leverage relation between arm 16 and pull rod 111.

The pull of the tractor 31 on draw bar 32 is transmitted to the plow at advantageous points and tends to lift guide member 142 at the front of the plow and to pull down to a certain extent on rear truck 22.

Upon rocking of axle portion 65, arm 76 takes a dead center position relatively to link 77 whereby the rear furrow wheel is locked in position during operation of the plow.

Standards 28, 29 and 30 may be clamped to beam 20 in any desired relation and it is contemplated that under severe plowing conditions or if traction power is limited, standard 28 and its attached parts, including disk 25 may be removed entirely whereupon truck 22 will be moved

forwardly as above described and links 35 and pull rod 111 will be shortened to accommodate the new position of truck 22. A two-disk plow is thus provided in place of the three-disk plow illustrated in Fig. 1. Standard 29 may also be removed if necessary, within the contemplation of the invention.

The above being a complete description of an illustrative embodiment of the invention, what is claimed as new and desired to be secured by Letters Patent of the United States is:

1. In a disk plow having a member of I-beam cross section and providing a channel on either side thereof and means for supporting the forward end of the beam, a rear truck for supporting the rear end of the beam, said beam providing a plurality of holes for a fastening means, said truck having means fitting within the channels and slidably engaging the beam whereby it may be shifted relatively to the beam for changing the length of the disk plow, while remaining in supporting relation to the beam, said engaging means providing a hole for a fastening means, and a fastening means engaging the holes for securing the truck to the beam in various positions.

2. In a disk plow having a beam providing a guiding channel on a side thereof, and means for supporting the forward end of the beam, a rear truck for supporting the rear end of the beam, means for rigidly and positively securing the truck to the beam in a plurality of adjusted positions, and said truck having a portion slidably engaged with said guiding channel whereby it may be shifted relatively to the beam for changing the length of the disk plow, when the securing means is disengaged, while remaining in supporting relation to the beam.

3. In a disk plow having a beam providing a guiding channel on a side thereof and means for supporting the forward end of the beam, a rear truck for supporting the rear end of the beam, said beam providing a plurality of holes for a fastening means, said truck having a portion slidably engaging the channel in said beam whereby it may be shifted relatively to the beam for changing the length of the disk plow while remaining in supporting relation to the beam, said means slidably engaging the beam being rotatably adjustable relatively to the truck, and means for rigidly securing said slidable means to the beam in a plurality of adjusted positions.

4. In a disk plow having a beam providing a guiding channel in a side thereof and means for supporting the forward end of the beam, a rear truck for supporting the rear end of the beam and having means slidably engaging the guiding channel in said beam and rotatably adjustable relatively to the truck, said beam providing a plurality of holes for a fastening means and said slidable means providing a hole for a fastening means, and a fastening means engaged in said holes for securing the truck to the beam in various positions.

5. In a disk plow having a beam, front power lift mechanism and a rear truck, a crank axle on the rear truck and arranged to move from a forwardly inclined position for plowing to a nearly vertical position for transport, power lift mechanism for so moving said axle, a substantially horizontal journal portion on the crank and journaled on said truck, an arm on the crank extending downwardly and rearwardly in the transport position of said axle, and a pull rod pivoted to said arm and extending forwardly and upwardly to said front power lift mechanism and in a direction oblique to the direction of swinging movement of said arm.

6. In a disk plow having a beam disposed diagonally to the direction of travel of the plow, a front supporting member and a rear truck; a draft hitch for the plow including a draft member pivoted to the plow adjacent the front end of and below said beam, a second draft member pivoted to the plow adjacent the rear end of the beam at a point substantially on a level therewith, said member extending forwardly to a point spaced laterally from the first mentioned draft member and at a level below said beam, guiding means extended from the beam for substantially preventing lateral or vertical movement of said draft member, a link pivoted to the last mentioned draft member and extending to and being united with the first mentioned draft member at a point in advance of the points of attachment respectively of the first mentioned draft member to the plow, and the link to the second mentioned draft member, and a draw bar pivotally connected to said link and said first mentioned draft member at said point.

7. In a disk plow having a beam disposed diagonally to the direction of travel of the plow, a front supporting means and a rear truck; a draft hitch for the plow including a draft member pivoted to the plow adjacent the front end of the beam, a draft member pivoted to the plow adjacent the rear end of the beam and extending forwardly to a point spaced laterally from the first mentioned draft member, said members converging to and being united at a point in advance of the points of attachment of the members to the plow, and a draw bar pivotally connected to said member at said point.

8. In a disk plow having a beam disposed diagonally to its direction of travel, a front supporting member and a rear truck; a draft hitch for the plow including a draft member pivoted to the plow adjacent the front end of and below said beam, a second draft member pivoted to the plow adjacent the rear end of the beam at a point substantially on a level therewith, said member extending forwardly to a point spaced laterally from the first mentioned draft member and at a level below said beam, guiding means extended from the beam for substantially preventing lateral or vertical movement of said draft member, a link pivoted to the last mentioned draft member and extending to and being united with the first mentioned draft member at a point in advance of the points of attachment respectively of the first mentioned draft member to the plow, and the link to the second mentioned draft member, said link being adjustable in length, and a draw bar pivotally connected to said link and said first mentioned draft member at said point.

9. In a disk plow having a beam disposed diagonally to the direction of travel of the plow, a front supporting means and a rear truck; a draft hitch for the plow including a draft member pivoted to the plow adjacent the front end of said beam, a draft member pivoted to the plow adjacent the rear end of the beam and extending forwardly to a point spaced laterally from the first mentioned draft member, guiding means for substantially preventing lateral movement of the second mentioned draft member, a link member pivoted to the second mentioned draft member and united with the first mentioned draft member at a point in advance of said link member and draft member, a rack fixed with one of the

last mentioned members, a draw bar united with said members at said point for swinging and predetermined longitudinal movement relatively thereto, and said draw bar having a portion engageable with said rack for preventing swinging movement of said draw bar upon rearward movement of said draw bar.

10. In a disk plow having a beam disposed diagonally to the direction of travel, a front support including a steerable furrow wheel and a rear truck; a draft hitch for the plow including a first draft member pivoted to the plow adjacent the front end of the beam, a second draft member pivoted to the plow adjacent to the rear end of the beam and extended forwardly to a point spaced laterally from said first draft member, a link member pivotally connected with the second draft member and united with the first draft member at a point in advance of the plow, a draw bar pivotally connected with the last mentioned members at said point and a steering connection from said draw bar to said steerable furrow wheel.

11. In a disk plow having a beam member of a cross section providing a guiding channel in at least one side thereof, means for supporting the forward end of the beam, a rear truck for supporting the rear end of the beam, and having an upstanding element on either side of the beam, at least one of said upstanding elements having a guiding portion engaging said guiding channel, and means for clamping said upstanding portions into rigid engagement with said beam for fixing the position of the rear truck relatively to the beam.

12. In a disk plow having a beam member of a cross section providing a guiding channel in at least one side thereof, means for supporting the forward end of the beam, a rear truck for supporting the rear end of the beam and having an upstanding element on either side of the beam, at least one of said upstanding elements having a guiding portion engaging said guiding channel, said beam providing a plurality of holes for a fastening means and said slidable means providing a hole for a fastening means, and a fastening means engaged in said holes for clamping said upstanding portions into rigid engagement with said beam for fixing the position of said rear truck relatively to said beam.

13. In a disk plow having a beam and means for supporting the forward end of the beam, a rear truck for supporting the rear end of the beam, said truck having a portion slidably engaging the beam whereby it may be shifted relatively to the beam for changing the length of the disk plow while remaining in supporting relation to the beam, said means slidably engaging the beam being rotatably adjustable relatively to the truck, and bolt and nut means engaged between said truck and said slidable portion and extending in a direction to cause turning of the truck relatively to the slidable portion upon adjustment of the bolt and nut means, and to positively maintain the rotated adjustment of the truck.

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