

May 29, 1951

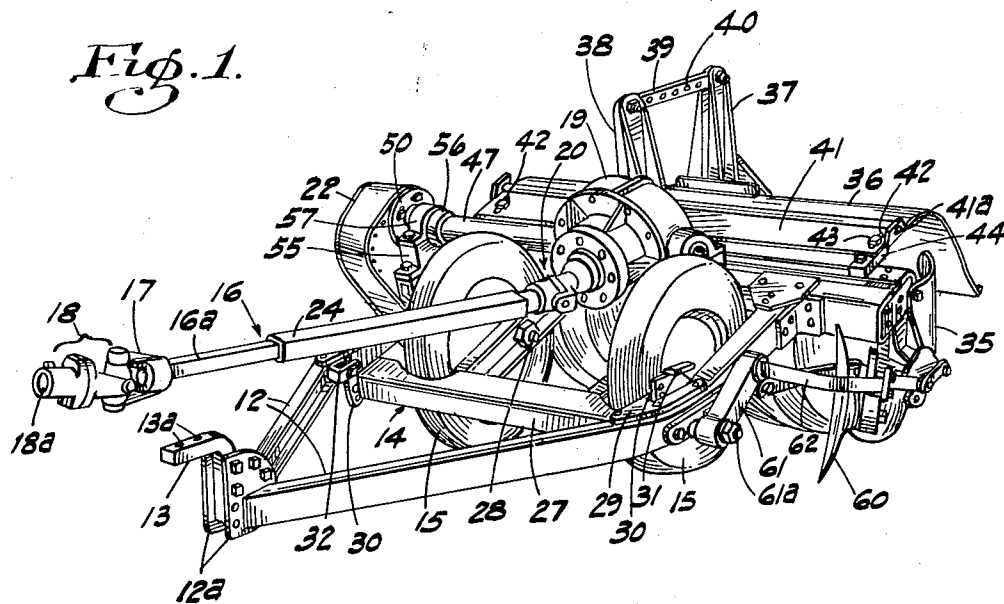
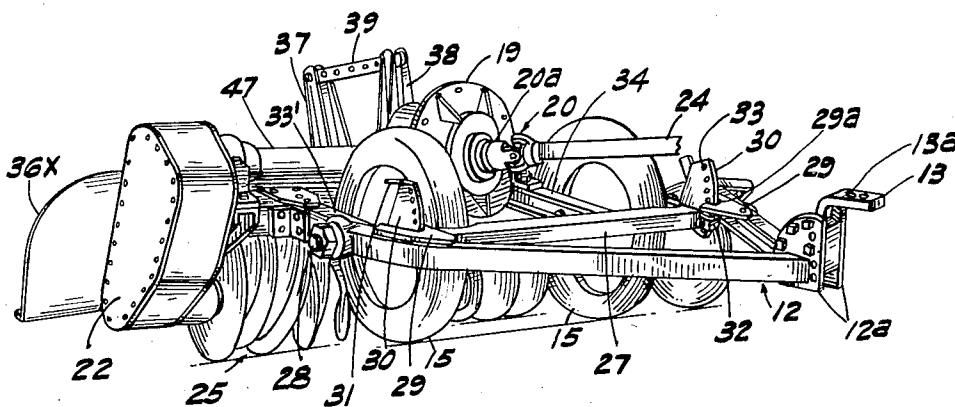
L. L. PATTERSON

2,554,498

ROTARY POWER-DRIVEN PLOW ASSEMBLY

Filed Jan. 14, 1946

4 Sheets-Sheet 1



LOUIS L. PATTERSON
INVENTOR.

BY
[Signature]
ATTORNEY.

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L. L. PATTERSON

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4 Sheets-Sheet 2

Fig. 3.

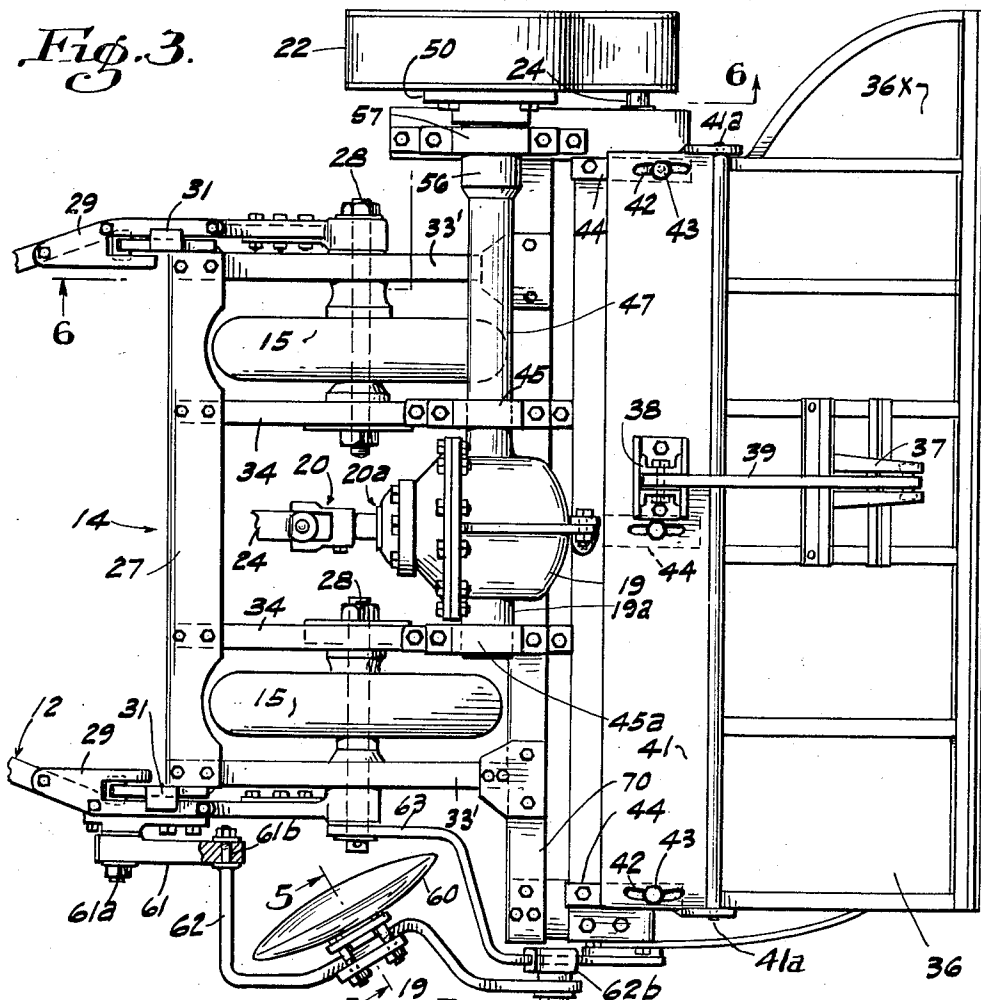


Fig. 4.

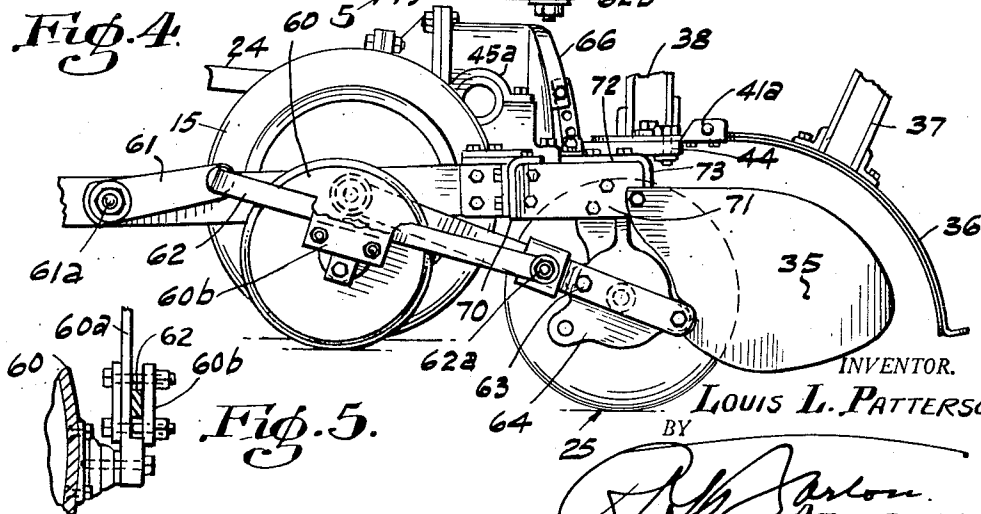
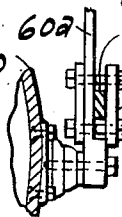


Fig. 5.



INVENTOR.

LOUIS L. PATTERSON,

BY

R. L. Carlson
ATTORNEY.

May 29, 1951

L. L. PATTERSON

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4 Sheets-Sheet 3

Fig. 6.

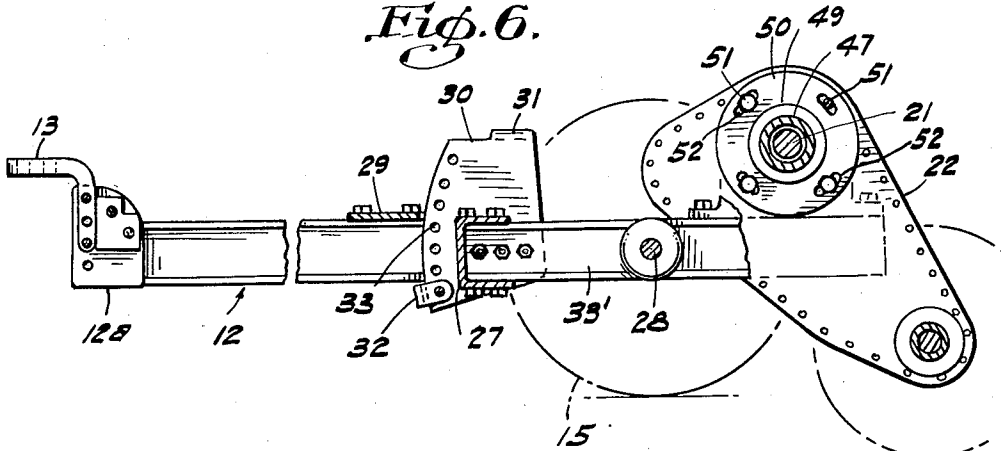


Fig. 7.

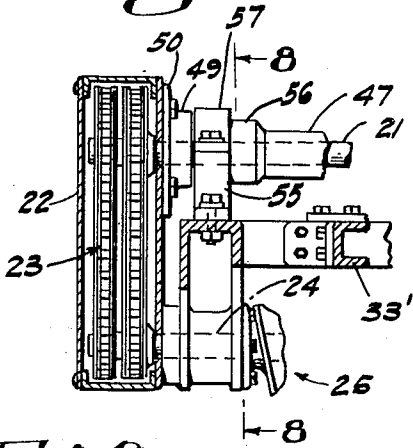


Fig. 8.

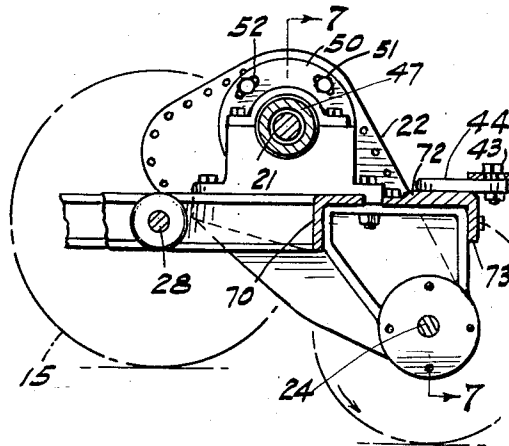
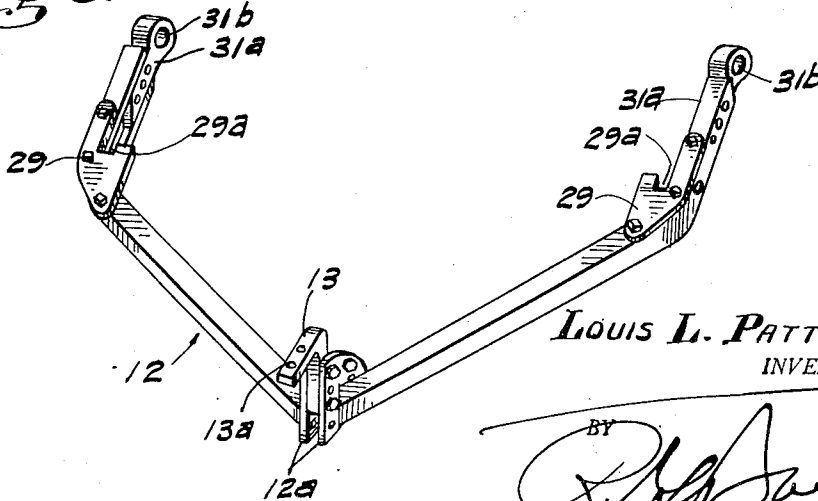


Fig. 9.



LOUIS L. PATTERSON,
INVENTOR.

BY

[Signature]
ATTORNEY.

May 29, 1951

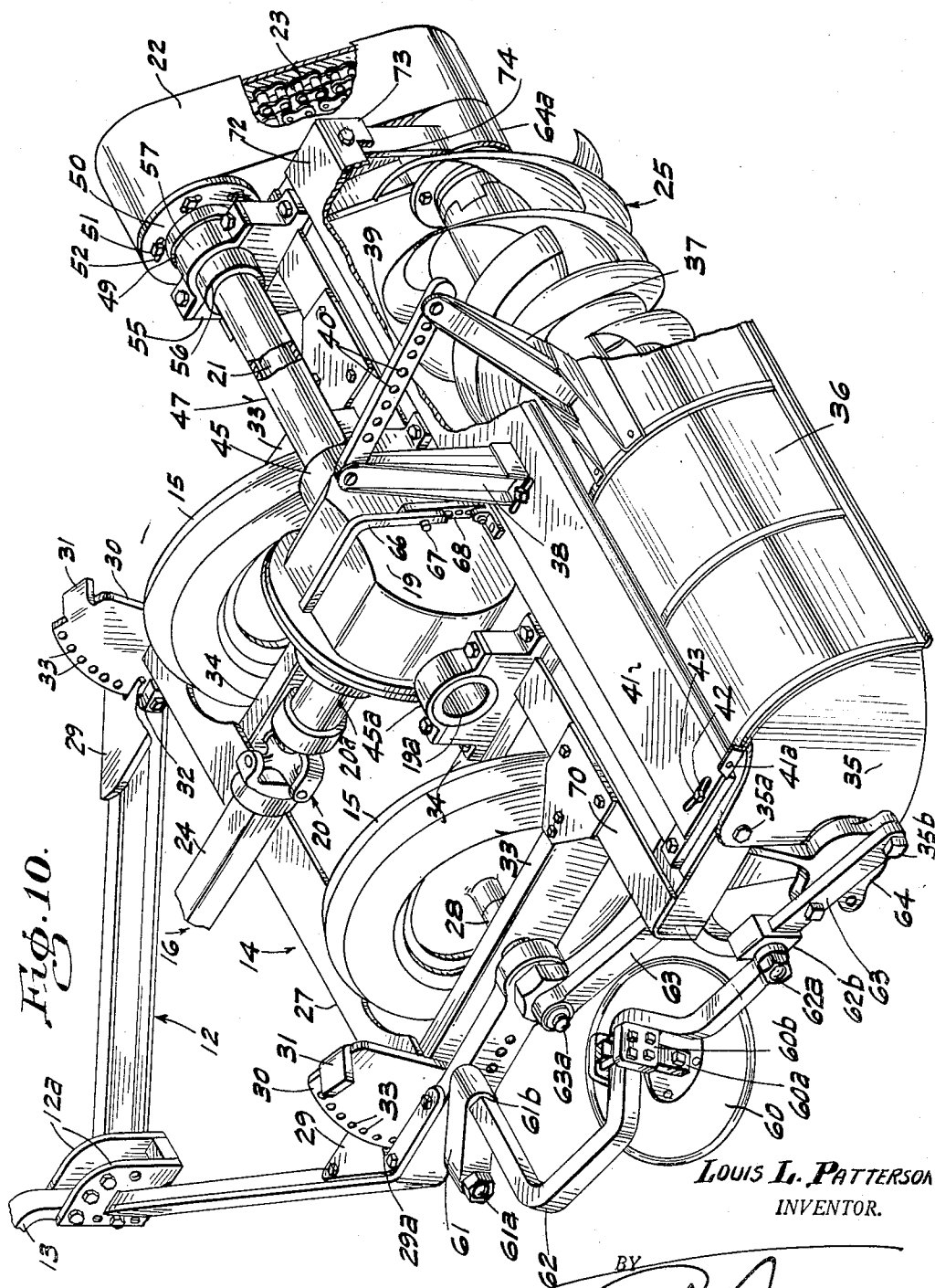
L. L. PATTERSON

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ROTARY POWER-DRIVEN PLOW ASSEMBLY

Filed Jan. 14, 1946

4 Sheets-Sheet 4



LOUIS L. PATTERSON
INVENTOR.

BY *[Signature]*
ATTORNEY.

UNITED STATES PATENT OFFICE

2,554,498

ROTARY POWER-DRIVEN PLOW ASSEMBLY

Louis L. Patterson, Los Angeles, Calif., assignor
to California Rotary Plow Company, Los Angeles, Calif.

Application January 14, 1946, Serial No. 641,019

18 Claims. (Cl. 97-41)

1

This invention relates to a rotary power-driven plow assembly.

More specifically speaking the present invention pertains to means for regulating and operating a power-driven rotary plow of the type described and claimed in my U. S. Patent No. 2,480,419, for Cutter Assembly for Rotary Plows, issued August 30, 1949. In said filed application I have set forth an improved arrangement of rotatable power-driven spiral plow blades together with a certain associated structure; whereas the present application pertains to various adjustments and operating means less intimately related to the rotatable soil-moving elements.

An object of the present invention is to provide a new arrangement or combination of the chassis and rotary plow cutter blades, so that, upon the disconnecting of the power drive from said blades, they will rotate freely and will immediately come to the surface of the soil when the implement moves forwardly, thus permitting the entire unit to be backed into fence corners or into any other desired position preparatory to again starting to plow; and also so that in the event of maneuvering to change position while in operation in the field it is unnecessary to change any wheel height adjustments. This latter feature results in a great time saver and is very desirable. It also makes it possible to trail the plow along highways by locking the cutter blades above the ground level, thereby placing the weight only upon the two ground wheels.

Another object of the invention is to provide, in an improved manner, for so constructing and arranging the implement that all the ground wheels thereof will travel only upon unplowed ground. Owing to this latter feature it is unnecessary to adjust the height of the ground wheels independently of each other so as to offset the difference in level between the wheels traveling on the unplowed ground and those traveling on the plowed ground, in order that the soil-moving members be caused to operate at equal depths at both ends of the plow cutter assembly.

Still another object of the invention is to provide improved means for causing the rotary soil-moving elements to automatically ride over obstructions on or below the soil level, thereby relieving the apparatus from shock and safeguarding the cutters against breaking.

Yet further objects pertain to an improved means for regulating the angularity of a universal joint drive for the rotary soil-moving blades,

2

so as to avoid unnecessary amount of angularity which would otherwise reduce the efficiency of the power drive and put excessive strain upon the power transmitting means; to provide an improved power transmission means for the drive assembly; to provide an improved combination of drawbar and plow chassis; to provide improved means to regulate the depth of the plowing; to improve the dust hood over the rear of the plow chassis; to improve the coulter assembly, and to provide a furrow-forming means arranged to act upon the plowed ground to form a temporary furrow thus unobstructing the advance of part of the plow's mechanism.

With the foregoing objects in view, together with such other objects and advantages as may subsequently appear, the invention resides in the parts and in the combination, construction and arrangement of parts hereinafter described and claimed, and illustrated by way of example in the accompanying drawings, in which:

Fig. 1 gives a perspective view of the complete assembly, the same being shown equipped with a power driving connection for being coupled onto the engine of an automotive vehicle, which vehicle will trail the plow by means of the drawbar structure also shown in this view.

Fig. 2 is a perspective view of the same structure as that shown in Fig. 1, the view point of the observer being at a different angle from that of the first view so as to show more clearly the opposite side of the structure.

Fig. 3 is a plan view on a larger scale than that of Figs. 1 and 2, portions of the drawbar structure and the power drive shaft being broken away.

Fig. 4 is an elevation of the structure shown in Fig. 3 looking at the end of said structure which is nearest to the observer with the device in plowing position.

Fig. 5 is a sectional detail showing a fragment of the coulter and of its mounting means, this section being taken on line 5-5 of Fig. 3.

Fig. 6 is a cross section taken on angular line 6-6 of Fig. 3.

Fig. 7 is a sectional detail taken on angular line 7-7 of Fig. 8.

Fig. 8 is a sectional detail taken on line 8-8 of Fig. 7.

Fig. 9 is a perspective view showing separately the drawbar structure.

Fig. 10 is a perspective view taken from the rear, portions of the structure being broken away to show underlying structure.

Referring in detail to the drawings and first

3

describing the illustrated embodiment of the invention from the viewpoint of operation and its relation to the tractor behind which it is trailed, the V-shaped drawbar 12 is provided at its front end with a two-part bracket consisting of a pair of semi-circular plates 12a having vertical forward edge portions which are bolted to the lower limb of an arm 13 which is of an inverted L-shape, said arm having a plurality of holes 13a through its upper horizontal limb (which is directed forwardly) to afford an adjustable attaching means for the pin of a conventional clevis, or like connecting means whereby the chassis 14 of the implement is connected with a tractor. 15 designates the ground wheels of the implement.

The driving means includes an extensible propeller shaft assembly 16, the male member 16a of which is provided at its forward end with a coupling 17 for connection with a front universal joint 18, said joint having at its front end a tubular extension 18a for connection with the power take-off of the tractor. Adjacent to the rear end of the propeller shaft assembly 16 there is provided a gear housing 19, there being a rear universal joint 20 whereby the rear end of the shaft assembly 16 is operatively connected with the pinion shaft assembly 20a and in turn the gearing contained within said housing.

From said gear housing 19 a transmission or jack shaft 21 leads into a sprocket chain housing 22 containing a gear and sprocket wheel assembly 23 well shown in Fig 7, and which does not need to be specifically described here since, separately considered, it forms no part of the present invention. From the power delivery end of said assembly 23 leads the shaft 24 which drives the cutter assembly 25, said cutter assembly also, separately considered, forming no part of the present invention and therefore not being herein described in detail.

Describing next the means provided for regulating the depth in the soil of the cutter blade assembly 25, the chassis frame is provided with a front cross piece 27 located considerably in advance of the ground wheels' axles 28 and adjacent to each end of said cross piece 14 the V-shaped drawbar 12 has secured to its upper side a plate 29 having a rearwardly opening notch 29a. The notch 29a of the plates 29 forms a guide for a segmental scuff plate 30 secured to the adjacent end of said crosspiece, the arcuate edge of said plate 30 being directed forwardly, the upper edge portion of said plate being furnished with an outwardly directed lip or stop flange 31 which limits the downward movement of said segmental plate by coming into contact with the upper side of said plate 29. A stop stirrup 32 on plate 30 limits the upward movement of said segment, said stop flange 31 and stirrup 32 thus limiting the rise and fall of the entire cutter assembly carried by the rear portion of the chassis. Said segmental plate 30 is provided with an arcuate row of holes 33 so that a stop pin may be inserted through the selected hole for the stirrup to adjust the scope of said movement as desired.

At the place where the plate 29 is attached to it each limb of the drawbar is deflected so as to extend directly toward the rear and have secured to it a shank 31a bolted or rivetted to it. The limbs of the drawbar may be made in one piece and whether so made or not are desirably made channel shaped in cross section with the channel directed inwardly and the shanks 31a

4

fitted into the rear end portion of the channel. Through the enlarged rear end of each shank 31a is a bolt hole 31b through which extends the adjacent end portion of the wheel axle 28 at that side of the chassis as shown in Fig. 3.

The chassis is furnished with outer side bars 33' which form the outer bearings for the ground wheels and with inner side bars 34 forming their inner bearings. Further details of the means for mounting the ground wheels need not be described as they do not pertain directly to the invention and may be varied to suit the manufacturer.

It is frequently customary to plow in a circular manner, the left hand side of the plow being against solid unplowed ground and the right hand side of the plow operating against plowed ground. Therefore it will readily be seen if extremely deep plowing is being done it will be necessary to provide a clearance for the chain housing 22 owing to its low-lying position. To provide for efficient operation under these conditions I provide a furrowing-out shield 35 which moves the plowed dirt slightly to the right thereby providing in the soil the desired clearance, the lower rear portion of the leveling hood carrying the soil sufficiently far to the right to in cooperation with the hood extension 36x fill the furrowed-out area as the plow advances. Said leveling hood is provided at its midlength with an upstanding extension or standard 37 which is operatively connected with a like chassis standard 38 by means of a link 39. Said link has through it a longitudinally extending series of holes 40 to cooperate with suitable pins or fasteners carried by the aforesaid standards thus affording a means for adjusting the height of the trailing edge of the hood 36. The standard 38 is fixed to a base plate 41 to the rear edge of which the hood 36 is pivoted at 41a. It is desirable that said base plate be adjustable in a front to rear manner and for this purpose each end portion thereof is provided with transverse slots 42 through which project clamp screws 43 that are anchored to the extension plates 44 as shown in Fig. 3.

Describing additional structure, and more particularly parts located rearwardly of the axles of the ground wheels, the already mentioned inner bearing bars 34 underlie and have bolted to them the paired pillow blocks 45, 45a, jack shaft housing sleeve 47 of the already mentioned jack shaft 21 being in part supported by the pillow block 45, the pillow block 45a supporting the boss 19a carried by the gear housing 19.

To the jack shaft housing sleeve 47 is welded a ring 49 having a wide radial flange 50, said flange being adjustably attached to the sprocket chain housing 22 by means of a plurality of cap screws 51 operating in slots 52 and tapped into said housing. Said slots make it possible to turnably adjust the sleeve 47 of the jack shaft 21, thereby also affording a turning adjustment to the gear housing 19, thus when necessary lessening the angularity of the relation between the axes of the rotary parts connected by the rear universal joint 20. This means is only an auxiliary adjusting means to regulate the position of the gear box 19, additional means therefor being hereinafter described.

With the pillow block 45, to additionally support the jack shaft sleeve 47, cooperates a pillow block 55 which supports a bushing or collar 56 that, in turn, supports said sleeve 47. A cap

plate 57 overlies said sleeve and has its end portions secured to said pillow block 55.

A furrow-making means, already described in part, is provided at that side of the advancing implement which is opposite to said chain housing, so that, when each succeeding round is traveled over the furrow made by said means will afford a clear path for the lower part of the housing 22. The already mentioned shield 35, shown supported at 35a and 35b in Fig. 10, forms only a part of this furrow-making means. The remaining parts thereof will now be described.

A coulter 60 is carried by the implement in advance of said shield 35 in a position to make and widen a cut extending downwardly into the unplowed soil, the leading edge portion of said shield 35 being positioned to follow along in said widened cut. The mounting means for said coulter comprises a pitman arm 61 having one end pivotally attached at 61a to the drawbar structure 12 and its opposite end pivotally connected at 61b to one end of a coulter-carrying arm 62, the latter arm having its opposite end pivotally connected at 62a to a block 62b slidably mounted upon the radius rod 63, said rod being carried at its rear end by the left hand trunnion bracket 64, the front end of said radius rod being pivotally connected with the reduced end portion 63a of the adjacent axle shaft 28. Said radius rod is provided to stiffen the trunnion bracket 64 which, in turn, supports rotatably the end of the plow assembly 25 which is opposite to the end thereof connected to its driving means 23. Since the radius rod is pivoted at its front end to the wheel axis, its rear end portion moves in the same arc as the plow assembly of cutters.

When the plow assembly swings upwardly said coulter mechanism, on account of being constructed and arranged in the above stated manner, causes the coulter to move vertically upward at an accelerated speed, so that, by the time the plow assembly has reached the level of the ground said coulter has also moved far enough up to clear the surface of the ground.

It will be observed, as well shown in Fig. 10, that the radius rod 63 has its midlength portion angularly deflected away from the coulter so as to provide ample room for the coulter to be adjusted laterally to a position wherein it widens to the desired extent the cut which it provides for the trunnion bracket 64 which trails it. The coulter 60 is directly carried by a mounting arm 60a which is slidably adjustable in a bracket 60b secured to the coulter-carrying arm 62, thus rendering the coulter vertically adjustable in relation to said arm 62 to compensate to variations in the diameter caused by wear.

When for any reason the power from the power take-off of the tractor is removed from the plow assembly 25 and the assembly is elevated to a ground level, the aforementioned means serves automatically to elevate the coulter assembly to a position also above the ground to give it the required clearance and thus prevent damage thereto, and giving it freedom of movability as the vehicle advances.

The coulter 60 is for the purpose of cutting a clearance in the ground for the left hand trunnion bracket 64, as viewed in Fig. 10, and for the additional purpose of loosening the soil whereby it may be more easily removed when contacted by the follow-up, furrow-making skirt 35 for the purpose of providing a clearance furrow for the chain housing and right hand trunnion bracket to subsequently travel in. This condition how-

ever need be met only when doing unusually deep plowing.

If an emergency arises whereby the plow assembly is caused to abruptly raise above the ground level to the extent allowed by the stop flange 31, the oscillation of the frame about the wheel's axes provides for this automatism. However, in order to provide for ease of automatic elevation of the plow assembly as stated, I further provide the usual male and female propeller shaft assembly as shown in Fig. 1 which affords the necessary flexibility to achieve this result satisfactory.

In order to operate the propeller shaft assembly 16 at a minimum angle (due to variations in power take-offs in tractors) it is necessary to provide a directional adjustment of the pinion shaft assembly 20a which supports the rear universal joint 20 in the propeller shaft assembly. This adjustment comprises means to raise and lower this joint connection in relation to the universal joint about a rotating axis on which the gear housing 19 is turnable. This adjustable means includes mechanism consisting of the jack shaft housing 47, the integral gear box 19 and the jack shaft housing flange 50. To localize the predetermined position of the gear box and jack shaft housing a flange 66 cast integral with the gear box has a locking pin 67 which engages within a plurality of holes in the bracket 68 carried by the plow chassis. Auxiliary means is provided to stabilize this rigidity and allow for rotary adjustment in the slotted holes in the flange 50 of the jack shaft housing already mentioned.

Rearwardly of the ground wheels the chassis 14 has a rear cross piece 70 of an angle iron character as shown in Fig. 10. Within the angle of said cross piece, at each end thereof is secured the member 71 which supports the member 72, the latter member having along its rear end a downwardly extending flange 73 which extends from side to side of the implement, said downwardly directed flange being cut away at 74 nearly its entire length to provide a clear path for the soil thrown upwardly by the assembly of cutting blades. At its ends and in the midlength portion of the member 72 are mounted thereupon the extension plates 44 which support the base plate 41 of the hood 36, the already mentioned trunnion bracket 64 and an additional trunnion bracket 64a at the opposite end of the cutter assembly, these brackets both being fastened internally to the members 70, 71 and 72 by any suitable means which need not be described in detail.

Briefly reviewing the different steps in the adjustability and operation of the improved cooperating parts, it is necessary to see that the correct directional adjustment is provided for the pinion shaft assembly 20a to accommodate the height of the power take-off of the particular tractor used, since these heights vary in the different makes of tractors. This is determined by the double adjustment provided in the jack shaft sleeve flange 50 and gear-box-to-frame connection 66, 67, 68. Then for the correct depth of plowing the part 32 (Fig. 6), is adjusted relatively to the part 30. Next the coulter 60 is set to the correct vertical height to clear a way for the trunnion bracket 64 located rearwardly thereof. Also, the hood 36 at the rear of the implement is set at the required elevation and lateral pitch. If the plowing operation requires no leveling of the soil the hood may be elevated to the maximum height as provided for by the row of

holes 40 in the link 39 so as not to interfere with the distribution of the land surfaced debris.

As soon as the power is applied to the cutter assembly the lead on the spiral blades causes the cutters to take hold at which time the drawbar frame 12 assumes a horizontal position as shown in Fig. 6, which view shows the plow assembly cutting at maximum depth as provided for by the stop stirrup 32, at which time the coulter cuts a clearance path for the trunnion bracket 64 trailing thereafter. The furrow-making skirt 35 cuts a path for the drive chain housing 22 and the hood extension 36x fills in this furrow on the next round as said chain housing travels in advance thereof. If additional dirt is required to fill in the furrow the hood may be skewed with its extension 36x positioned slightly forward of the opposite end as provided for by the slotted holes 42 in the plate 41 (see Fig. 3).

If any obstacle is encountered by the coulter assembly in plowing the complete plow assembly together with the chain housing and coulter assembly are oscillated upwardly automatically about the wheels' axes, such upward tilting being limited by the flanges 31 of the scuff plates 30 contacting with the upper face of the drawbar 12. When the power is removed from the plow assembly the cutters immediately rise to the ground level and the device can be backed around, turned and operated in any desired position it is required to satisfy.

I claim:

1. In a plow structure of the kind described, axle means, ground wheels supported thereby, a frame supported by said axle means, an assembly of rotary plow blades carried by said frame rearwardly of said ground wheels, power transmission means carried by said frame to rotate said plow blades, a housing for the latter means occupying a low position at one side of said frame, means at the opposite side of the frame to form during one round of the implement's travel a furrow thus clearing a path for said housing when the implement travels its next round, a transversely extending hood carried by said frame, said hood having an edge portion positioned to level the surface of the plowed soil rearwardly of said plow blades as the implement advances, said hood being adjustable to maintain it in a more or less skewed position to divert a sufficient amount of soil laterally to fill said furrow after it has afforded a path for said housing, said adjustable means comprising a plurality of bolts secured to said frame, and a horizontally disposed plate overlying said frame to which said hood is pivotally mounted to swing in a vertical plane, said bolts extending through elongated slots in said plate.

2. In a plow structure of the kind described, axle means, ground wheels supported thereby, a frame supported by said axle means, an assembly of rotary plow blades carried by said frame rearwardly of said ground wheels, power transmission means carried by said frame to rotate said plow blades, a housing for the latter means occupying a low position at one side of said frame, and means mounted upon the opposite side of the frame and extending outwardly beyond the swath plowed by said blades to form during one round of the implement's travel a furrow thus clearing a path for said housing when the implement travels its next round.

3. In a plow structure of the kind described having an axle, ground wheels mounted thereon, a chassis frame supported by said axle in a

freely tiltable manner, an assembly of rotary plow blades carried by the rear portion of said frame, a housing containing gearing which forms a part of a means for transmitting driving power to said blades, a jack shaft connected with the gearing in said housing, said jack shaft extending parallel to the axes of the ground wheels, means operatively connecting said jack shaft with said plow blades to drive them, a shaft assembly connectible with the engine of an engine driven tractor behind which the plow structure is trailed, said shaft assembly including a universal joint connection and being operatively connected with the gearing in said housing, said shaft assembly entering said housing at substantially a right angle to said jack shaft, said housing being mounted on the chassis frame in a rotationally adjustable manner in relation to the axis of said jack shaft.

4. In an agricultural implement of the kind described, means for making a furrow at one side of the advancing implement to be occupied by low-lying parts at the opposite side of the implement during succeeding round traveled thereby, said furrow-making means comprising a coulter carried by the implement in a position to make and widen a cut extending downwardly into the unplowed soil, and a soil-moving shield mounted on the implement with a leading edge portion positioned to follow along in said widened cut, the portion of said shield to the rear of its leading edge being positioned to enlarge said widened cut into a spacious furrow.

5. The subject matter of claim 4, and a jointed rod structure extending forwardly and rearwardly of the implement and having its end portions pivotally connected thereto, said coulter being rotatably carried by a part of said rod structure intermediate its end portions so as automatically to override the surface of the ground when said plow assembly moves upwardly to an inoperative non-plowing position.

6. In an agricultural implement of the kind described, axially aligned ground wheels, axle means supported by said wheels, a chassis frame rockably mounted upon said ground wheels, a drawbar attached to said means, a rotatable assembly of plow blades carried by said frame in a rearwardly spaced relation to said axle means, a pitman arm having one of its ends attached pivotally to one side of said drawbar in advance of said axle means, the free end of said arm being inclined upwardly and toward the rear of the implement, a coulter-carrying arm having a front end pivotally connected with the free end of said pitman arm at a point located forwardly of the aforesaid axle means, the opposite end of said coulter-carrying arm being pivotally and slidably connected with the implement rearwardly of said axle means, and a coulter mounted upon said coulter-carrying arm.

7. In an agricultural implement of the kind described, axially aligned ground wheels, axle means supported by said wheels, a chassis frame rockably mounted upon said ground wheels, a drawbar attached to said means, a rotatable assembly of plow blades carried by said frame in a rearwardly spaced relation to said axle means, a pitman arm having one of its ends attached pivotally to one side of said drawbar in advance of said axle means, the free end of said arm being inclined upwardly and toward the rear of the implement, a coulter-carrying arm having a front end pivotally connected with the free end of said pitman arm at a point located forwardly of the

aforesaid axle means, a block, and a radius rod along which said block at times moves, said radius rod having a front end portion fastened to the outer end portion of the aforesaid axle means at that side of the chassis and a rear end portion connected with the rear portion of the implement.

8. In a plow structure of the kind described, axle means, ground wheels supported thereby, a frame supported by said axle means and freely tiltable thereon in a vertical plane, an assembly of rotary plow blades carried by said frame rearwardly of said ground wheels, a transversely extending hood carried by said frame, said hood having a lower edge portion positioned to level the surface of the plowed soil rearwardly of said plow blades as the implement advances, a substantially horizontal elongated attaching plate for said hood, said attaching plate extending transversely along the rear part of said frame and having a rear edge portion to which the upper part of said hood is pivotally connected to swing in a vertical plane, said attaching plate having through it transverse slots, and releasable attaching means for said attaching plate securing the latter adjustably to said frame so that said attaching plate may be adjustably skewed in relation to said frame thus maintaining said hood in a more or less skewed position to divert laterally to a predetermined extent the soil upon which said hood acts.

9. The subject matter of claim 2 and, said furrow-making means comprising a coulter carried by the plow structure in a position to make and widen a cut extending downwardly into the unplowed soil.

10. The subject matter of claim 2 and, said furrow-making means comprising a coulter carried by the plow structure in a position to make and widen a cut extending downwardly into the unplowed soil, and a soil-moving shield mounted on the plow structure with a leading edge portion positioned to follow along in said widened cut, the portion of said shield to the rear of its leading edge being positioned to enlarge said widened cut into a spacious furrow.

11. In an agricultural implement of the kind described, axially aligned ground wheels, axle means supported by said wheels, a chassis frame mounted upon said ground wheels to freely rock thereon in a vertical plane through a predetermined angle, a drawbar attached to said means, a rotatable assembly of plow blades carried by said frame in a rearwardly spaced relation to said axle means, a pitman arm having one of its ends attached pivotally to one side of said drawbar in advance of said axle means, the free end of said arm being inclined upwardly and toward the rear of the implement, a coulter-carrying arm having a front end pivotally connected with the free end of said pitman arm at a point located forwardly of the aforesaid axle means, the opposite end of said coulter-carrying arm being pivotally connected with the implement rearwardly of said axle means, and a coulter mounted upon said coulter-carrying arm.

12. In a plow structure of the kind described having aligned axles, ground wheels mounted thereon, a chassis frame supported by said axles in a freely tiltable manner, an assembly of rotary plow blades carried by the rear portion of said frame, a gear housing containing gearing which forms a part of a means for transmitting driving power to said blades, a jack shaft connected with the gearing in said gear housing, said jack shaft

extending parallel to the axis of the ground wheels, a shaft assembly connectable with the engine of an engine driven tractor behind which the plow structure is trailed, said shaft assembly including a universal joint connection and being operatively connected with the gearing in said gear housing, said shaft assembly entering said gear housing at substantially a right angle to said jack shaft, said housing being mounted on the chassis frame in a rotationally adjustable manner in relation to the axis of said jack shaft so as to reduce to the minimum requirement the angularity of the parts of said shaft assembly at opposite sides of its universal joint, and means to rotationally adjust said gear housing on said frame.

13. A plow structure of the kind described consisting of an agricultural implement mounted upon wheels having aligned axles, said implement having a frame provided with a front and a rear end mounted upon said axles and freely tiltable thereon in a vertical plane through a predetermined angle, a rotary plow assembly carried by said rear end of said frame and positioned to move in an arc simultaneously during the automatic tilting of said rear end frame about the aligned axles of said wheels as an axis caused by soil obstruction, power transmission means carried by said frame to rotate said rotary plow assembly, a housing for the latter means occupying a low position at one side of said frame, a coulter at the opposite side of the frame to form during one round of the implement's travel a furrow, and a soil-moving shield mounted on the implement with a leading edge portion positioned to follow along said furrow, the portion of said shield to the rear of its leading edge being positioned to enlarge said furrow thus clearing a path for said housing when the implement travels its next round.

14. The subject matter of claim 12 and, means operatively connecting said jack shaft with said plow blades to drive them.

15. The subject matter of claim 12 and, power transmission means operatively connecting said jack shaft with said plow blades to drive them, and a transmission housing enclosing said power transmission means, said means to rotationally adjust said gear housing comprising a jack shaft housing in which said jack shaft is mounted, one end of said jack shaft housing being connected to said gear housing and the opposite end thereof being adjustably connected to said power transmission housing.

16. In a structure of the kind described, axle means, ground wheels mounted thereon, a horizontally disposed frame pivotally mounted intermediate its front and rear ends on said axle means for free tilting movement thereabout, a rotary soil tilling element mounted on the rear end of said frame, a second horizontally disposed frame pivotally connected at its rear end to said axle means and having a forwardly projecting portion forming a tongue, the forward end of said first mentioned frame being tiltable within the limits defined by said second mentioned frame to a higher level and a lower level than the normal plane in which said second mentioned frame lies, and means associated between the forwardly projecting portion of said first mentioned frame and an intermediate portion of said second mentioned frame for adjusting the tilting distance of said first mentioned frame relative to said second mentioned frame whereby to regulate the depth to which said rotary element penetrates and at

11

the same time regulate the extent to which the front end portion of said first mentioned frame dips below said second mentioned frame.

17. The subject matter of claim 16 and, a differential gear housing pivotally mounted upon said first mentioned frame and adjustable in a vertical plane, driving means acting between said gear housing and said rotary element to rotate the latter, and a power take-off shaft connectable with the engine of a tractor behind which the structure is trailed, said shaft including a universal joint construction operatively connected with the gearing in said housing.

18. The subject matter of claim 17 and, said driving means comprising a jack shaft connected with the gearing in said housing, said jack shaft extending parallel to the axles of said ground wheels, and a jack shaft housing in which said jack shaft is mounted, one end of said jack shaft housing being connected to said differential gear housing and the opposite end thereof being provided with means to turnably adjust said jack

12

shaft housing in relation to means in a fixed relation to said driving means.

LOUIS L. PATTERSON.

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