Sept. 25, 1956

B. L. FOWLER

REVERSIBLE PLOW

2,764,075

Filed March 19, 1953

3 Sheets-Sheet 1

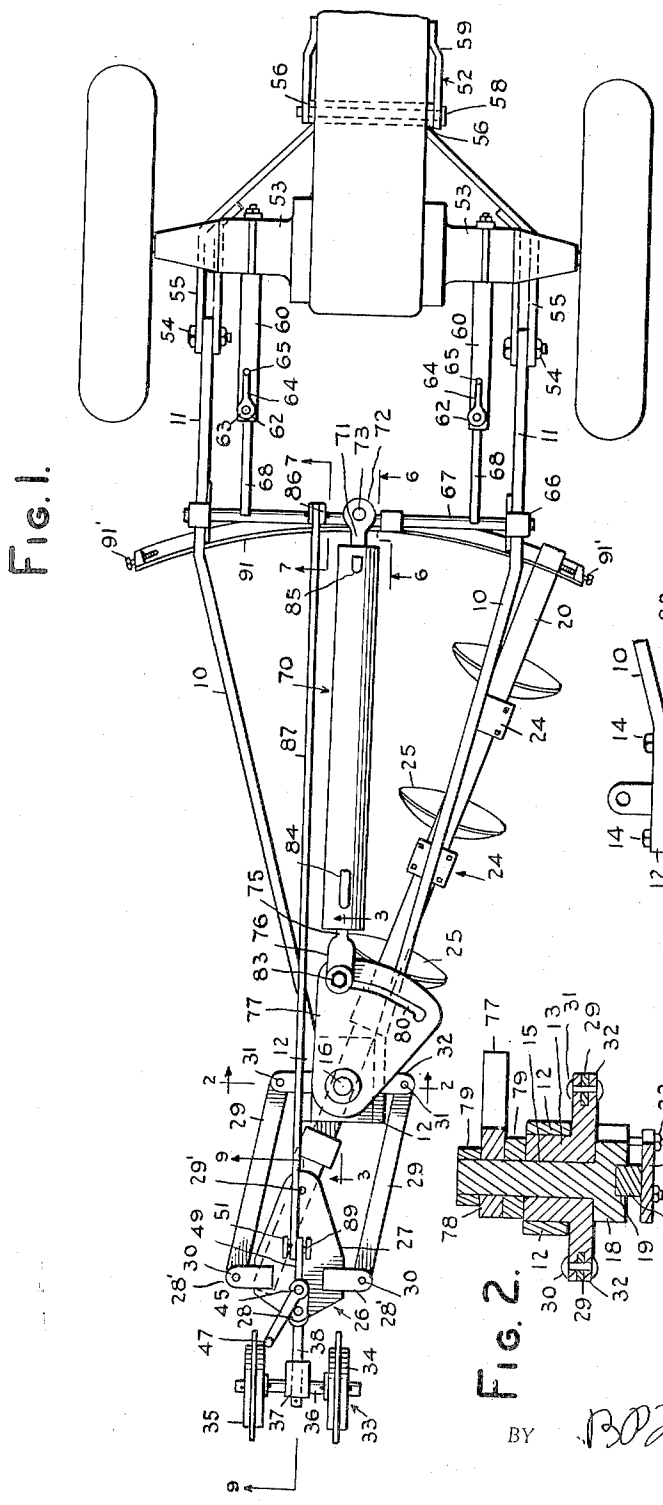


FIG. 1.

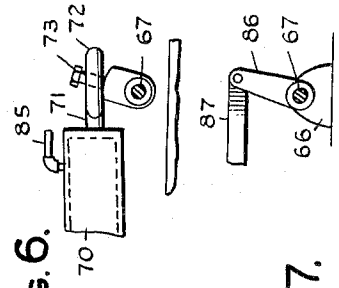


FIG. 6.

FIG. 7.

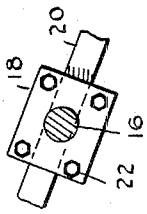


FIG. 5.

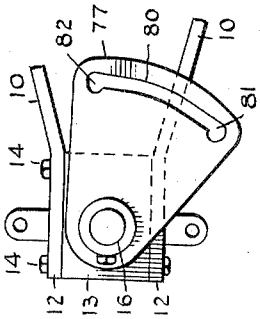


FIG. 4.

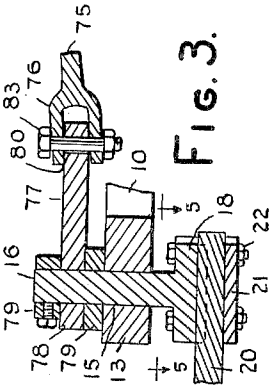


FIG. 3.

FIG. 2.

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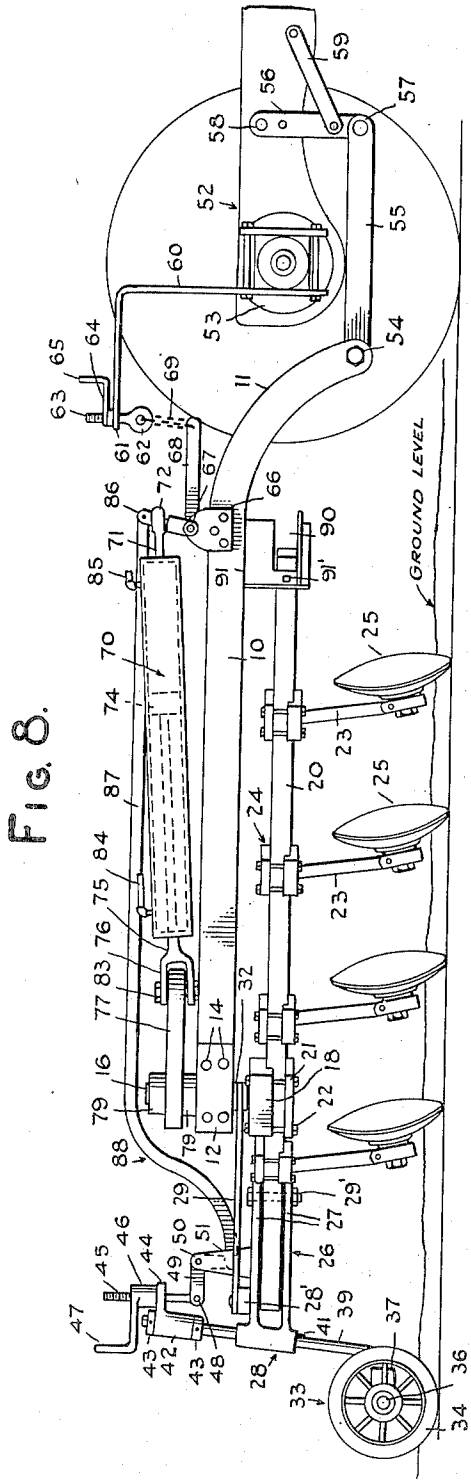


FIG. 8.

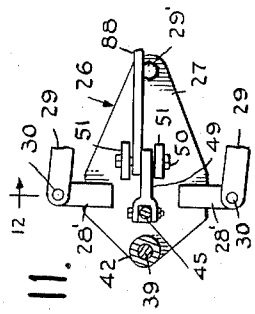


FIG. 11.

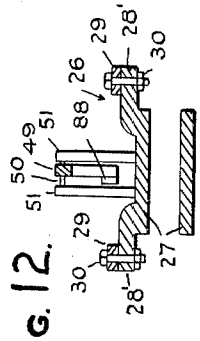


FIG. 12.

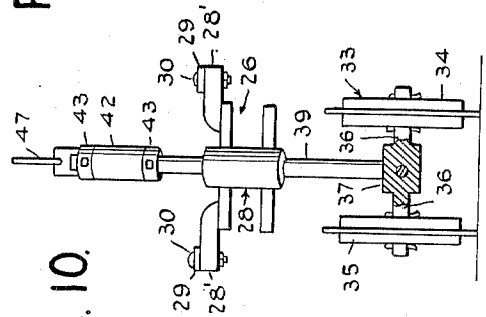


FIG. 10.

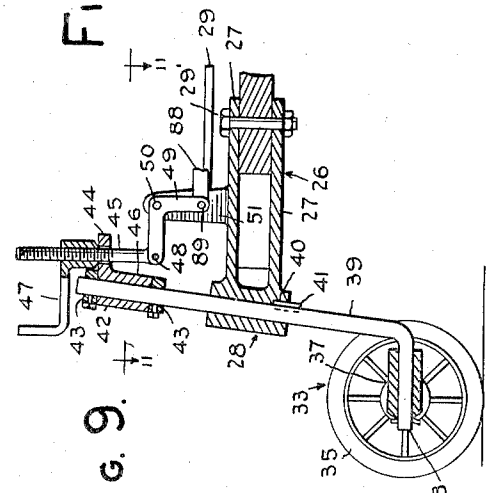


FIG. 9.

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FIG. 15.

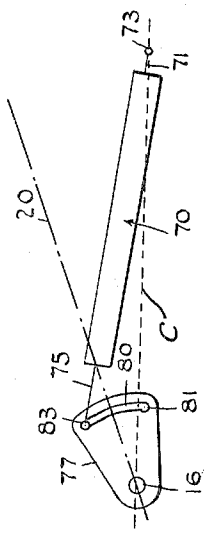


FIG. 16.

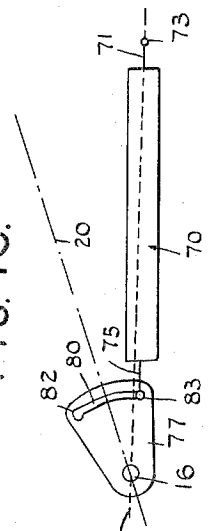


FIG. 13.

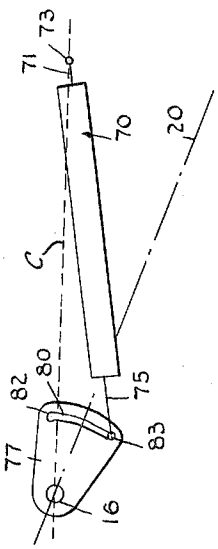
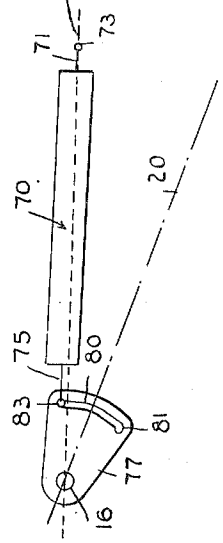


FIG. 14.



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2,764,075

REVERSIBLE PLOW

Byron Leo Fowler, Corpus Christi, Tex., assignor to E. L. Caldwell & Sons, Corpus Christi, Tex., a firm

Application March 19, 1953, Serial No. 343,392

13 Claims. (Cl. 97—31)

My invention relates to reversible plows, which will throw the dirt in the same direction when travelling in opposite directions in a longitudinal path.

An important object of the invention is to provide pressure operated means which will raise the support carrying the tool bar, to shift the blades or plow discs above the ground, and then shift the tool bar to an opposite side angular position so that the blades or plow discs will throw the soil in the same direction when the plow travels longitudinally in opposite directions.

A further object of the invention is to provide a longitudinally extensible pressure-operated device, connected with means for raising and lowering the frame or support carrying the tool bar, and also connected with the means for angularly adjusting the tool bar.

A further object of the invention is to provide a fluid pressure operating device which is simple in construction and reliable in operation.

A further object of the invention is to provide means which is shifted by the movement of the tool bar, for compensating the side shifting pressure produced by the blades or plow discs so that the rear end of the plow will not tend to shift laterally unduly.

Other objects and advantages of the invention will be apparent during the course of the following description.

In the accompanying drawings forming a part of this application and in which like numerals are employed to designate like parts throughout the same,

Figure 1 is a plan view of a reversible plow embodying my invention,

Figure 2 is a vertical section taken on line 2—2 of Figure 1,

Figure 3 is a longitudinal vertical section taken on line 3—3 of Figure 1,

Figure 4 is a plan view of the shifting plate, parts omitted,

Figure 5 is a plan view of a clamp, viewed from the line 5—5 of Figure 3,

Figure 6 is a detailed section taken on line 6—6 of Figure 1, parts omitted,

Figure 7 is a similar view taken on line 7—7 of Figure 1,

Figure 8 is a side elevation of the reversible plow,

Figure 9 is a longitudinal vertical section taken on line 9—9 of Figure 1,

Figure 10 is a rear elevation of the tail wheel device and associated elements,

Figure 11 is a horizontal section taken on line 11—11 of Figure 9,

Figure 12 is a section taken on line 12—12 of Figure 11,

Figure 13 is a diagrammatic view showing the shifting plate swung to the right, viewed from the rear of the machine and the cylinder in the shifted position,

Figure 14 is a similar view, showing the shifting plate in the right position and the cylinder returned to the starting position,

Figure 15 is a similar view showing the shifting plate swung to the left, viewed from the rear of the machine, and the cylinder in the shifted position, and,

Figure 16 is a similar view showing the shifting plate shifted to the left and the cylinder returned to the starting position.

A main frame is provided comprising horizontal longitudinal bars 10, which diverge forwardly and are provided with forward extensions 11, which are parallel and curved or inclined downwardly. The bars 10 have rear extensions 12, which are parallel and a bearing block 13 is arranged between the extensions 12 and rigidly secured thereto by bolts 14 or the like. The block 13 has a vertical opening 15, pivotally receiving a vertical pin 16. This vertical pin has a shoulder at its lower end and carries an upper clamp block 18, which is integral therewith. The upper clamp block 18 has its lower face provided with a groove 19, to receive a generally horizontal tool bar 20. Arranged beneath the upper clamp block 18 is a lower clamp block 21, connected with the same by bolts 22, and the tool bar is therefore rigidly clamped to the upper clamp block 18.

Arranged beneath the tool bar 20 are arms or standards 23, secured thereto by means of clamps 24. The standards 23 have rotary plow discs 25 rotatably mounted upon their lower ends, and the mounting is such that the plow discs may be angularly adjusted with respect to the standards 23.

Arranged at the rear end of the main frame is a tail supporting device or unit 26, which is horizontal and is shifted laterally while retaining its longitudinal axis parallel with the longitudinal direction of travel of the machine. This unit 26 comprises upper and lower elongated plates 27, which are spaced and rigidly secured to an upstanding sleeve 28, at their rear ends. The rear end of the tool bar 20 extends between the plates 27 and is pivotally connected with the front ends of these plates by a bolt 29'.

The upper plate 27 is provided with outwardly extending generally horizontal brackets 28', rigidly secured thereto, and having parallel links 29 pivotally connected therewith by pins 30. The forward ends of the links 29 are pivoted at 31 to brackets 32, Figure 2, rigidly secured to the bearing block 13. The brackets 28' are above the plate 27 while the brackets 32 are beneath the bar extensions 12, as shown.

The device or unit 26 is supported by a tail wheel device 33, including wheels 34 and 35, carried by transverse axle sections 36, rigidly mounted upon a bearing sleeve 37. The bearing sleeve 37 is pivotally mounted upon the lower horizontal end portion 38 of an upstanding post 39. This post 39 is rotatable within the sleeve 28. The sleeve 28 may be raised and lowered upon the post 39, as will be explained, and when the sleeve 28 is in the lowermost position, its internal groove 40, will receive a rib 41 rigidly secured to the post 39. The post 39 is therefore locked against turning movement within the sleeve 28, when the sleeve is in the lowermost position, but when the sleeve 28 is raised, the rib 41 is removed from the groove 40, and the post 39 may turn in the sleeve 28. The wheels 34 and 35 are rotatable upon the axle sections 36, and the wheel 34 may travel in the furrow while the companion wheel 35 will travel upon the top of the ground, which is rendered possible by the fact that the bearing sleeve can turn upon the extension 38.

The numeral 42 designates a sleeve which is rotatably mounted upon the upper end of the post 39, and held against longitudinal movement on this post by the collars 43, rigidly secured thereto. The sleeve 42 has a forwardly extending horizontal crank 44, having a vertical opening formed therein to slideably receive a link 45, which may be cylindrical and screw-threaded upon its upper portion. These screw-threads slide within the open-

ing of the crank 44 when the link is shifted vertically. A nut 46 engages the screw-threaded portion of the link 45 and is arranged above the crank 44 and is turned by a handle 47. Pivotally connected with the lower end of the link 45, at 48, is a bell-crank lever 49, which is pivoted at 50 upon the vertical bracket 51, rigidly mounted upon the upper plate 27, and positioned to hold the bell-crank lever at the transverse center of the plate 27. It is thus seen that means are provided for supporting the rear end of the frame including the bars 10 from the wheels 34 and 35 and associated elements.

Arranged in advance of the extensions 11 of the bars 10 is a tractor 52, having a rear axle housing 53. The extensions 11 are pivotally connected at 54 with horizontal links 55 which extend inwardly and are pivotally connected with stationary links 56, at 57. These stationary links are rigidly secured near their upper ends to the body of the tractor, as shown in 58 and are also connected with diagonal links 59. The numeral 60 designates inverted L-shaped brackets which are rigidly mounted upon the axle housing 53. These brackets have openings 61 formed in their horizontal arms, to slideably receive eye-bolts 62, having upper screw-threaded ends 63, receiving nuts 64, turned by handles 65. Mounted upon the frame bars 10 near their forward ends are fixed bearings 66, pivotally receiving a horizontal transverse rock shaft 67, carrying forwardly extending horizontal cranks 68, rigidly secured to the rock shaft. Flexible elements or chains 69 are secured to the forward ends of the cranks 68, and the lower ends of the eye-bolts 62. The numeral 70 designates a generally horizontal cylinder, having its forward end provided with a rod 71, rigidly secured thereto, and this rod has an apertured head 72, pivotally receiving an upstanding crank 73 which is rigidly mounted upon the rock shaft 67. The opposite ends of the cylinder 70 are closed and the cylinder receives a piston 74, connected with a piston rod 75, extending rearwardly beyond the end of the cylinder and carrying a forked-head 76, which straddles the forward end of a shifting element or plate 77. This shifting element or plate is horizontally arranged and is preferably tapered rearwardly, and its reduced end has an opening 78 for receiving the shaft 16, and the shifting element or plate 77 is rigidly clamped to the shaft 16, by nuts 79. The forward large end of the shifting element or plate 77 has a slot 80 formed therein, extending transversely of the plate, and this slot may be curved. At its ends, the slot 80 has notches or end slots 81 and 82, upon the rear side of the slot 80. The end portions of the slot 80 are straight and diverge toward their free ends. The ends of the slot 80 extend forwardly with respect to the center line when such ends are shifted to the alternate positions close to the center line C. In Figure 13 it will be seen that the slot extends rearwardly with respect to the center line C throughout its entire length, and hence the pivot element 83 will move to the notch 82, when the piston 74 is shifted forwardly. The pivot element 83 will now occupy the position shown in Figure 14, and will be on the left side of the center line C as viewed from the rear of the machine. When the piston 74 is shifted rearwardly, plate 77 is turned to the left, as viewed from the rear of the machine, Figure 15. The slot 80 is now inclined forwardly toward the notch 81 with respect to the center line, and when the piston 74 is shifted forwardly, pivot element 83 will move to the notch 81, Figure 16. When the piston is again shifted rearwardly, plate 77 will be swung to the right, viewed from the rear of the machine, Figure 14.

The forked head 76 has the pin or pivot element 83 secured thereto and extending through the slot 80. The plate 77 extends longitudinally of the implement bar 20, and its central longitudinal axis coincides with the central longitudinal axis of the bar 20. The plate 77 and bar 20 swing as a unit.

In Figure 1, the shifting element or plate 77 has been

shifted to the right, viewed from the rear of the machine, and this movement of the shifting element or plate has swung the implement bar 20 to the right. The forward end of the cylinder 70 is pivotally connected with the crank 73, so that the cylinder can swing horizontally upon this crank, and follow the movement of the plate 77.

A pipe 84 leads into the rear end of the cylinder 70 upon the rear side of the piston 74 and a pipe 85 leads into the forward end of the cylinder 70 upon the forward side of the piston 74.

An upstanding crank 86 is rigidly secured to the rock shaft 67, and a rigid link 87 is pivoted thereto, and this rigid link extends rearwardly above and over the shifting element or plate 77 and has a downwardly inclined portion 88, pivotally connected at 89 with the lower end of the vertical arm of the bell-crank lever 49. It is thus seen that when the rock shaft 67 is turned clock-wise, the cranks 68 will turn upon the chains 69, and raise the forward ends of the bars 10. The clock-wise turning movement of the rock-shaft 67 will shift link 87 forwardly turning bell-crank lever 49 counterclock-wise, whereby the bell-crank lever will swing upon the pivot 48, and raise the tail supporting unit 26 which in turn will raise the implement bar 20 and the frame including bars 10. In this manner the forward and rear ends of the main frame including the bars 10 are raised, and the implement above and out of contact with the ground.

bar 20 is raised so that the disc plows 25 may be shifted

The forward end of the implement bar 20 is slideably mounted in the slot 90 of a horizontal curved guide rail 91, arranged beneath and rigidly secured to the frame bars 10. This guide rail extends transversely of the frame and is concentric with the pin 16. At its ends, the guide rail 90 is equipped with adjustable stop-bolts 91' having screw-threaded engagement therewith, and these stop bolts limit the swinging movement of the implement bar 20 and the shifting plate rigidly connected with the implement bar.

The operation of the plow is as follows:

When the parts are adjusted as shown in Figure 1, the plow is moving longitudinally forwardly, and the implement bar has been shifted to the right, as viewed from the rear end of the plow. The main frame including the bars 10 and associated elements are in the lower position, since the fluid pressure has been exhausted from the forward end of the cylinder 70 and applied into the rear end of the cylinder. This action causes the all-over length of the pressure-operated device to shorten since the piston rod 75 now moves into the cylinder 70. When the frame bars 10 were lowered, the plow disc or blades 25 were brought into engagement with the ground, to turn the furrow, and hence the implement bar 20 is held against the swinging movement with respect to the frame bars 10. The pivot element 83 which was at the notch 81, when the plate 77 was shifted to the right, viewed from the rear end of the plow, has travelled in the slot 80 from the notch 81 to the notch 82, since the piston rod 75 has moved forwardly into the cylinder 70, the cylinder being free to swing horizontally upon the crank 73. The pivot element 83 bears against the forward wall of the slot 80, holding the plate 77 against turning movement. The implement bar 20 is now angularly arranged for holding the plow discs 25 so that they will turn the furrow toward the right, viewed from the rear of the plow. The angular position of the plow discs 25 tends to exert a lateral force or pressure upon the plow as a whole, which would shift the same to the left, at its rear end, if not compensated for. When the implement bar 20 has its forward end shifted to the right, its rear end is shifted to the left, viewed from the rear of the machine, and the tail supporting device 26 is bodily shifted to the left, viewed from the rear of the plow, carrying with it the post 39 and wheels 34 and 35, and these wheels, particularly the one travelling in the furrow will exert an increased pressure against side-wise shifting of the frame

of the plow, in opposition to that caused by the plow disc 25. It should be noted that when the frame bars 10 are in the lower position, post 39 will not turn in sleeve 28, since rib 41 is now in groove 40.

When the end of the row is reached and it is desired to reverse the direction of travel of the plow, the fluid pressure is exhausted from the rear end of the cylinder through the pipe 84 and is introduced into the forward end of the cylinder 75 through the pipe 85. It might be stated that the pipes 84 and 85 extend to a position near the operator's seat upon the tractor, and are there connected with a suitable valve which will alternately supply the fluid pressure through the pipes 84 and 85, and when supplying the pressure through one pipe will exhaust it through the other pipe. The piston rod 75 is now shifted rearwardly with respect to the cylinder 70, and the cylinder is pressing forwardly against the crank 73. The pivot element 83 carried by the forked head 76 is off dead center with respect to the pin 16, and the pressure upon the piston rod 75 would swing the shifting plate 77 to the left, viewed from the rear of the plow, were it not for the fact that the plow discs 25 are now engaging the ground and prevent such shifting movement. Since the plate 77 cannot now be swung to the left, the cylinder 75 shifts forwardly, and turns rock-shaft 67 clock-wise, Figures 1 and 2, whereby cranks 68 raise the forward ends of the frame bars 10 and the link 87 swings the bell-crank lever 49 upon its pivot for raising the rear end of the frame bars 10. When this action is completed, the plow discs or blades 25 are raised out of engagement with the ground, and when this occurs the forward movement of the cylinder 75 stops, and the piston rod 75 then shifts rearwardly with respect to the cylinder 70, and swings the shifting plate 77 to the extreme left position, viewed from the rear end of the plow. This action of the plate 77 now moves the implement bar to the extreme left angular position, viewed from the rear of the machine. After the implement bar has been angularly adjusted, and while the pressure is maintained in the forward end of the cylinder 70 for keeping the plow discs 25 raised out of contact with the ground, the tractor and plow are turned around to travel longitudinally in an opposite direction of the row. The plow discs 25 must now be brought into engagement with the ground, and this is effected by exhausting the fluid pressure from the forward end of the cylinder 70 and introducing fluid pressure into the rear end of the cylinder 70. The cylinder may now tend to shift rearwardly, causing or permitting rock-shaft 67 to turn counterclock-wise and bell-crank lever 49 to turn clock-wise, so that the frame bars 10 are lowered, and the plow discs 25 will sink into the ground. When the cylinder has the pressure introduced into its rear end, piston 74 moves forwardly and the pivot element 83 will travel in the slot 80 until it reaches the opposite end of the slot adjacent to the notch 81, and the pivot element will bear against the forward wall of the slot 80. When it is again desired to shift the implement bar 20 to the right, viewed from the rear of the plow, pressure is exhausted from the rear end of the cylinder and introduced into the forward end, as explained, and the operation is repeated with respect to the other manipulation. Figure 13 shows the piston rod 75 extending to the extreme right, and Figure 15 shows the piston rod 75 extending to the extreme position to the left. The outward movements of the shifting plate 77 and bar 20 are regulated by the stop bolts 91', and the pivot element 83 is always past dead center with respect to the pin 16, when the plate 77 is in the starting position.

As shown in Figures 13 to 16 inclusive, the plate 77 is swung horizontally in opposite directions and its movement in each direction is limited when the tool bar 20 contacts with the stop 91'. The plate 77 is shown in detail in Figures 1 and 4. When the plate 77 is swung to the end of its stroke, to the right, viewed from the

rear end of the machine, Figure 13, the notch or end 81 is remote from and upon one side of the center line C, and the notch or end 82 is arranged near and upon the opposite side of the center line C. When the plate 77 is swung to the end of its stroke, to the left, viewed from the rear end of the plow, Figure 15, the notch or end 82 is remote from and disposed upon one side of the center line C while the notch or end 81 is arranged near and upon the opposite side of the center line C. The notches or ends 81 and 82 never cross the center line C. In Figures 13 and 14, the slot 80 is inclined and the notch or end 82 is nearer the pivot 73 than the notch or end 81. In Figures 15 and 16, the slot 80 is inclined and the notch or end 81 is nearer the pivot 73 than the notch or end 82. In Figure 13, when the piston rod 75 moves forwardly, viewed from the rear end of the plow, the pivot element 83 will travel in the slot 80 to the end or notch 82, Figure 14, and this pivot element will then swing the plate 77 to the left, viewed from the rear end of the plow, when the piston rod 75 moves rearwardly, Figures 14 and 15. When the piston rod 75 again moves forwardly, the pivot element 83 will travel in the slot 80 to the notch 81, Figures 15 and 16, and when the piston rod 75 is again shifted rearwardly, plate 77 will be swung to the right, viewed from the rear end of the plow, Figure 13.

When the frame bars 10 are in the lowered position, the post 39 cannot turn within the sleeve 28, since rib 41 is held within groove 40. When frame bars 10 are raised so that the plow discs 25 disengage the ground, then lug 41 is out of groove 40, and shaft 39 can turn in sleeve 28.

It is thus seen that the plow discs or blades 25 will throw the soil in the same direction when plowing parallel furrows with the plow travelling alternately in opposite directions in producing the furrows. While I have shown the frame bars 10 and associated elements as applied or attached to parts of a tractor, it is to be understood that they may be attached to some other wheeled support, which would be secured to a tractor by means of a draft appliance.

In some instances, the tool bar 20 may begin to swing laterally before the plow discs have completely disengaged the ground, but this will depend upon the character of the ground. If the ground is tough or strong, or contain rocks, the swinging movement may not occur until the discs have completely disengaged the ground. If the swinging movement of the tool bar should start while the supporting structure is being raised, then of course the raising of the supporting structure will be completed while the tool bar is being swung or even after the tool bar has been swung.

It is to be understood that the form of my invention herewith shown and described is to be taken as a preferred example of the same, and that various changes in the shape, size, and arrangement of the parts may be resorted to without departing from the spirit of my invention or the scope of the subjoined claims.

Having thus described my invention I claim:

1. A reversible plow comprising, ground-engaging supporting means, a supporting structure associated with the ground-engaging supporting means, a generally horizontal implement bar, ground-engaging implement means carried by the implement bar, means to pivotally mount the implement bar upon the supporting structure so that the supporting structure will raise and lower the implement bar and the implement bar can be swung about a substantially vertical axis to assume angular positions with respect to the supporting structure with its free end upon opposite sides of said substantially vertical axis, a member connected with the implement bar to swing the same about the substantially vertical axis, adjustable means mounting the supporting structure upon the ground-engaging supporting means and adapted to be operated for raising and lowering the supporting structure, and a single fluid pressure operated extensible de-

vice only including a pair of relatively movable parts, one part being connected with said member and the other part connected with the adjustable mounting means, said single fluid pressure operated extensible device being adapted when extended to raise the supporting structure while the ground-engaging implement means engages the ground at a selected depth and to subsequently swing the implement bar about the substantially vertical axis.

2. A reversible plow comprising, ground-engaging supporting means, a supporting structure associated with the ground-engaging supporting means, a generally horizontal implement bar extending generally longitudinally of the line of travel of the plow, ground-engaging implement means carried by the implement bar, means to pivotally mount the implement bar upon the supporting structure so that the supporting structure will raise and lower the implement bar and the implement bar can be swung about a substantially vertical axis to assume angular positions with respect to the supporting structure with its free end upon opposite sides of said substantially vertical axis, a member connected with the implement bar to swing the same about the substantially vertical axis, said member having an elongated guide extending transversely of said line of travel, adjustable means mounting the supporting structure upon the ground-engaging supporting means and adapted to be operated for raising and lowering the supporting structure, and a single fluid pressure operated extensible device only including a pair of relatively movable parts, one part slidably engaging the elongated guide and the other part connected with the adjustable mounting means, said single fluid pressure operated extensible device being adapted when extended to raise the supporting structure while the ground-engaging implement means engages the ground at a selected depth and to subsequently swing the implement bar about the substantially vertical axis.

3. A reversible plow comprising, ground-engaging supporting means, a supporting structure associated with the ground-engaging supporting means, a generally horizontal implement bar extending generally longitudinally of the line of travel of the plow, ground-engaging implement means carried by the implement bar, means to pivotally mount the implement bar upon the supporting structure so that the supporting structure will raise and lower the implement bar and the implement bar can be swung about a substantially vertical axis to assume angular positions with respect to the supporting structure with its free end upon opposite sides of a longitudinal line extending through said substantially vertical axis, a member connected with the implement bar to swing the same about the substantially vertical axis, said member having an elongated guide extending transversely of said longitudinal line, adjustable means mounting the supporting structure upon the ground-engaging supporting means and adapted to be operated for raising and lowering the supporting structure, a single fluid pressure operated extensible device only including a pair of relatively movable parts, one part slidably engaging the elongated guide and the other part connected with the adjustable mounting means, said single fluid pressure operated extensible device being adapted to raise the supporting structure and to swing said member, and means to limit the swinging movement of the implement bar in each direction so that when said member is swung to the end of its travel in one direction one end of the elongated guide will be upon one side of and remote from said longitudinal line and the opposite end of said elongated guide will be disposed upon the opposite side of said longitudinal line.

4. A reversible plow comprising, ground-engaging supporting means, a supporting structure associated with the ground-engaging supporting means, a generally horizontal implement bar extending generally longitudinally of the line of travel of the plow, ground-engaging implement means carried by the implement bar, means to pivotally mount the implement bar upon the supporting structure so that the supporting structure will raise and lower the implement bar and the implement bar can be swung about a substantially vertical axis to assume angular positions with respect to the supporting structure with its free end upon opposite sides of a longitudinal line extending through said substantially vertical axis, a swinging member connected with the implement bar to swing the same about the substantially vertical axis, means mounting the supporting structure upon the ground-engaging supporting means and adapted to be operated for raising and lowering the supporting structure, said mounting means including a rockable device, an extensible device having one end pivotally connected with the rockable device, and means forming a pivotal connection between said member and the opposite end of the extensible device, the pivotal forming means being shiftable transversely of said longitudinal line.

5. A reversible plow comprising, a rear ground-engaging supporting device, a tail supporting device vertically adjustably mounted upon the rear ground-engaging supporting device, a supporting structure, a generally horizontal implement bar, ground-engaging implement means carried by the implement bar, means to pivotally mount the implement bar upon the supporting structure so that the implement bar and supporting structure move vertically together and the implement bar may be swung about a substantially vertical axis to assume angular positions upon opposite sides of a line extending longitudinally of the supporting structure, means pivotally connecting the rear end of the implement bar with the tail supporting device so that the rear end of the implement bar is supported by the tail supporting device, links pivotally connecting the tail supporting device and the supporting structure, a forward ground-engaging supporting device, means mounting the forward end of the supporting structure upon the forward ground-engaging supporting device, rear operating means mounted upon the tail supporting device for raising and lowering the rear end of the supporting member, forward operating means for raising and lowering the forward end of the supporting structure, means connecting the rear operating means and the forward operating means so that they operate in unison, a pressure operated extensible device connected with the forward operating means, an operating member connected with the implement bar to swing the same about the substantially vertical axis, and means connecting the pressure operated extensible device and operating member.

6. A reversible plow comprising, ground-engaging supporting means, a supporting structure associated with the ground-engaging supporting means, a generally horizontal implement bar, ground-engaging implement means carried by the implement bar, means to pivotally mount the implement bar upon the supporting structure so that the implement bar will move vertically with the supporting structure and can be swung about a substantially vertical axis to assume angular positions upon opposite sides of a line extending longitudinally of the supporting structure, a member connected with the implement bar to swing the same about the substantially vertical axis, means mounting the supporting structure upon the ground-engaging supporting means and adapted to be operated for raising and lowering the supporting structure, a fluid pressure operated extensible device including a cylinder and piston connecting said mounting means and said member and tending to move said mounting means and said member simultaneously, the engagement of the ground-engaging implement means with the ground at a selected depth preventing the swinging of said member so that the extensible device will first elevate the supporting structure.

7. A reversible plow comprising, a forward ground-engaging supporting means, a tail supporting device including a sleeve, a generally vertical post pivotally and

longitudinally movably mounted within said sleeve, wheel means carried by the lower end of said post, rear rockable means mounted upon the tail supporting device and connected with the post and operable to elevate the tail supporting device upon the post, a supporting structure mounted upon the forward ground-engaging supporting means, forward rockable means secured to the supporting structure near its forward end and serving to raise the forward end of the supporting structure with relation to the forward ground-engaging supporting means, means connecting the forward rockable means and the rear rockable means so that they move in unison, a generally horizontal implement bar, a substantially vertical shaft mounting the implement bar upon the supporting structure and having a substantially vertical axis so that the implement bar can be swung about the substantially vertical axis to assume angular positions upon opposite sides of a line extending longitudinally of the supporting structure, ground-engaging implement means carried by the implement bar, an operating member secured to the substantially vertical shaft and extending radially thereof, an extensible fluid pressure operated device pivotally connected with the forward rockable means and having a pivotal sliding connection with the operating member, said extensible device when extended tending to move the forward rockable means and the operating member, the operating member being held against movement when the ground-engaging implement means engages with the ground at a selected depth so that said extensible device will then operate the forward rockable means, links connecting the tail supporting device and the supporting structure, means pivotally connecting the rear end of the implement bar and tail supporting device, and means to lock the post with said sleeve against turning movement when the sleeve is lowered to a selected elevation.

8. A reversible plow comprising, a supporting structure, a generally horizontal implement bar extending generally longitudinally of the line of travel of the plow, ground-engaging implement means carried by the implement bar, a substantially vertical shaft secured to the implement bar and mounted upon the supporting structure and adapted to swing the implement bar about the substantially vertical axis of the substantially vertical shaft to assume angular positions with respect to the supporting structure with its free end upon opposite sides of a longitudinal line extending through said substantially vertical axis, an operating member mounted upon the substantially vertical shaft to turn the same and extending radially thereof and adapted to be swung transversely of said longitudinal line, said member having an elongated guide device extending generally transversely of said longitudinal line, means to limit the swinging movement of the implement bar and operating member in each direction so that when said operating member is swung to the end of its travel in one direction one end of the elongated guide device will be disposed upon one side of and remote from said longitudinal line and the opposite end of said guide device will be disposed upon the opposite side of said longitudinal line, an extensible fluid pressure operated device extending generally longitudinally of the supporting structure and pivotally mounted upon the supporting structure to swing transversely of said longitudinal line, the extensible fluid pressure operated device including a part slidably engaging said elongated guide device, and means for supporting the supporting structure and for raising and lowering the supporting structure.

9. A reversible plow comprising, ground engaging supporting means, a supporting structure associated with the ground engaging supporting means, a generally horizontal implement bar extending generally longitudinally of the line of travel of the plow, ground engaging implement means carried by the implement bar, a substantially vertical shaft secured to the implement bar and mounted upon the supporting structure so that the implement bar will be raised and lowered by the supporting

structure and the implement bar can be swung about the substantially vertical axis of said substantially vertical shaft to assume angular positions with respect to the supporting structure with its free ends upon opposite sides of a longitudinal line extending through said substantially vertical axis, a member mounted upon the substantially vertical shaft to turn it and adapted to be swung transversely of said longitudinal line, said member having an elongated slot extending transversely of said longitudinal line, means to limit the swinging movement of the implement bar in opposite directions so that when said member is swung to the end of its travel in both directions the ends of said slot will be on opposite sides of said longitudinal line, means mounting the supporting structure upon the ground engaging supporting means and adapted to be operated for raising and lowering the supporting structure, a single extensible fluid pressure operated device only extending generally longitudinally of the supporting structure and pivotally mounted upon the supporting structure to swing transversely of said longitudinal line, means to connect the fluid pressure operated device with the mounting means, and an element carried by the fluid pressure operated device and engaging within said slot.

10. A plow comprising, a frame, wheels, means interconnecting the wheels and frame and operable for raising and lowering the frame, a substantially vertical shaft pivotally mounted upon the frame, a tool bar mounted upon the shaft to be swung thereby, a plate mounted upon the substantially vertical shaft to turn it, said plate having a main slot and end slots leading into the main slot near its ends and arranged transversely of the main slot, a pivoted fluid pressure operated device, an element connected with and moved by the fluid pressure operated device and operating within the main slot and entering the end slots, and driving connecting means connecting the fluid pressure device and the interconnecting means so that the interconnecting means raises and lowers the frame when said element enters the end slots.

11. A plow comprising, a frame, forward and rear wheels, means interconnecting the wheels and frame and operable for raising and lowering the frame, a substantially vertical shaft pivotally mounted upon the frame, a tool bar mounted upon the shaft to be swung thereby, a shifting plate mounted upon the shaft to turn it, said plate having a main slot and end slots leading into the main slot near the ends of the main slot and extending transversely of the main slot, a fluid pressure operated device, an element connected with and operated by the fluid pressure device and operating within the main slot and entering the end slots, said element moving the shifting plate when it engages the end of either end slot, and driving connecting means connecting the fluid pressure device and the interconnecting means and operating the interconnecting means for raising and lowering the frame.

12. A plow comprising, a frame, a tool bar, a shifting plate associated with the tool bar and having a main slot and end slots leading into the main slot near its ends, said end slots extending transversely of the main slot, means mounting the tool bar upon the frame for swinging movement and connecting the shifting plate with the tool bar, an operating element to travel within the main slot and to enter the end slots, fluid pressure operated means mounted upon the frame and connected with the operating element to move it, and adjustable means connected with said frame for raising and lowering it and connected with the fluid pressure means to be operated by the fluid pressure means.

13. A plow comprising, a frame, ground engaging means associated with the frame, interconnecting means connecting the frame and ground engaging means and operable for raising and lowering the frame, a tool bar pivotally mounted upon the frame, a member connected with the tool bar to swing the same, said member having a main guide device and end guide devices near the ends

of the main guide device and extending transversely of the main guide device, power operated means mounted upon the frame and including an element for operating within the main guide device and end guide devices, and driving connecting means connected with the power operated means and the interconnecting means for operating the interconnecting means by the power operated means.

References Cited in the file of this patent

UNITED STATES PATENTS

2,163,832	Coviello	June 27, 1939
2,561,032	Onfrey	July 17, 1951
2,578,942	Onfrey	Dec. 18, 1951
2,582,337	Kaltoft	Jan. 15, 1952
2,600,359	Coviello	June 10, 1952
2,648,267	Pursche	Aug. 11, 1953
2,672,801	Barrett	Mar. 23, 1954
2,675,749	Pursche	Apr. 20, 1954
2,723,612	Morkoski	Nov. 15, 1955