Oct. 3, 1950 W. B. RICHARDSON 2,524,329

HYDRAULIC WING CONTROL

Filed Feb. 7, 1949 4 Sheets-Sheet 1

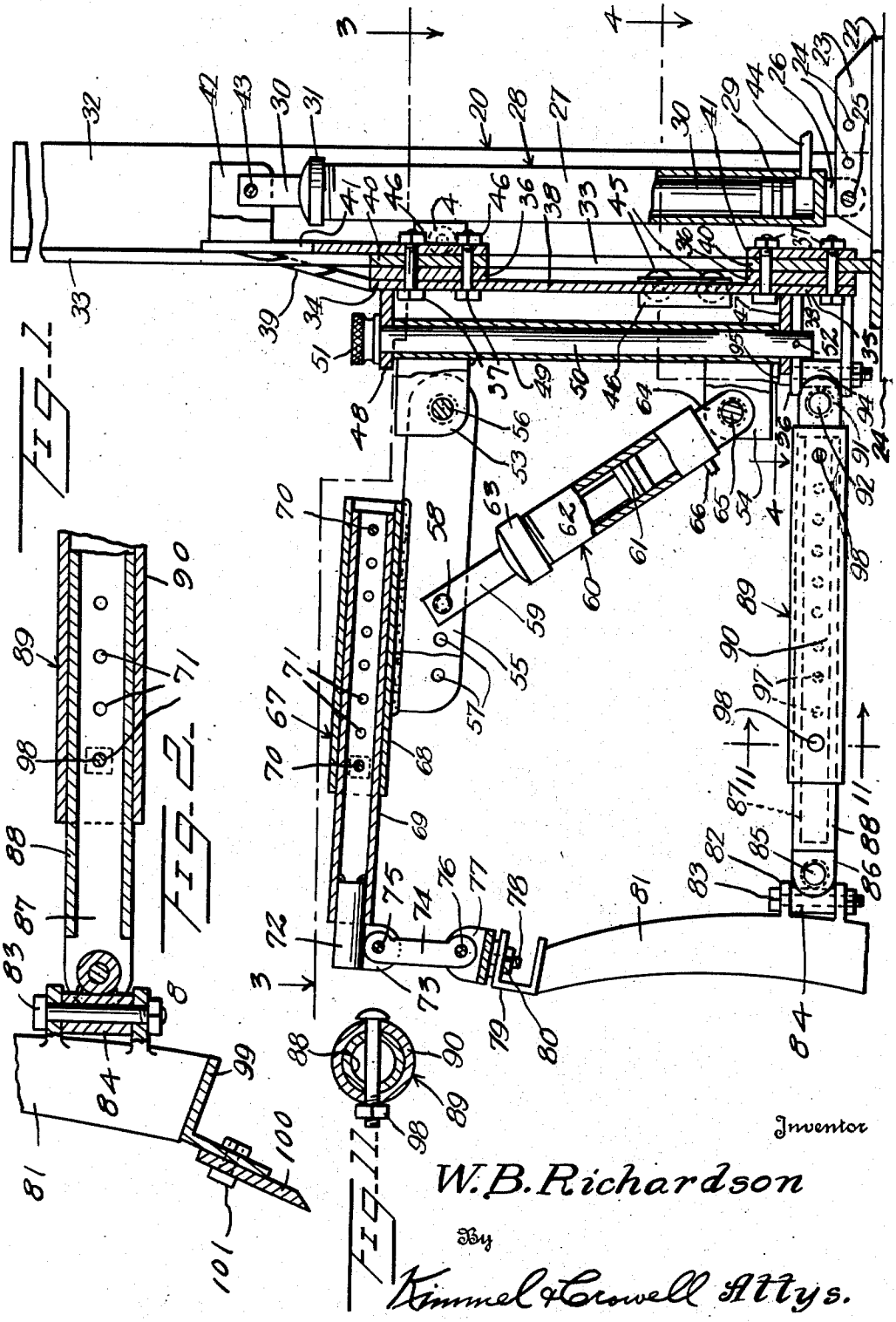


FIG. 1

FIG. 2

FIG. 11

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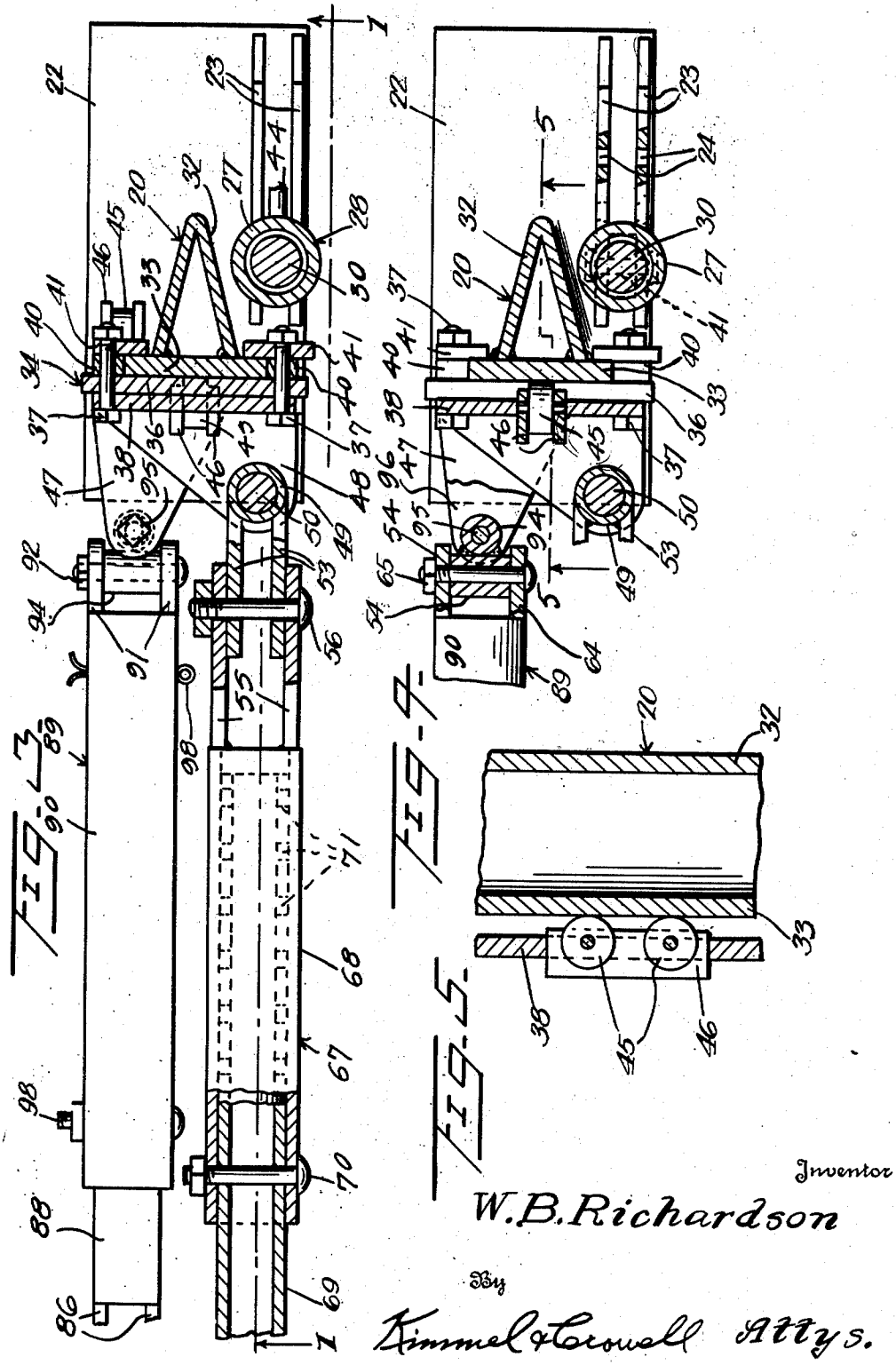


FIG. 3

FIG. 4

FIG. 5

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FIG. 6.

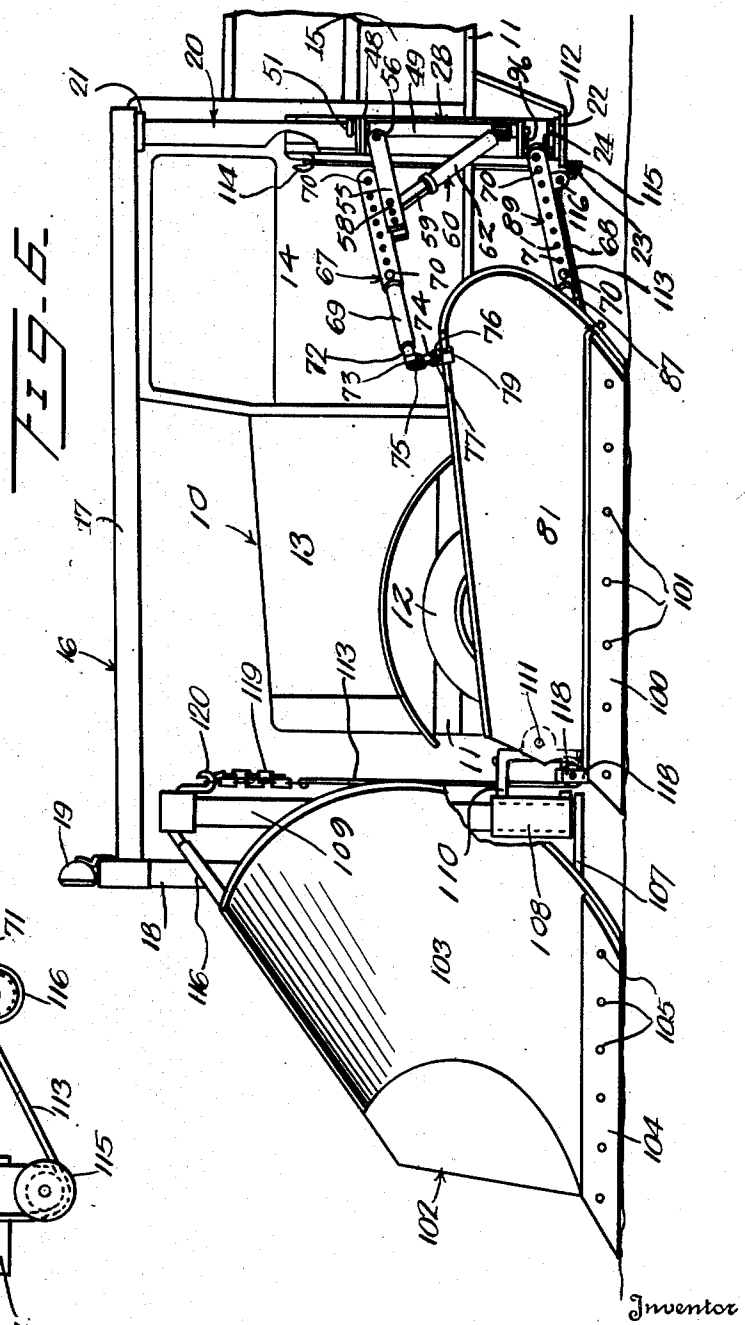
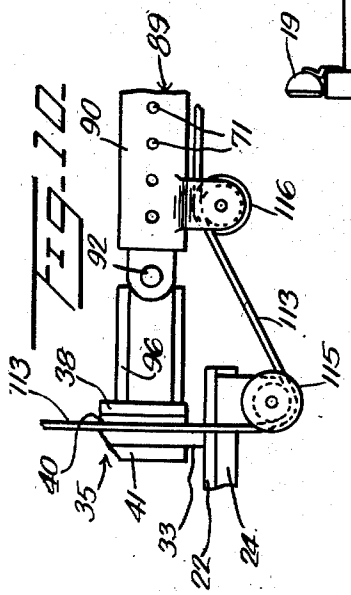


FIG. 7.



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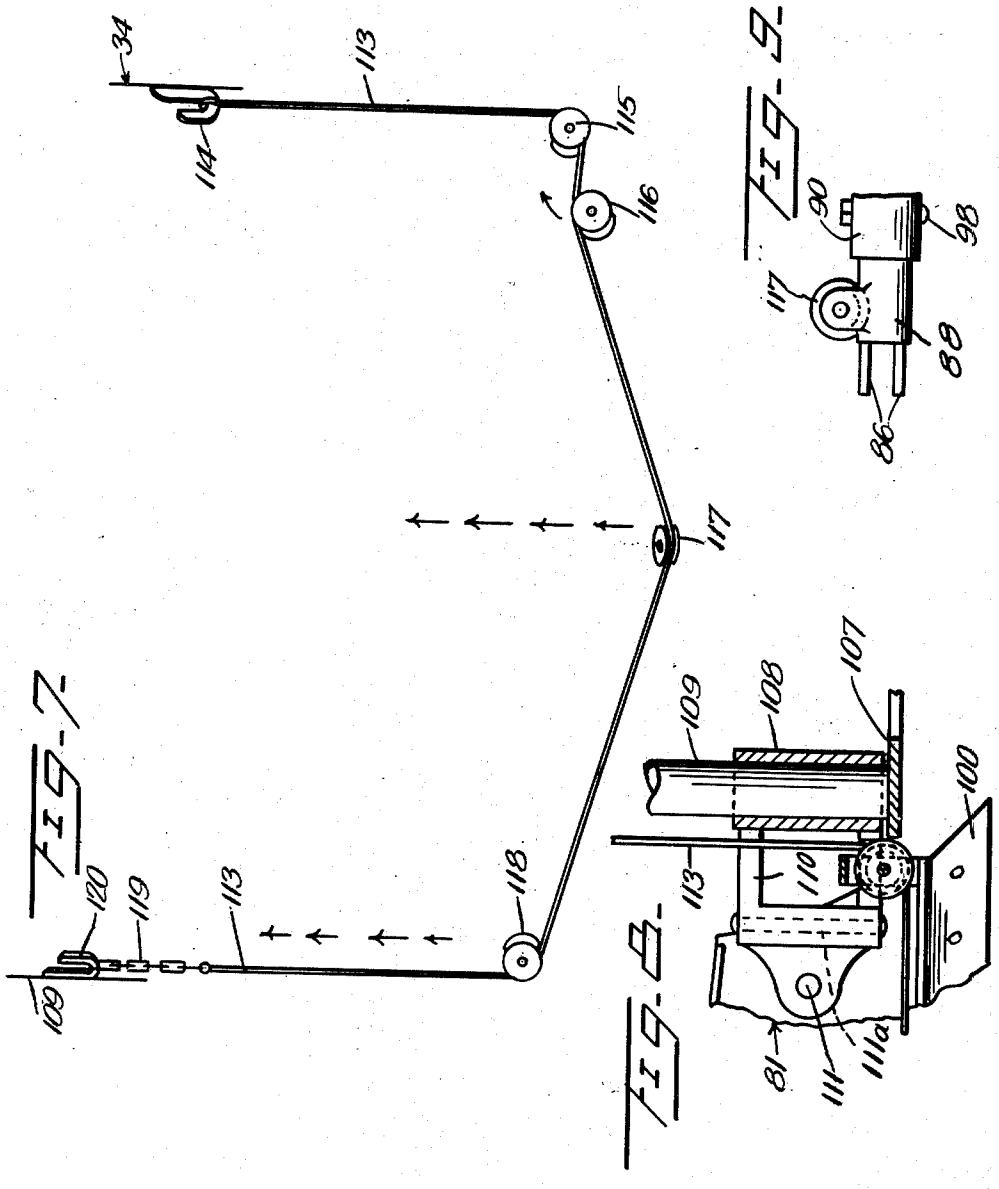
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HYDRAULIC WING CONTROL

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UNITED STATES PATENT OFFICE

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HYDRAULIC WING CONTROL

Walter B. Richardson, Bridgton, Maine

Application February 7, 1949, Serial No. 74,980

5 Claims. (Cl. 37—44)

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My invention relates to a hydraulic wing control adapted for use in connection with snow plows, bulldozers, rams, floor cranes, loaders for trucks, vans and the like.

An object of the invention is to provide a wing control and lift of the class described for right or left hand duty whereby the wing or other element may be lifted or swung to either side, or tripped or tilted in or out by hydraulic means, ram, lift or elevator.

Another object is to provide a wing control construction by which the wing, blade or other element to be raised or lowered, is connected to lifting means, preferably hydraulic, at both the top and bottom so as to increase the efficiency in lifting and reduce friction, which permits the same to be tilted or tripped in or out at the top or bottom to change the angle of inclination of the actuated part, wing or blade, and in which the wing is also so constructed and mounted as to swing laterally in a horizontal plane or incline on a vertical axis, the apparatus including upright or vertical guide rails, posts or standards and a slide movable vertically thereon. The device also includes upper and lower arms simultaneously actuated by hydraulic means at the post and slide to raise or lower the same and wing, blade or other element carried thereby, and the upper arm has separate means between it and the slide whereby the wing or blade may be independently raised or lifted from the top irrespective of the position of the slide on the vertical guide post whereby the angular position, incline or relation of the wing or the like, may be altered at will forwardly or backwardly.

A further object is to provide a hydraulic wing control for snow plows, road graders or scrapers, bulldozers or the like, in which there is provided a frame on the front of a motor vehicle or truck supporting a central plow or blades set in angular relation and outer wings or blades set and movable in angular relation thereto and extending outwardly from behind the outer end or ends of the plow or blades thereof, each wing being supported by an upper lifting arm and a lower brace and attached to a slide movable up or down on a vertical post by means of a hydraulic lift or ram. A hydraulic lift is also provided between each slide and arm to raise or lower the wing with the slide raised or lowered and the wing raised at the outer or back end, or bodily, the front end being carried on a wing post behind the outer end of the plow. The means for raising the wing also includes cables connected to the wing post, wing and slide to fold or extend the wings upon actuation of the slide to raised or lowered position, all supported by and braced to the frame.

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A still further object is to provide a slide movable vertically on an upright or vertical guide post or rail with a vertically elongated pivot carried by and movable with the slide, and pivotally supporting upper and lower vertically swingable brace arms for supporting a wing or other load member movable therewith when simultaneously raised or lowered hydraulically with the slide, or when the upper brace arm is raised or lowered independently, and the arms and wing or load member being capable of swinging together laterally horizontally as well as vertically and so connected pivotally as to be tripped or tilted at the desired angle of inclination forwardly or rearwardly at the top to take and discharge the load or material advanced by the plow and discharged onto the wings.

To the foregoing objects, and others which may hereinafter more fully appear, the invention consists of the novel construction, combination and arrangement of parts, as will be more specifically referred to and illustrated in the accompanying drawings, but it is to be understood that changes, variations, and modifications may be resorted to which fall within the scope of the invention as claimed.

In the drawings:

Figure 1 is a vertical section of the hydraulic wing control constituting the invention, taken substantially on the line 1—1 of Figure 3, and showing certain additional features of construction.

Figure 2 is an enlarged detail sectional elevation showing the connection between a lower wing brace or arm and adjacent portions of a wing.

Figures 3, 4 and 5 are sections taken in part on the lines 3—3, and 4—4 of Figure 1; and 5—5 of Figure 4, respectively.

Figure 6 is a side elevation, partly broken away, of the device applied to a plow equipped truck.

Figure 7 is a somewhat diagrammatic view of the cable means for moving the wings in and out with the raising and lowering of the slide mounting a wing.

Figure 8 is a detailed sectional elevation showing the mounting of a wing and cable on a wing post behind the plow.

Figure 9 is a detail of a guide sheave or pulley at the inner end of a lower wing brace or arm.

Figure 10 is a detail of the connection of the lower brace arm to the base of the vertical guide post and mounting of the cable thereon.

Figure 11 is a detail cross section of a wing supporting and bracing arm.

Referring to the drawings, while the invention is capable of many applications and is adaptable to many vehicles or industrial machines such as

snow plow equipped trucks, bulldozers, rams, scrapers, floor cranes, loaders for trucks, vans and the like, it is shown applied to a snow plow equipped truck represented generally at 10 having the usual frame or chassis 11, front steering wheels 12, hood 13 over the engine, cab 14 and body 15. A supporting and bracing frame 16 is provided over the front of the vehicle upon the frame or chassis thereof so as to extend over the hood and cab, and comprises horizontal top side rails 17 supported on the upper ends of upright frame members 18 at the front of the vehicle on each side, and upon which headlights 19 may be mounted due to the usual headlights being precluded from view and rendered inoperative by the plow equipment at the front.

At the sides between the cab and the body are upright guide rails or posts 20 which may be connected by a top cross member 21 in rear of the cab 14 and top thereof in front of the body 15 and between the same. The upright guide rails or posts 20 are supported in vertical position upon a base plate 22 having spaced parallel upstanding longitudinal bearing plates 23 with a series of aligned holes 24 to receive a pivot or bolt 25 which is engaged through an apertured lug or boss 26 at the lower end of a cylinder 27 of a hydraulic lift or elevator 28. A piston 29 operates in the cylinder 27 and its piston rod 30 extends upwardly through the head or cap 31 at the top of the cylinder. Each upright guide rail or vertical post 20 comprises a V-bar 32 secured at its edges by welding or otherwise to the rear face of a flat vertical front bar 33 disposed transversely widthwise and having its opposite edges projecting beyond the sides of the V-bar 32 to form tracks on which upper and lower slides 34 and 35 are mounted to move vertically. These slides are in the form of grooved members to slidably engage the projecting vertical edges of the bars 33 and as shown, are made up of flat plates 36 disposed against the front of the bars 33 and projecting outwardly thereof to slide thereagainst and are connected or bolted as indicated at 37 through a front connecting bar 38 between the upper and lower slides and extending in inclined position at the top as indicated at 39, the slides being channeled or U-shaped.

The plates 36 project outwardly of the side edges of the bars 33 and narrow spacing bars 40 are disposed against the vertical side edges of the bars 33 and receive the fastening means 37 which are also extended through narrow plates 41 at the back overlying the side margins of the rear faces of the bars 33, so as to slide on the latter. The upper plates 41 extend above the upper slide 34 or top edges of the parts 36 and 40 and may be connected transversely and to the upper ends of the rearwardly inclined portions 39 to mount apertured lugs 42 through which connection is made at 43 with the upper ends of the piston rods 30 so that the hydraulic pressure admitted to the cylinders 27 against the pistons 29 will raise the piston rods 30 to simultaneously actuate the slides 34 and 35. Fluid pressure may be admitted to the cylinder from a suitable source through a line 44. Anti-friction members or rollers 45 are mounted in bearings 46 on the bars 38 to engage the front and rear faces of the bars 33 of the guide rails 20.

At the front of the lower slide 35, vertically spaced horizontal pivot lugs 47 are provided toward the outside and the upper slide 34 is provided with similar pivot lugs 48 toward the inside and these lugs are connected by vertical tubular members 49 adapted to receive elongated vertical pivot pins 50 preferably having heads 51 at the top to rest upon the upper pivot lugs 48 and retained in position below the bottom pivot lugs 47 as by a pin 52. Upper and lower vertical pivot ears 53 and 54 are fixed to the tube 49 near its upper and lower ends, so that the pin 50 constitutes a vertical pivot axis on which the ears 53 and 54 may swing in horizontal planes while the lugs 47 and 48 are rigid with the vertically movable carrier formed by the connected slides 34 and 35.

Elongated spaced plates or lugs 55 are pivoted at their rear ends horizontally at 56 through the ears 53 to swing vertically and extend forwardly therefrom. Plates 55 are provided with a plurality of opposed spaced holes 57 for adjustable connection at 58 with the upper end of a piston rod 59 of a hydraulic ram or lift 60 similar in construction to the lift 28 and having its piston 61 operating in the cylinder 62 and its piston rod 59 operating through the head or cap 63 at the top of the cylinder which is disposed in a rearwardly inclined position from its connection 58 and provided with a pivot lug 64 at its lower end pivoted transversely and horizontally at 65 to the ears 54 at the bottom. Fluid under pressure may be supplied to the cylinder 62 from a suitable source which supplies the cylinder 27, through a line 66 connected with a reservoir or pump on the truck in the customary manner of supplying fluid pressure in connection with such devices and in connection with tractors. The forward end portions of the plates 55 are welded at the upper edges of an extensible upper arm 67 through the medium of an outer tube section 68 from which the plates or lugs 55 depend.

The arm 67 comprises an extensible construction including the tubular member 68 and an inner tubular member 69 fitting and telescoping therein and capable of adjustment or extension and retraction relative thereto to vary the length of the arm as by means of a bolt 70 engageable through any pair of a plurality of opposed holes 71 in the respective tubular sections or members 68 and 69. A pin or plug 72 is welded or otherwise fixed in the outer end of the tubular member 69 and has depending pivot ears 73 to which the upper end of a link 74 is pivoted at 75 and the lower end of the link is pivoted at 76 to pivot ears of a bracket 77 swiveled at its depending shank 78 through a channel member 79 and retained in connection by a nut 80. The channel member 79 is provided at the upper edge of a wing 81 near the outer end of the latter and beneath this pivotal connection, the wing 81 or rear bracing frame thereof is provided with vertically spaced and aligned apertured ears 82 for pivotal connection by means of a vertical pivot bolt 83 through a vertical tubular pivot connection 84 horizontally pivoted at the back as indicated at 85 to vertical pivot lugs 86 formed at the forward end of a plug, pin or cap 87 on the forward end of an inner tubular member 88 constituting a telescoping and extensible section of a lower brace and swing supporting arm 89. This arm includes an outer tubular member or section 90 on which the section 88 is telescopically fitted and has its inner end provided with vertical pivot lugs 91 connected by a horizontal pivot bolt 92 to a vertical tubular pivot member 94 pivotally mounted on a pivot bolt 95 through the pivot lugs 47 to which the lower end of the

tube 49 is attached, and horizontal pivot lugs 96 therebeneath, so that the arm 89 can swing vertically on the pivot 92 and horizontally on the pivot 95.

A similar series of opposed registering holes 97 are provided in the tubular sections 88 and 90 to receive a bolt 98 for adjusting the length of the arm 89. At its bottom edge, the wing 81 is provided with an angle bar 99 to which a scraper blade 100 is bolted at 101.

The wings 81 extend outwardly from a central forwardly tapered plow 102, the blades 103 of which diverge rearwardly above its bottom scraping or cutting edge or blade 104 similar to the blade 100 and bolted to the plow blades as indicated at 105. The plow 102 is suitably attached and braced to the frame 16 at the front, as indicated at 106 and 107 at the top and bottom, respectively, and the latter brace carries a vertical tubular socket 108 in which a vertical wing post 109 is mounted as shown in Figures 6 and 8 of the drawings, suitable bracing structure 110 being provided between the socket 108 and the plow 102 as shown. The post 109 is rigidly secured at its upper and lower ends and the tubular socket or sleeve 108 is adapted to slide vertically thereon, being attached to the wing 81 as by a horizontal pivot 111 of the brace structure 110 and vertical pivot 111a to swing vertically and horizontally, so that the wings may be raised and lowered with respect to and independently of the central plow with the wings extending outwardly and rearwardly from each side of the plow.

The base plates 22 are connected transversely and to the body 15 as by a suitable bracing structure 112 to give support to the vertical guide rails or posts 20 on which the rear outer ends of the wings may move up and down at the slides by actuation of the hydraulic lifts 28 while the lifts 60 are designed to be actuated for independently swinging the upper arms 70 up or down, to trip or tilt the wings 81 through the link connections 74 therewith so that the wings may be tilted forwardly or rearwardly at the desired angle, depending upon the load and the control of the advancement and discharge thereof.

In order to raise or lower the wings by the action of raising or lowering the slides and arms at the rear ends thereof through which connection is made to the outer ends of the wings, cables 113 are anchored to hooks 114 of the carriage formed by the slides 34 and 35 and extend around guide sheaves or pulleys 115 mounted therebeneath upon the base plates 22 or bracing structure 112 as shown particularly in Figure 6 of the drawings. The cables then extend over guide sheaves or pulleys 116 carried by and depending from the inner ends of the lower arms 89 and then outwardly or through the end along the arms 89 and around horizontal guide sheaves or pulleys 117 carried by the outer ends of the arms 89 and then around vertical guide sheaves or pulleys 118 fixed to the bracing structure 107 or lower ends of the wing posts 109. From this point, the cables are extended upwardly and anchored to the upper ends of the wing posts 109 as through the medium of chain sections 119 adjustably engageable over hooks 120 carried by the upper ends of the posts, so as to vary the lengths of the cables 113. In this way, it will be seen that operation of the hydraulic lifts 28 will cause the carriage or slides to be elevated on the guide rails 20 to raise the rear and outer ends of the wings or to permit the same to be

lowered by releasing the pressure, and this may be employed when using the cables 113 when connected to the hooks 120, to bodily raise the wings 81 at both ends. However, when the cables are not in use, the wings may be elevated at the rear and outer ends thereof in forwardly inclined positions from the front, the degree of extension depending upon the adjustment of the lengths of the upper and lower arms 67 and 89, respectively. Also, by operation of the lifts or rams 60, the upper arms 67 may be raised to position the links 74 vertically and dispose the wings 81 vertically or tripped and tilted at different angles forwardly or rearwardly inclined or vertically at the will of the operator.

It is of course to be understood that the hydraulic lifts 28 and 60 are to be controlled from a suitable valve in the cab or otherwise, so as to be actuated conveniently by the driver when desired. Adjustment of the lengths of the arms 67 and 89 will also determine the relative angular positions and extensions of the wings 81 outwardly, the height thereof being also controlled by the positions of the carriages or slides on the guide rails 20 in connection with the lengths of the extensible or telescopic arms 67 and 89. The action of the rams or lifts 60 may also be varied by adjustment of the upper outer ends thereof in the series of holes 57 and this will be determined somewhat by the lengths of the upper arms 67. When the wings are elevated at the front and back by raising the carriage or slides upon the guide rails 20 through the medium of the lifts 28, assisted by the rams or lifts 60, free ingress and egress is had with respect to the cab 14.

The width of the vehicle is reduced when the wings are not in use, or in travelling along a road from place to place so that only the width of the vehicle and plow 102 need be accommodated, as this determines the gauge of the vehicle. When the wings are lowered, they may be tilted rearwardly by raising the arms 67 or shortening them, and may be disposed vertically or tilted forwardly by extending said arms or raising and lowering the same by means of the lifts 60, so that the wings may be adjusted in different positions according to the work to be done. In addition, the wings may be raised at the back and folded in while lowered at the front, in addition to being folded in when raised both at the front and back or inner and outer ends thereof, as previously described, by employing the hydraulic lifts 28 and the cables 113 for lifting the outer and inner ends thereof simultaneously in the manner previously set forth. Thus, it will be seen that I have provided a hydraulic wing control adaptable to various vehicles, tractors or industrial machines including trucks as illustrated in the embodiment shown, and that the device may be readily mounted or demounted as desired for use, or when the use thereof is not desired or necessary.

I claim:

1. In a wing control of the kind described for a wing associated with a main plow blade, a vertical guide post, a slide movable up and down thereon, hydraulic means for raising and lowering the slide, arms pivoted to the slide for vertical and horizontal swinging movements, a hydraulic lift between the slide and upper arm, and a wing carried by said arms mounted at one end to swing vertically and horizontally relative to said main plow blade, said wing pivoted at the top and bottom to the free ends of the arms, the pivot connection of the upper arm to the top of the wing including a link pivoted to both, whereby upward

pressure on the upper arm by the hydraulic lift between the slide and arm will trip the wing to a forwardly angled position at the top.

2. In a wing control of the kind described for a wing associated with a main plow blade, a vertical guide post, a slide movable up and down thereon, hydraulic means for raising and lowering the slide, arms pivoted to the slide for vertical and horizontal movements, a hydraulic lift between the slide and upper arm, and a wing carried by said arms mounted at one end to swing vertically and horizontally relative to the main plow blade, said wing pivoted at the top and bottom to the free ends of the arms to tilt forwardly or rearwardly, said wing adapted to fold in and out with the swinging of the arms.

3. In a wing control of the kind described for a wing associated with a main plow blade, a pair of vertical guide posts, a slide movable up and down on each post, hydraulic means for raising and lowering each slide, arms pivoted to each slide for vertical and horizontal swinging movements relative to the main plow blade, a hydraulic lift between each slide and upper arm, wings carried by said arms mounted at one end to extend outwardly and move up and down at their inner and outer ends, and cable means anchored to one guide post at one end and movably connected to the lower arm and inner end of each wing, and anchored at its other end to the other of said guide posts to raise and lower the wings upon raising and lowering the slides.

4. In a wing control for plows, a plow, a wing post at one side of the plow, a wing pivoted for horizontal and vertical movement and adapted to slide up and down on the post, an upright guide in rear of one end of the plow, a carriage slidable vertically thereon, hydraulic means for raising the carriage, upper and lower arms pivoted to the carriage and to the wing to swing vertically and laterally, the connection of the upper arm to the wing including a swivel and a pivoted link to permit the wing to be disposed vertically or inclined forwardly or rearwardly, and a hydraulic lift between the upper arm and the carriage therebeneath, to raise or lower the upper arm independently of the lower arm.

5. The combination with a vehicle, a frame mounted on the vehicle, a plow centrally supported on the frame at the front of the vehicle, vertical wing posts at the ends of the plow, wings mounted to slide vertically on the posts and adapted to pivot horizontally and vertically, means for raising and lowering the wings on the posts and for swinging them in and out, vertical guide bars mounted at the sides of the vehicle, slides movable up and down on said guides, hydraulic means supported at the bases of the guides and connected to the slides for raising and lowering the same, upper and lower extensible arms connected to the slides for vertical and lateral swinging movement, hydraulic means between the lower portions of the slides and the inner portions of the upper arms to raise and lower the latter independently of the lower arms and the slides, links connecting the upper arms to the wings at the top to tilt the wings upon actuation of the latter hydraulic means, and cable means connected to the posts and slides and movably associated with the lower arms and wings to raise the wings bodily, said wings upon movement of the slides adapted to be raised at their outer end and in either position to be folded in or extended outwardly.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,624,839	Lombard	Apr. 12, 1927
1,791,942	Symonds	Feb. 10, 1931
1,853,939	Soule et al.	Apr. 12, 1932
1,956,007	Davin et al.	Apr. 24, 1934
2,095,096	Humphrey	Oct. 5, 1937
2,144,698	Allan	Jan. 24, 1939
2,193,532	Frink	Mar. 12, 1940