March 14, 1933. H. M. WIRT 1,901,485

TRACTOR SCOOP STRUCTURE

Filed Aug. 25, 1931 3 Sheets-Sheet 1

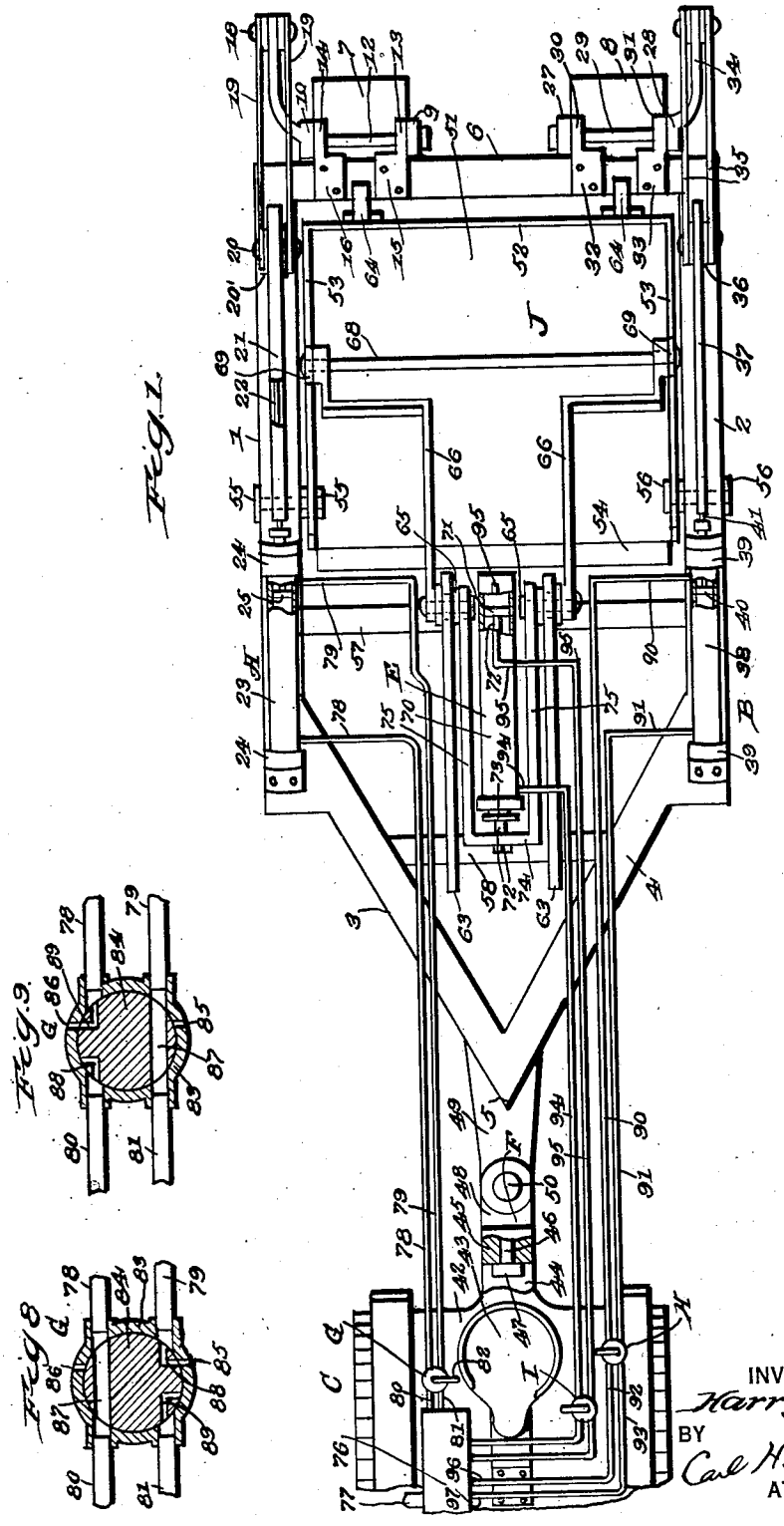


Fig. 1.

Fig. 9.

Fig. 8.

INVENTOR
Harry M. Wirt
BY
Carl H. Crawford
ATTORNEY

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TRACTOR SCOOP STRUCTURE

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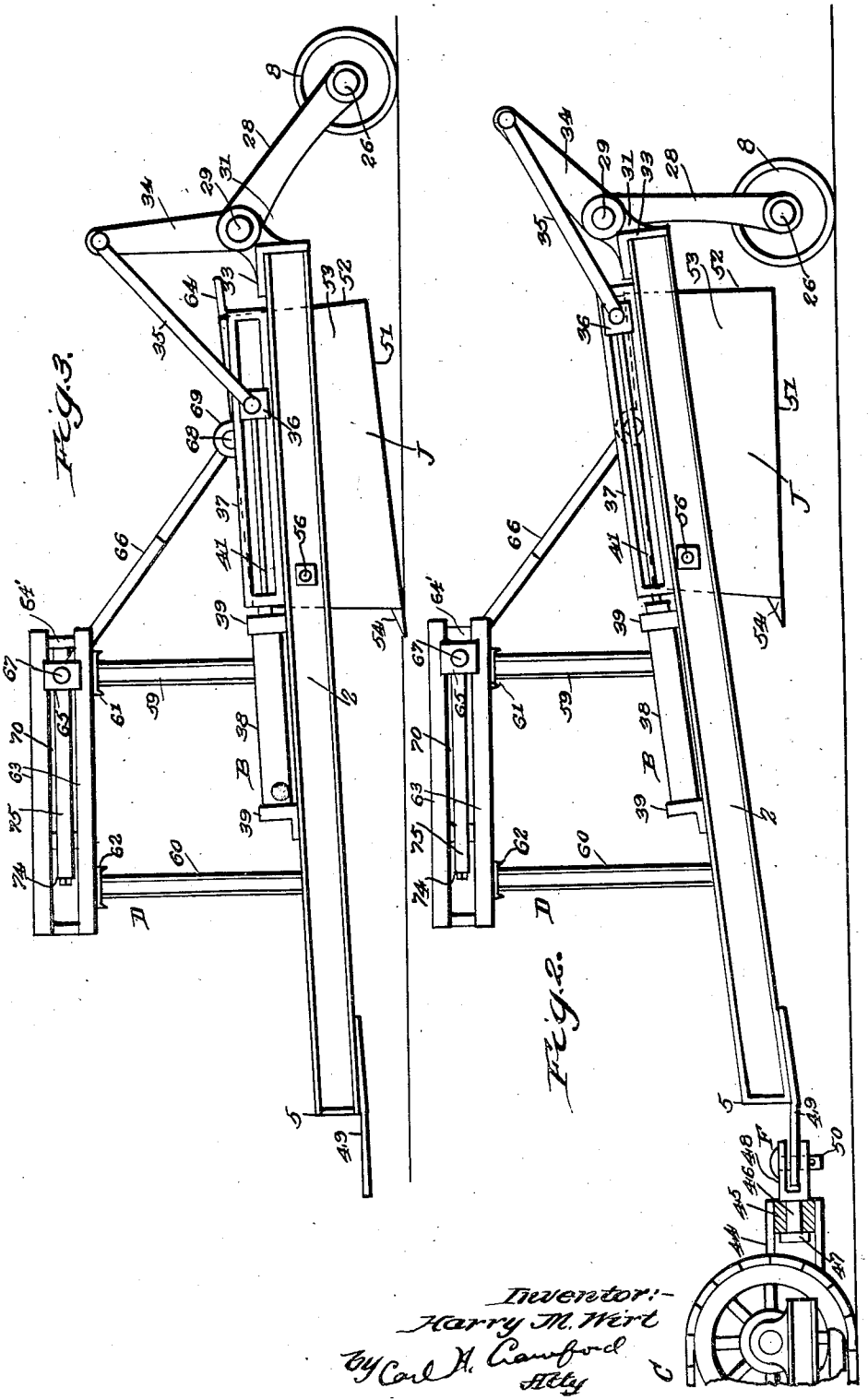


Fig. 3.

Fig. 2.

Inventor:-
Harry M. Wirt
By Carl H. Crawford
Atty

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Fig. 4.

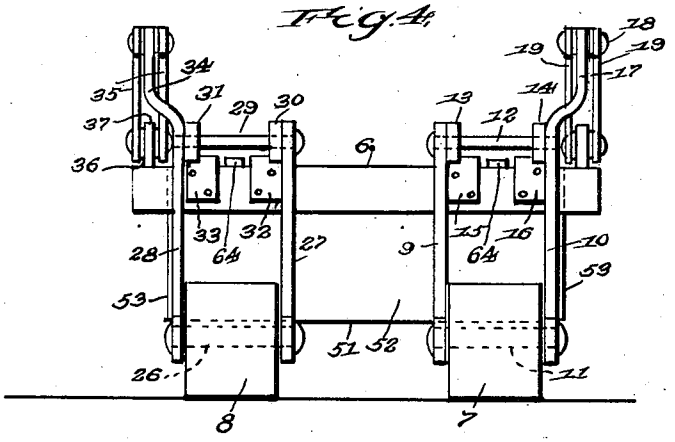


Fig. 6.

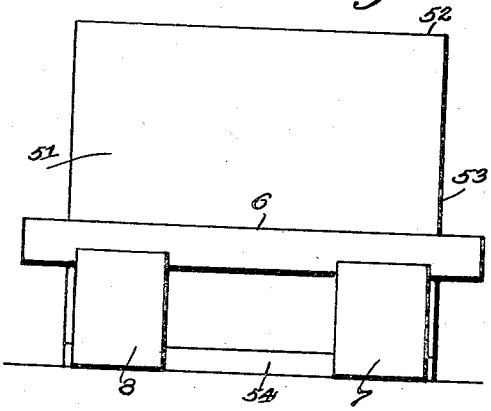
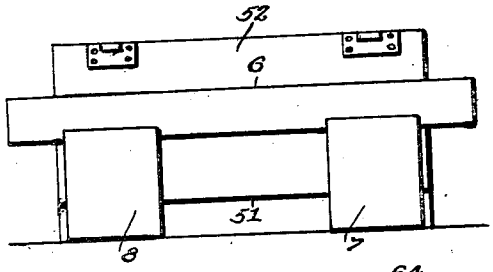


Fig. 5.



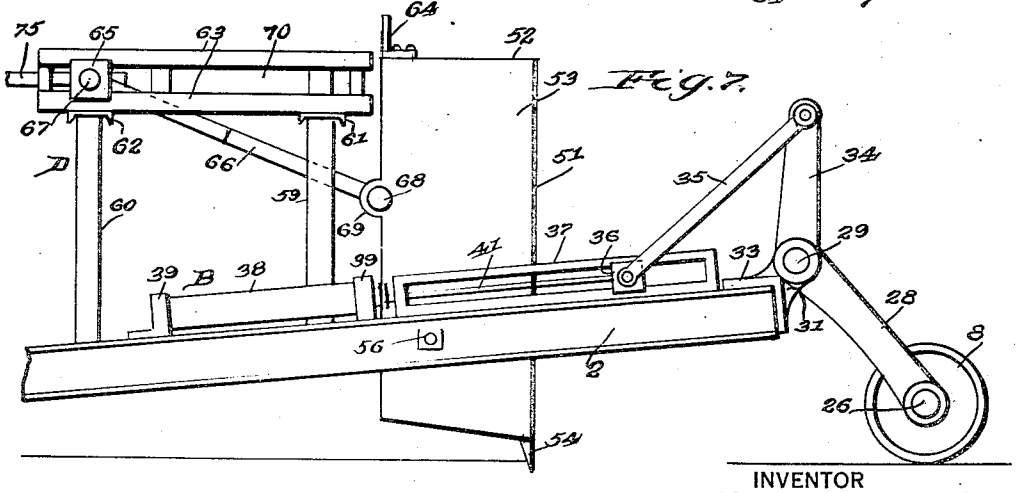


Fig. 7.

INVENTOR
Harry M. Wirt
BY
Carl H. Crawford
ATTORNEY

Patented Mar. 14, 1933

1,901,485

UNITED STATES PATENT OFFICE

HARRY M. WIRT, OF SPOKANE, WASHINGTON, ASSIGNOR TO MARCH CONSTRUCTION CO., COMPOSED OF GEORGE H. MARCH AND HARRY M. WIRT

TRACTOR SCOOP STRUCTURE

Application filed August 25, 1931. Serial No. 559,178.

This invention relates to improvements in tractor drawn scoop mechanism.

A novel feature of this invention resides in a scoop frame that is mounted on bearing wheels in such a manner that the frame may be elevated from or lowered toward the dirt in horizontal planes by relative adjustment of said wheels with respect to the frame.

A further novel feature resides in providing bearing or supporting wheels for the frame which are independently adjustable so that in addition to raising or lowering the frame in horizontal planes, the frame may be tilted about the longitudinal axis of the frame irrespective of the position of the latter above the dirt.

The invention includes a novel form of coupling for connecting the frame in draft relation to a tractor in such a manner as not only to support the forward end of the frame but also to permit the latter to be tilted about its longitudinal axis while in such supported and draft connection with the tractor.

The invention includes a scoop or fresno that is pivotally mounted on the frame and is adapted to be actuated or adjusted into scooping positions, or levelling or surfacing positions dependent upon the function to be performed, and the position to which the frame has been adjusted.

In the most improved form of the invention, I employ fluid pressure mechanism for adjusting the scoop and frame, and in the preferred construction, such mechanism is so designed and constructed that it will not only adjust or move the parts to the desired position but will also hold them to the position to which they have been movably adjusted.

A feature of special importance in this novel structure resides in a frame having a pair of supporting wheels preferably at the rear thereof, the scoop being mounted in such proximity to said wheels that the greatest load will fall thereon, and the front end of the frame having a single point of draft connection with the tractor, which point of connection is also a supporting connection, whereby the frame is provided with what might be termed a tri-point support.

The invention also resides in a frame, which, as a whole, is a rigid frame structure, and which is arranged and designed in such a novel manner as to sustain the various stresses imposed by the operating mechanism in not only adjusting the supporting wheels and the scoop to various positions, but also in holding them in their adjusted positions, thereby avoiding the objectionable feature of a frame structure having relatively movable portions.

The invention has many other features and objects which will be more fully described in connection with the accompanying drawings and which will be more particularly pointed out in and by the appended claims.

In the drawings:—

Fig. 1 is a plan view of the device of my invention which illustrates the novel manner in which the same is coupled into draft connection with a tractor.

Fig. 2 is a side view thereof showing the frame elevated as it would be when the scoop is in a non-operative position, the frame being in a substantially horizontal position transversely of its length.

Fig. 3 illustrates a horizontal adjustment of the frame into a lowered position with respect to that shown in Fig. 2, and wherein the scoop is in a cutting and dirt filling position.

Fig. 4. is an end view of the apparatus looking from the right of Fig. 2.

Fig. 5 is a rear view, similar to Fig. 4, with details omitted, and showing how the frame may be tilted from a transversely horizontal position with the scoop in one position of adjustment.

Fig. 6 is a view similar to Fig. 5, showing how the frame may be tilted into another position and showing the scoop adjusted to a position different from that shown in Fig. 5.

Fig. 7 is a partial side view showing the scoop adjusted to the position shown in Fig. 6.

Figs. 8 and 9 are sectional views through

one of the valves showing the valve plug in different positions.

Like characters of reference designate similar parts throughout the different figures of the drawings.

Referring to Fig. 1, the frame is shown to consist of side sections 1 and 2 which converge toward the front at 3 and 4, to an apex 5. The frame is closed at the rear by a transverse member 6, and therefore it will be seen that this is an enclosing type of frame affording a maximum of strength and wholly rigid. The character of material making up this frame and the particular way in which it is fabricated are not material to this invention.

The frame is supported by a pair of wheels 7 and 8 which are rearwardly disposed with respect thereto and the novel mounting of which wheels I will now describe in detail. While said wheels 7 and 8 are identical in structure and operation, as well as the means for adjusting them to different positions, still I will designate each unit with different reference numerals to facilitate a later description of operation by reason of the fact that the operative means for each wheel is selective. However, as both these units are identical, only one need be discribed in detail.

Arms 9 and 10, journal in their lower ends an axle 11, for wheel 7, and the upper portions of said arms are non-rotatively secured to a rock shaft 12 that is journalled in bearings 13 and 14, of brackets 15 and 16, that are secured to member 6, of the frame.

Arm 10, has an off-set extension 17, which is pivotally connected at 18, with links 19, whose remaining ends are pivoted at 20, to a cross head 20′ that is slidable in guideways 21, mounted on frame section 1, as will be seen from Fig. 1. A piston rod 22, is connected with said cross head 20′ and said piston rod extends into a cylinder 23, secured at 24, to section 1, of the frame, and is connected with a piston 25, that is slidable in said cylinder 23, responsive to fluid pressure exerted on either face of the piston, as will be later described. It may be stated however, that fluid pressure will be exerted on both sides of the piston in the majority of cases by reason of the fact that the function of the operative means set forth is not only to shift wheel 7 to a given position, but also to hold it in the position to which it has been shifted. For convenience in the later description of operation, the operative means just described for wheel 7, will be referred to as "means A."

Wheel 8, is axled on 26, and is journalled in the lower ends of arms 27 and 28 which are rigidly secured to rock shaft 29, that is journalled in bearings 30 and 31, of brackets 32 and 33, secured to cross member 6. Arm 28 has an off-set extension 34 pivoted to links 35, and the latter are pivoted to a cross head 36, slidable in guide ways 37, mounted on frame member 2. A cylinder 38, is anchored at 39, to member 2, and contains a piston 40, having a piston rod 41, that is connected with cross head 36. The above operating means for wheel 8, will hereinafter be referred to as a whole, as "means B."

Reference will next be made to the improved draft and supporting coupling by means of which the frame, just described, is coupled with a tractor, reference being had more particularly to Figs. 1 and 2.

I have conventionally shown a caterpillar tractor designated as a whole at C and having a platform 42 from which a seat 43, rises. A draw bar 44, rigid with the tractor, extends rearwardly therefrom and is provided with a swivel block 45. A swivel draft bolt 46 is rotatively mounted in said block and has a head or nut 47 adapted to transmit draft to said block. A clevis 48 is rigidly connected with said bolt 46 and is adapted to receive a forwardly projecting draft bar 49, secured to said frame, and a clevis pin 50, unites the frame with said draw bar, as will now be clear. There is sufficient play between the bar 49 and the clevis 48 to permit of up and down adjustment of the rear of the frame, as will later appear. Further, the swivel connection permit of tilting movement of the frame about the longitudinal axis of the latter which is coincident with the axis of bolt 46. In addition to the foregoing, it will be seen that this novel draft coupling serves to support the forward end of the frame, the rear end being supported by wheels 7 and 8.

Reference will next be made to my improved scoop or fresno and to the manner in which it is mounted in the frame and also to the operative means for adjusting and holding the same in fixed positions.

This scoop comprises bottom, end and side walls 51, 52 and 53, respectively, the scoop having an open front, and the bottom wall 51 terminating in a cutting or scraping or shaping cutting edge bar 54. Said scoop is pivoted to the frame by pivots 55 and 56, one extending through frame member 1, and the other extending through frame member 2, and it will be seen from Fig. 2, that this pivotal axis is disposed forwardly of the scoop, as far as possible, and the scoop is located as near the rear frame member 6, as possible. Thus, it will be clear that the major weight is carried by wheels 7 and 8, and only a minor weight is carried by the novel coupling, heretofore described. No structural stops are necessary to limit movement of the scoop except in a dirt carrying position, by reason of the fact that the scoop is adjusted to different positions and held in such positions, either when functioning or

not, by the operating means about to be described.

Said operating means is mounted on an elevated frame rising from the main frame, heretofore described. As shown, transverse supporting members 57 and 58, extend across the main frame, as shown in Fig. 1, and to which said members 57 and 58 are anchored. Upright members 59 and 60, rise from said members 57 and 58 and are tied by transversely disposed channel members 61 and 62. Guide ways 63 are mounted on said members 61 and 62. If desired, although not essential, the guide ways 63 may be provided with cross head stops 64'. Cross heads 65, are slidable in said guide ways 63. Scoop operating links 66, are pivotally connected at 67, at their upper ends to said cross heads 65, and are pivotally connected at their lower ends at 68, to upwardly projecting ears 69, on the side walls 53, of said scoop.

A cylinder 70, is suitably mounted on said frame work and is provided with a piston 71, having a piston rod 72, which latter projects through a suitable gland 73. A cross head yoke is provided which is substantially U-shaped, and said piston rod 72 is secured to the bight 74, of said yoke and serves to shift the latter to the left of Fig. 1, when the scoop is to be tilted upwardly, as will later appear. The limbs 75, of said yoke, extend rearwardly and are pivotally connected with said cross heads 65. For convenience in later reference to this part of the structure, I will refer to the elevated frame, which is rigid with the main frame, as "frame D" and I will refer to the scoop operating means as "means E" and the improving coupling as F.

Reference will next be made to the fluid pressure connections whereby operation of means A, B and E is consummated, and as these pressure connections are only claimed broadly, in combination with the heretofore described structure, reference to said connections will be of a general nature, as well as the illustration thereof, and the latter will be semi-diagrammatic.

On the tractor, I have shown an air or other fluid pressure reservoir 76, which may have any suitable source of supply through pipe 77, which may if desired be fed from a pump operated by the engine of the tractor. Pipes 78 and 79, are connected with the ends of cylinder 23 at points beyond the travel of piston 25, or rather at points beyond the extremes of travel of the latter, so that pressure fluid can be admitted to either end of the cylinder. Said pipes are intersected by a controlling valve which I will designate as a whole by G, and leading from valve G, are pipes 80 and 81. Valve G has an operating handle 82, accessible to the driver in seat 43, as will be clear from Fig. 1.

Valve G, is shown in horizontal section, in two positions in Figs. 8 and 9, and comprises a valve casing 83 having an oscillatory plug or valve closure 84, therein, adapted to be operated by handle 82. Said casing 83 has exhaust ports 85 and 86, which are shown as opening to atmosphere. The closure 84 has a main fluid conducting port 87 adapted in the Fig. 8, position to connect pipes 80 and 78, and in the Fig. 9, position, to connect pipes 79 and 81. The valve casing 83, has ports of the same diameter as said port 87, for registering the latter with the above named pipes, as clearly shown. Said closure 84, has an exhaust port 88, of reduced size with respect to port 87 and which is adapted to connect pipe 79 with exhaust 85, when the closure is in the Fig. 8, position and when said closure is in the Fig. 9, position, port 88 registers with pipe 80 and with a blind portion of casing 83, which is a non-functioning position for port 88. Said closure has an exhaust port 89, which in the Fig. 8, position, registers with pipe 81 and with a blind portion of casing 83, which is a non-functioning position. In the Fig. 9, position, port 89 registers with pipe 78 and exhaust port 86. It will be clear that there is so much difference in size between port 87 and ports 88 and 89, that control of exhaust can readily be effected by partial registry of port 87, with the selected pipes.

It will now be clear that if valve G, is in the Fig. 8, position, air or other fluid pressure will flow from reservoir 76 through pipes 80, valve G and pipe 78, to force piston 25 to the rearward position shown in Fig. 1, thereby shifting wheel 7, into the same position occupied by wheel 8, in Fig. 2. Air will exhaust from the right side of piston 25 through pipe 79, and out through ports 88 and 85 to atmosphere, and no flow at all can occur through pipe 81.

If it were desired to shift wheel 7, from the Fig. 2, position to a position like that shown in Fig. 3, as regards wheel 8, then, the valve closure would be shifted into the Fig. 9, position. Thus air or other pressure fluid would flow from the reservoir 76 through pipe 81, valve G and pipe 79, to the right hand side of piston 25, viewing Fig. 1, and force the piston 25 to the left of said figure to the desired extent. Exhaust would take place through pipe 78, port 89 and exhaust 86, and port 88 would be in a non-functioning position, as shown in Fig. 9. By reason of the small size of the exhaust ports 85 and 86, it will be easy to shift the closure 84 sufficiently to cut ports 88 or 89 out of registry with the particular exhaust ports named, and still maintain registry through port 87, and hence, after the piston had been moved to the desired position, such adjustment of the valve would serve to hold

the piston in such adjustment. Thus, it will be seen that the piston is a double acting piston, and active fluid pressure will function against that side of the piston where resistance is greatest, or against the greatest thrust exerted by the part being controlled.

Means B, for wheel 8, is controlled by the indentical type illustrated and described in connection with wheel 7, and hence need not be described in detail. Means B, includes pipes 90 and 91 leading from opposite ends of cylinder 38 to a valve H, which is identical with valve G. From valve H, pipes 92 and 93, lead to reservoir 42.

It will now be clear that from the driver's seat 43, there is afforded separate and independent controls for the wheels 7 and 8, whereby both may be shifted to raise or lower the frame in a horizontal plane, or whereby one wheel may be shifted to a different position from the other, as shown in Figs. 5 and 6, to tilt the frame about its longitudinal axis as desired.

I have merely shown one specific form of fluid pressure control for air, oil or whatever medium is employed, as it will be understood that in view of this disclosure, the specific form of said control may readily be changed, within the purview of the claims.

Fluid pressure control of the scoop, is identical with that described in connection with "means A" and "means B." Pipes 94 and 95, lead from cylinder 70, to a valve I, which is accessible to the driver, and from valve I, pipes 96 and 97 lead to the reservoir 76.

While in the majority of positions which the scoop may occupy, no stops are necessary, still, in the dirt carrying position shown in Fig. 2, I provide stops 64, which are secured to wall 52, of the scoop J, and which overhang and are adapted to engage the top of frame member 6, and which function to limit downward movement of the rear end of the scoop J. This novel disposition of the stops disposes most of the weight on the rear wheels 7 and 8.

While the main frame is practically at all times disposed at a downward inclination toward the tractor, it will be clear that wherever I have referred to said frame as being raised or lowered in a horizontal plane, I mean its transverse plane, as it will be seen from Fig. 4, that member 6, is horizontally disposed and can be raised or lowered in a horizontal plane, or tilted as shown in Figs. 5 and 6, from a horizontal plane.

While it is believed that the operation will be understood from the foregoing description, it may briefly be recapitulated as follows:—

In going to and from the work, the scoop, which may be designated as a whole at J, may be disposed in the position shown in Fig. 2, with the cross heads 65 engaging the abutments 64′, and the wheels 7 and 8 in the foremost position of adjustment. The valves G and H, would be in the Fig. 8, position, and turned sufficiently to dispose the exhaust ports 88, out of registry with the ports 85 so that there would be pressure against pistons 25 and 40, or specifically against the left hand faces thereof, viewing Fig. 1. Thus, the wheels 7 and 8 would be held in the Fig. 2, position, and by reason of the fact that the wheels are so far forward that a vertical plane intersecting the axis of shafts 12 and 29, would be slightly in the rear of the axes of wheels 7 and 8, the latter would be sufficiently beyond or forward of dead center so that the weight would be structurally carried by the arms 9, 10 and 27 and 28. Valve I, would be shifted so that its main port corresponding to port 87, would be in an out of registry position, which could be termed a neutral position, because the abutments 64′ would support the scoop J in the Fig. 2, position, which is either a non-functioning position, or a dirt carrying position. In this position, it will be seen that the bottom wall 51, is in a substantially horizontal position, which is not a usual scooping or digging position.

Reference will next be made to the scooping or digging position shown in Fig. 3, and the valve adjustment pre-requisite therefor.

At this point it is important to state that there is a very essential and interdependent action between the adjustment of wheels 7 and 8 and the adjustment of the scoop J, for any operative position of the latter, and it will now be understood why there is such an intimate combination between the wheels and their adjusting means, and the scoop and its adjusting means, even though the acts of adjustment may be performed sequentially instead of simultaneously.

Assuming that the operator desired to dispose the scoop J with its bottom transversely horizontal to dig or scoop a horizontal swath, the valves G and H would be adjusted into the Fig. 8, position until the wheels 7 and 8 had assumed the Fig. 3, position, and then to support and maintain said wheels in such position, the valves G and H would be turned to the Fig. 9, position, so that pressure would be against the right hand faces of pistons 25 and 40, viewing Fig. 1, to sustain the wheels, and the adjustment would be such that the exhaust ports 89 would be out of registry with ports 86, so that there would be no exhaust of air or other pressure fluid. Thus, the pressure fluid against the left hand faces of pistons 25 and 40, would be locked or trapped and the active pressure would be against the left hand faces of said pistons, which would be the same as a double acting position, for this particular purpose. If it were desired to have the active pressure

against both sides of the pistons, at all times, I consider this would be within the province of my invention, in view of the present disclosure. At any time that a further or lesser adjustment of the wheels 7 and 8, were to be made, the valves G and H, could be turned to the full Fig. 8 or 9 position, in accordance with the nature of adjustment desired, and thereafter, a non-exhaust position could be restored, with active pressure on that side of the piston sustaining the greatest load.

After the frame had been adjusted to the Fig. 3, position, the operator would adjust valve I, to shift the scoop J to the required or desired tilt and it would then be held at such position, as will now be clear, by thereafter making a non-exhaust adjustment of valve I, or changing the adjustment of said valve if he desired a greater or increasing tilt of scoop J. After the scoop had been filled, even in the position shown in Fig. 3, and without changing the position of the scoop, the valves G and H could be adjusted to raise the frame and the filled scoop J would be elevated and the apparatus could be advanced to a dump location. After the frame had been elevated, it will be clear that the scoop J, could be tilted upwardly as shown in Fig. 6, or 7, to dump the contents.

Assuming that it was desired to crown a road bed in the process of forming it, then the wheels 7 and 8 could be adjusted to the position shown in Fig. 5, while working on one side of the apex of the crown, and then to the position shown in Fig. 6, while working on the other side thereof.

In Fig. 7, I have shown how the scoop J can be adjusted to shape a road surface and it will be understood that the frame can be laterally or transversely tilted in the performance of this function, as previously described in connection with Fig. 5, and as shown in Fig. 6.

It is believed that the invention and its operation will be fully understood from the foregoing description, and while I have herein shown and described one specific form of the invention, I do not wish to be limited thereto except for such limitations as the claims may import.

I claim:—

1. In a tractor scoop structure, a frame having a pair of supporting wheels, arms pivoted to said frame and journalling said wheels and said arms being shiftable rearwardly from said frame to lower the latter and toward said frame to elevate the latter relative to the ground and said arms being movable toward said frame beyond a dead center to support said frame directly on said arms, a scoop mounted on said frame, a swivelled draft coupling connecting the front of said frame with a tractor, and mechanism for imparting adjustment movement to said arms to shift the latter toward or away from said frame singly or in unison to either tilt said frame or change its degree of elevation from the ground and thereby alter the position of said scoop with respect to the ground.

2. A scoop structure adapted to be drawn from its front end, comprising, an enclosing main frame, wheels supporting the rear of said main frame, a scoop disposed within and pivoted to said main frame, an elevated frame rigidly mounted on and extending above said main frame and provided with cross head guides, cross heads slidable in said guides, links pivoted to said cross heads and to said scoop, a yoke having its limb ends pivoted to said cross heads, and a power cylinder mounted on said elevated frame and having a piston rod connected with the bight of said yoke for actuating said scoop.

3. In a tractor scoop structure, a main frame adapted to be coupled at its front end to a tractor and composed of side and rear members, a scoop disposed between and being pivoted to said side members, an elevated frame mounted on and extending above said main frame and said scoop and provided with cross head guides, cross heads slidable in said guides, links having their upper ends pivoted to said cross heads and extending downwardly and having their lower ends pivoted to said scoop, a power cylinder mounted on said elevated frame between said cross heads and having a piston rod, a yoke having its bight connected with said rod and its limbs connected with said cross heads to operate said scoop, a pair of supporting wheels for said main frame each having a lever arm, a power cylinder on each side frame member having a piston rod, a cross head and guide for each of said piston rods, and a link for each cross head connecting the latter with an arm of a wheel whereby either or both of said wheels may be shifted to raise or lower or tilt said main frame and said elevated frame, and valve devices accessible to the driver of the tractor for independent control of said power cylinders.

4. In a scoop structure adapted to be drawn from its front end, comprising, a main frame, wheels supporting said main frame near the rear thereof, a scoop pivotally mounted on said main frame and disposed near the rear thereof to impose the major weight on said wheels, an elevated frame rigidly mounted on said main frame and extending above the latter and said scoop and disposed forwardly of the latter, and mechanism on said elevated frame having downwardly extending link means connected with said scoop rearwardly of the pivotal mounting thereof for shifting and holding said scoop into dumping, scooping, levelling or shaping positions with a pur-

chase favorable to said mechanism by reason of the elevated position thereof with respect to said scoop.

5. In a scoop structure adapted to be drawn from its front end, comprising, a main frame, wheels pivotally supporting said frame, a scoop pivotally mounted on said frame to swing about a fixed axis, an elevated frame rigidly mounted on said main frame and extending above the latter and said scoop, mechanism on said elevated frame connected with said scoop for shifting and holding the latter into dumping, scooping, carrying, levelling, road shaping and scraping positions with a purchase favorable to said mechanism by reason of the elevated position thereof with respect to said scoop, and devices for shifting said pivotally mounted wheels for raising, lowering or tilting said frame in accordance with the function being performed by said scoop.

6. In a scoop structure adapted to be drawn from its front end, comprising, a main frame, wheels pivoted to and supporting said main frame, devices for shifting said wheels separately or together to raise, lower or laterally tilt said main frame, a scoop mounted on said main frame to swing about a fixed axis relative to said main frame, an elevated frame mounted on said main frame and extending above the latter and said scoop, and mechanism on said elevated frame operatively connected with said scoop for shifting and holding the latter into dumping, scooping, carrying, levelling or shaping positions dependent upon the position of said main frame and with a purchase favorable to said mechanism.

7. In a scoop structure adapted to be drawn by a tractor, a frame having side members and provided at its front end with a swivelled draft coupling adapted to support the front end of said frame and permit the latter to be tilted, a pair of supporting wheels at the rear end of said frame, a scoop disposed between and pivotally mounted on said side members to swing free from interference therewith and disposed rearwardly of said frame and relatively close to said wheels to dispose the major weight of the load on the latter, means for shifting and holding said scoop into dirt scooping, carrying, dumping, road scraping or road shaping positions, and mechanism for independently changing the relation of either or both of said wheels with respect to said frame to raise or lower the latter in horizontal planes, or tilt said frame from the horizontal and thereby alter the position of said scoop or afford clearance of the latter from the road surface, in accordance with any of the functions being performed by said scoop.

8. In a scoop structure adapted to be drawn by a tractor, a frame having a draft coupling at its forward end adapted for supported attachment with a tractor, a pair of supporting wheels at the rear of said frame, a scoop pivoted on said frame close to said rearwardly disposed supporting wheels to impose the major weight thereon, means for shifting and holding said scoop into dirt scooping, carrying, dumping, road scraping and road shaping positions, and mechanism for independently changing the relation of either or both of said supporting wheels with respect to said frame to raise or lower the latter in horizontal planes, or tilt said frame from the horizontal and thereby alter the position of said scoop or afford clearance of the latter from the road surface, in accordance with any of the functions being performed by said scoop.

In witness whereof, I have hereunto affixed my hand.

HARRY M. WIRT.