Jan. 16, 1940. C. LE BLEU 2,187,072

TRAIL BUILDER, BULLDOZER, AND THE LIKE

Original Filed April 6, 1936 2 Sheets-Sheet 1

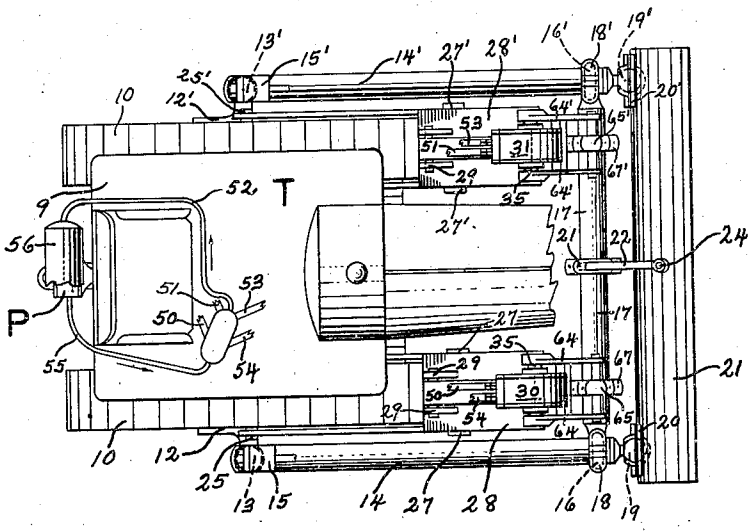


FIG. 1

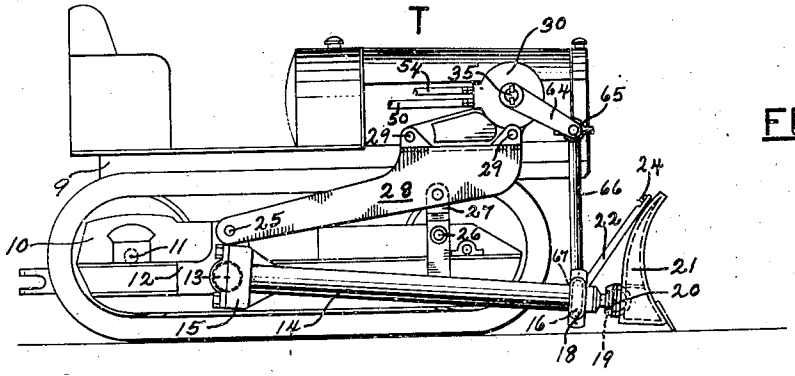


FIG. 2

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TRAIL BUILDER, BULLDOZER, AND THE LIKE

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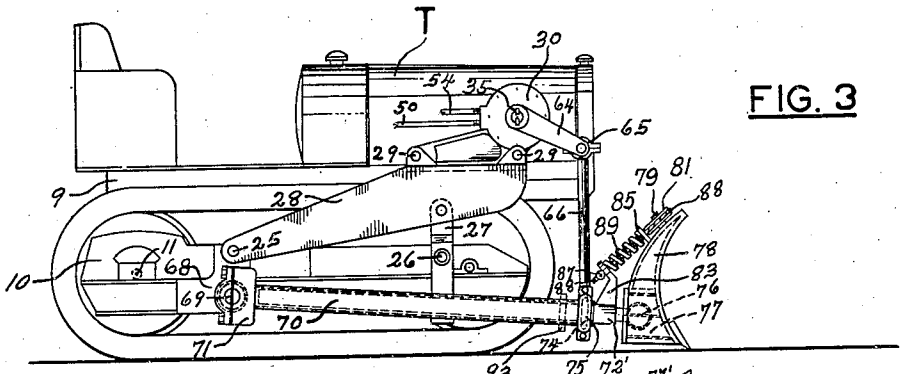


FIG. 3

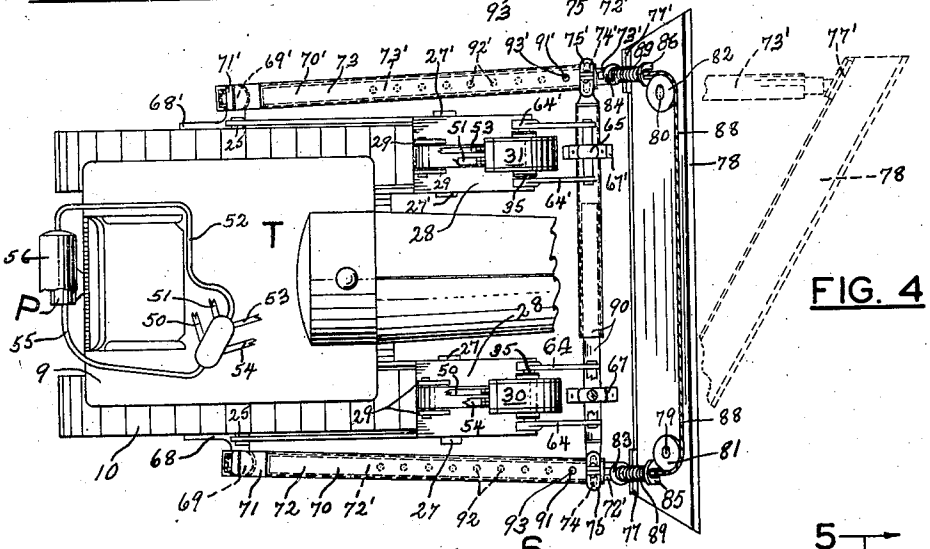


FIG. 4

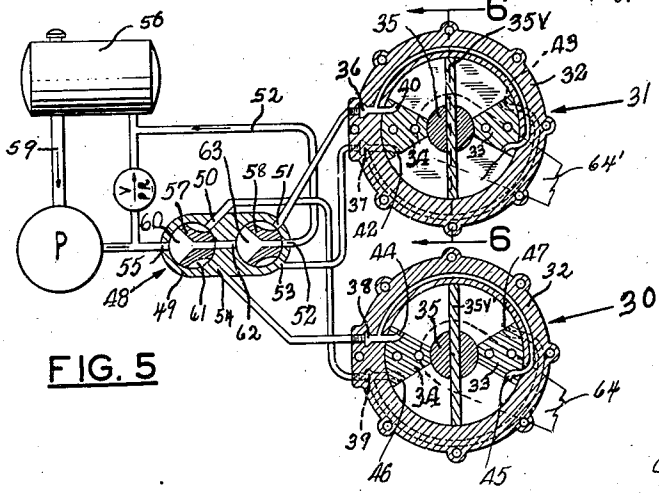


FIG. 5

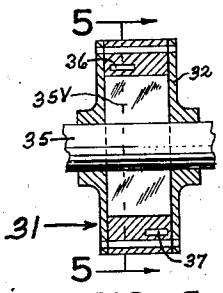


FIG. 6

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UNITED STATES PATENT OFFICE

2,187,072

TRAIL BUILDER, BULLDOZER, AND THE LIKE

Charles Le Bleu, Los Angeles, Calif.

Application April 6, 1936, Serial No. 72,960
Renewed May 5, 1939

22 Claims. (Cl. 37—144)

This invention relates to earth moving devices, the term "earth" being taken in the broad sense to include snow, ice, and the like, adapted to be connected to a tractor to be moved across a surface to be treated and includes a digging and scraping implement disposed in operation forwardly of the tractor. Such devices are usually termed bulldozers, trail builders, snow plows, backfillers, graders, and the like.

Devices of the class named as usually constructed include a rigidly constructed pusher frame carrying at its forward end a material handling implement which, in the case of the bulldozer, is a rigid part of the pusher frame, but in the trail builder is pivoted to the forward end of the pusher frame, and transverse tilting of the material handling implement is accomplished by collectively tilting the pusher frame, or by tilting the material handling implement on the pusher frame. This conventional type of construction entails certain costs that it is the object of this invention to minimize.

Another object of this invention is the provision, in a device of the class named, of an articulately assembled pusher frame and scraper assembly and a suitably designed control means therefor adapted to articulate the assembly to raise, lower and transversely tilt the material handling implement and to positively retain the assembly in its articulately adjusted positions.

Still another object is the provision in a device of the class described of a pusher frame, a scraper mounted on the forward end of the pusher frame for rearward rocking movement and yieldable means disposed between the pusher frame and the scraper to resist the rearward rocking movement of the scraper.

Still other objects, features and advantages of this invention will be apparent to those skilled in the art upon detailed perusal of the attached drawings and the following specifications, wherein I describe and exemplify my invention, but it is to be understood that my invention as herein exemplified and described is susceptible to many changes in the combination, correlation and construction of parts, members, and features without departing from the spirit of the invention as defined in the annexed claims.

In the drawings:

Figure 1 is a plan view of my invention as embodied in a bulldozer attached to a tractor of conventional design.

Figure 2 is a side elevation of Figure 1.

Figure 3 is a side elevation of my invention as embodied in a trail builder, grader, and the like.

Figure 4 is a plan view of Figure 3.

Figure 5 is a longitudinal sectional view of the hydraulic motors for raising, lowering, and articulately adjusting the device associated with a diagrammatic illustration of a control mechanism for said motors.

Figure 6 is a transverse sectional view of one of the hydraulic motors (these motors are identical) taken on a line 6—6 of Figure 5.

In the drawings similar characters of reference designate corresponding parts in the several views.

Referring now to the drawings, Figures 1, 2, and 3, T is a tractor of conventional design including a body 9 and a pair of track laying units, 10, 10' disposed one at each side of the body and pivotally connected thereto at 11, 11' for vertical swinging movement. A pair of brackets 12, 12' are secured one to each of the track frames and provided with a ball 13, 13'. A pair of pusher arms 14, 14' are disposed one at each side of the tractor and provided at their rear ends with ball sockets 15, 15' by means of which they are articulately mounted on balls 13, 13' carried by the track frames.

Pusher arms 14, 14' are provided behind their front ends with round faced rings 16, 16' adapted to receive a ball socket. A cross beam 17 is disposed transversely in front of the tractor, see Figure 1, and provided at each of its opposite ends with a ball socket 18, 18' articulately mounted on round faced rings 16, 16' carried by pusher arms 14, 14' are provided at their front ends with balls 19, 19' articulately mounted in ball sockets 20, 20' carried by a scraper 21.

Arm 22 is articulately connected at its lower end to cross beam 17 at 23, and at its upper end to the back of scraper 21 at 24. Arm 22 retains the scraper in the upright position shown. Brackets 12, 12' carry trunnions 25, 25'.

Spaced forwardly from trunnions 25, 25' are other trunnions 26, 26' also mounted one on each of the track frames.

Pivotally mounted on each of the trunnions 26, 26' is a vertical link 27 and 27'.

A pair of fabricated brackets 28, 28' are disposed one on each of the track frames and pivotally mounted at their rear ends on trunnions 25, 25' and behind their front ends on the upper ends of vertical links 27, 27'.

Mounted on each of the fabricated brackets by means of lugs and pins, as at 29, is an oscillating motor 30 and 31.

Motors 30 and 31 are identical in construction and each comprises (refer to Figures 5 and 6) a cylinder 32 having fixed partitions 33 and 34 diametrically opposite to one another and of sectoral form with a common center concentric with the bore of cylinder 32. Concentrically disposed within the cylinder 32 is a shaft 35 having vanes 35 and 35V' sweep the spaces between fixed partitions 33 and 34. Cylinders 32 are provided each with a pair of ducts 36, 37 and 38, 39. Duct 36 registers with parts 40 and 41 communicating

with the bore. Duct 37 registers with parts 42 and 43 communicating with the bore. Duct 38 registers with parts 44 and 45, communicating with the bore. Duct 39 registers with parts 46 and 47 communicating with the bore.

The motor just described is an oscillating motor. When fluid under pressure is admitted to duct 36 and duct 37 is connected to exhaust, the impeller 35, 35V will be rocked clockwise, by arresting the flow of fluid the impeller may be fluid locked in its arrested position. By reversing the flow of fluid the impeller may be turned in the opposite direction. The other motor being identical in construction operates in a similar manner. When fluid under pressure is admitted to duct 38 and duct 39 is connected to exhaust, the impeller 35, 35V will be rocked clockwise, and by arresting the flow of fluid the impeller may be fluid locked in its arrested position, and by reversing the flow of fluid the impeller may be turned in the opposite direction. Obviously then, fluid under pressure may be directed to the motors to cause simultaneous operation thereof in the same or in opposite directions and the motors may be operated singly in either direction. I provide means for directing the flow of fluid to and from the motors 30 and 31 as follows: I provide a control valve 48 comprising a housing 49 having a pair of bores and a conduit 50 connected to duct 39, a conduit 54 connected to duct 38, a conduit 51 connected to duct 36, a conduit 53 connected to duct 37, a conduit 52 connected to a fluid reserve tank 56 and a conduit 55 connected to a source of fluid under pressure P. Turnably mounted in each of the said pair of bores are valve plugs 57 and 58. Valve plugs 57 and 58 being in the positions shown, the motors are fluid locked against rotation in either direction and the continuously running pump P receives fluid via conduit 59 from the reserve tank 56 and discharges the fluid into conduit 55 from which it flows through the control valve 48 into a conduit 52 and thence into reserve tank 56. To operate motor 30 in a counterclockwise direction, valve plug 57 is rotated in a counterclockwise direction to register through part 60 with conduit 50 and register side part 61 with connecting duct 62 and conduit 54. Thus fluid under pressure will enter the bore of motor 30 through parts 46 and 47 thus causing counterclockwise rotation of impeller 35, 35V' and the fluid displaced thereby through parts 44 and 45 will return to the valve 48 via conduit 54 thence via side part 61 and connecting duct 62 to the through part 63 of valve plug 58. Now if valve plug 58 remains in the position shown, the fluid will flow thence to the reserve tank 56, but valve plug 58 may be operated in the manner of valve plug 57 and the fluid displaced from the motor 30 may thus be utilized to operate motor 31. Thus it is clear that motors 30 and 31 may be operated simultaneously in the same or in opposite directions and may be operated singly. When the motors are operated simultaneously fluid displaced by the operation of motor 30 will be utilized to operate motor 31, and when only one motor is operated the fluid will be received directly from the pump P via the control valve 48. It is believed that further explanation of the operation of control valve 48 and motors 30 and 31 is unnecessary since it is clear from a study of Figure 5 that the valve plugs 57 and 58 may be operated in the manner already described to register the through parts with the various conduits connected to the motors to accomplish the desired operation thereof. An advantage of the hydraulic hook-up just described resides in the fact that the fluid displaced by the operation of one of said motors may be utilized to operate the other of said motors with the results that both motors may be oscillated simultaneously and equally regardless of the fact that said motors may be unequally loaded.

Each of motor shafts 35 are provided, one with arms 64 and the other with arms 64', carrying between their outer ends ball and socket connections 65 and 65'. 66 is a suspension link secured at its upper end to ball socket connection 65 and secured at its lower end to a ball and socket connection 67 carried by cross beam 17 adjacent one of its ends, and this structure is duplicated at the other side of the tractor, ball socket connection 65' being provided with a suspension link 66' secured at its lower end to a ball and socket connection 67' carried by cross beam 17 adjacent its other end. Thus it is seen that motor 30 is operably connected to cross beam 17 adjacent one of its ends, and motor 31 is operably connected to cross beam 17 adjacent the other of its ends, and since, as heretofore explained, side beams 14, 14' and cross beam 17 and scraper 21 are articulately assembled and side beams 14, 14' are articulately connected to the tractor, it follows that side beams 14, 14' may be swung singly and may be swung simultaneously in the same or opposite directions. Motors 30 and 31, as explained, are disposed and adapted to be operated singly, or simultaneously in the same or opposite directions, and since these motors are operably connected to cross beam 17, one adjacent each end thereof, it follows that the motors may be operated singly, or simultaneously in opposite directions for transversely tilting the scraper 21, and may be operated simultaneously in the same direction for raising and lowering scraper 21.

Referring now to Figures 3 and 4 wherein I exemplify my invention in a modified form whereby the scraper may be disposed either in the transverse position or in an oblique position indicated in Figure 4 by broken lines, a pair of brackets 68, 68' are secured one to each of the track frames and provided with a ball 69, 69'. A pair of telescoping pusher arms 70, 70' are disposed one at each side of the tractor and provided at their rear ends with ball sockets 71, 71' by means of which they are articulately mounted on balls 69, 69' carried by the track frames. Telescoping pusher arms 70, 70' each comprises a fixed section 72 and 73 and a telescoping section 72, 73' slidably disposed in the fixed section. The fixed sections 72 and 73 are provided adjacent their front ends with round faced rings 74, 74' adapted to receive a ball socket. A telescoping cross beam 90 is disposed transversely in front of the tractor, see Figure 3, and provided at each of its opposite ends with a ball socket 75, 75' articulately mounted on round faced rings 74, 74' carried by the fixed sections 72, 73 of the telescoping pusher arms 70, 70'. Telescoping sections 72', 73', of the pusher arms 70, 70' are provided at their forward ends with balls 76, 76' articulately mounted in ball sockets 77, 77' carried by scraper 78. Journaled on scraper 78 at 79 and 80 are sheaves 81 and 82. Secured adjacent the front ends of telescoping section 72', 73' of pusher arms 70, 70' are brackets 83 and 84. Secured to scraper 78 are brackets 85 and 86. Adjustably secured to bracket 83 at 87 is a cable 88 extending up-

wardly therethrough, thence through an opening in bracket 85, thence about sheave 81, thence about sheave 82 and downwardly through an opening in bracket 86, thence on downwardly and secured to bracket 84. Disposed between bracket 83 and bracket 85 and encircling cable 88 is a compression spring 89. Disposed between brackets 84 and 86 and encircling cable 88 is compression spring 89'. Thus cable 88 prevents scraper 78 from rocking forward past the adjusted upright position shown, and the compression springs continuously urge the scraper forward against the restraining effect of cable 88. This arrangement permits the necessary articulation of the scraper 78 relative to pusher arms 70, 70', when the pusher arms are swung in opposite directions for transversely tilting the scraper, and when the track laying units swing independently in a vertical plane. Still another advantage of this arrangement is as follows: The force exerted on scraper 78 by the compression springs 89 and 89' may be such that, when a predetermined force is applied by accumulated materials to the scraper above the ball joint connection of the pusher arms with the scraper, the scraper 78 may rock backwardly thus compressing the springs and partially or wholly prevent the further accumulation of material, thus minimizing the necessity for almost constant operation of the motors 30, 31 to control the accumulation of material. The operation of these motors together with associated control mechanism has already been described in connection with Figures 1, 2, and 3, and therefore will not be repeated in connection with the description of Figures 3 and 4.

Still referring to Figures 3 and 4, it will be noted that the fixed sections 72 and 73 of telescoping pusher arms 70, 70' are provided with openings 91 and 91', and the telescoping sections 72' and 73' are provided each with a plurality of openings 92 and 92'. A pair of pins 93 and 93' are also provided. Thus the effective length of pusher arms 70 and 70' may be adjusted as desired and secured in the adjusted position by the pins 93 and 93', and by adjusting one of said pusher arms the scraper 78 may be disposed in the oblique position indicated in Figure 4 by broken lines.

Having thus described my invention, what I claim as new and useful and desire to secure by Letters Patent is:

1. A material handling machine comprising a tractor, a pair of pusher arms disposed one at each of the opposite sides of the tractor, means articulately mounting the rear end of the pusher arms on the tractor, for independent vertically swinging movement about a common axis a rigidly constructed scraping unit disposed forwardly of the tractor, means articulately mounting the scraping unit on the front ends of the pusher arms whereby the pusher arms may swing independently in opposite directions in a vertical plane about the common axis for transversely tilting the scraping unit without imparting torsional strain thereto, and power operated means to swing the pusher arms for tilting the scraper unit, and other means for retaining said scraper unit in its upright position on said pusher arms.

2. A material handling machine comprising a tractor, a pair of pusher arms disposed one at each of the opposite sides of the tractor, means articulately mounting the rear ends of the pusher arms on the tractor, a rigidly constructed scraping unit disposed forwardly of the tractor, means articulately mounting the scraping unit on the front ends of the pusher arms, and power operated means for swinging the pusher arms simultaneously in opposite directions for transversely tilting the scraping unit, and other means for retaining said scraper unit in its upright position on said pusher arms.

3. A material handling machine comprising a tractor, a pair of pusher arms disposed one at each of the opposite sides of the tractor, means articulately mounting the rear ends of the pusher arms on the tractor, a rigidly constructed scraping unit disposed forwardly of the tractor, means articulately mounting the scraping unit on the front ends of the pusher arms, and power operated means for swinging the pusher arms to transversely tilt the scraping unit, and other means for retaining said scraper unit in its upright position on said pusher arms.

4. A material handling machine comprising a tractor, a pair of pusher arms disposed one at each of the opposite sides of the tractor, means articulately mounting the rear ends of the pusher arms on the tractor for independent vertical swinging movement, a rigidly constructed scraping unit disposed forwardly of the tractor, means articulately mounting the scraping unit on the front ends of the pusher arms, other means connected to the pusher arms and the scraping unit to retain the scraping unit in the upright position on the pusher arms and automatically shiftable to permit the pusher arms to be swung in opposite directions for transversely tilting the scraping unit, and means for so swinging the pusher arms.

5. A material handling machine comprising a tractor, a pair of pusher arms disposed one at each of the opposite sides of the tractor, means articulately mounting the rear ends of the pusher arms on the tractor, a scraping unit disposed forwardly of the tractor, means articulately mounting the scraping element on the front ends of the pusher arms, other means connected to the pusher arms and the scraping unit and shiftable automatically on the latter to permit the pusher arms to be swung in opposite directions in a vertical plane for transversely tilting the scraping unit, and means to so swing the pusher arms.

6. A material handling machine comprising a tractor, a pair of pusher arms disposed one at each of the opposite sides of the tractor, means articulately mounting the rear ends of the pusher arms on the tractor, a cross beam disposed forwardly of the tractor, means articulately connecting the ends of the cross beam each to a pusher arm, a scraping unit disposed forwardly of the tractor, means articulately mounting the scraping unit on the front ends of the pusher arms, means connected to the pusher arms and the scraping unit to retain the scraping unit in its upright position on the pusher arms and shiftable to permit the pusher arms to swing in opposite directions in a vertical plane for transversely tilting the scraping unit, and power operated means mounted on the tractor and connected to the cross beam for so swinging the pusher arms in opposite directions to transversely tilt the scraping unit.

7. A material handling machine comprising a tractor, a pair of pusher arms disposed one at each of the opposite sides of the tractor, means articulately mounting the rear ends of the pusher arms on the tractor, a cross beam disposed forwardly of the tractor, means articulately connecting the ends of the cross beam each to a

pusher arm, a scraping unit disposed forwardly of the tractor, means articulately mounting the scraping unit on the front ends of the pusher arms, means connected to the cross beam and the scraping unit to retain the scraping unit in its upright position on the pusher arms and permit the pusher arms to swing in opposite directions in a vertical plane, and control means mounted on the tractor and connected to the cross beam for swinging the pusher arms in opposite directions to transversely tilt the scraping unit.

8. A material handling machine comprising a tractor including a body and a pair of track laying units disposed one at each of the opposite sides thereof and journaled behind their front ends to the body for independent vertical swinging movement, a pair of pusher arms disposed one at each of the opposite sides of the tractor, means articulately mounting the rear ends of the pusher arms on the track laying units for independent vertical swinging movement, a rigidly constructed scraping unit disposed forwardly of the tractor, means articulately mounting the scraping unit on the front ends of the pusher arms, and power operated means for swinging the pusher arms longitudinally for raising, lowering and transversely tilting the scraping unit, and other means for retaining said scraper unit in its upright position on said pusher arms.

9. A material handling machine comprising a tractor including a body and a pair of track laying units disposed one at each of the opposite sides thereof and journaled behind their front ends to the body for independent vertical swinging movement, a pair of pusher arms disposed one at each of the opposite sides of the tractor, means articulately mounting the rear ends of the pusher arms on the track laying units for independent vertical swinging movement, a scraping unit disposed forwardly of the tractor, means articulately mounting the scraping unit on the front ends of the pusher arms, power operated means connected to the pusher arms and the scraping unit to retain the scraping unit in its upright position on the pusher arms and permit simultaneous swinging movement of the pusher arms in opposite directions in a vertical plane without affecting the upright position of the scraping unit, and means to control the operative and inoperative positions of the machine.

10. A material handling machine comprising a tractor including a body and a pair of track laying units disposed one at each of the opposite sides thereof and journaled behind their front ends on the body for independent vertical swinging movement, a pair of pusher arms disposed one at each of the opposite sides of the tractor, means articulately mounting the rear ends of the pusher arms on the track laying units, a scraping unit disposed forwardly of the tractor, means articulately mounting the scraping unit on the front ends of the pusher arms, other means connected to the pusher arms and the scraping unit to retain the latter in its upright position on the pusher arms and permit simultaneous swinging movement of the pusher arms in opposite directions in a vertical plane without affecting the upright position of the scraping unit, a cross beam disposed forwardly of the tractor behind the scraper, means articulately connecting the ends of the cross beam each to a pusher arm, and power operated means mounted on the track laying units and connected to the cross beam for raising, lowering and transversely tilting the scraping unit.

11. A material handling machine comprising a tractor including a body and a pair of track laying units disposed one at each of the opposite sides thereof and journaled behind their front ends on the body for independent vertical swinging movement, a pair of pusher arms disposed one at each of the opposite sides of the tractor, means articulately mounting the rear ends of the pusher arms on the track laying units, a scraping unit disposed forwardly of the tractor, means articulately mounting the scraping unit on the front ends of the pusher arms, a cross beam disposed forwardly of the tractor behind the scraping unit, means articulately connecting the ends of the cross beam each to a pusher arm, means articulately connected to the cross beam and the scraping unit to retain the latter in its upright position on the pusher arms and permit simultaneous swinging movement of the pusher arms in opposite directions in a vertical plane without affecting the upright position of the scraping unit, and power operated means mounted on the track laying units and connected to the cross beam and operable to raise, lower and transversely tilt the scraping unit.

12. The combination in a device of the class described, a pair of substantially spaced apart telescoping pusher arms adapted at their rear ends for pivotal connection to a tractor, a scraping unit disposed at the front ends of the pusher arms, means articulately mounting the scraping unit on the front ends of the pusher arms, other means connected to the pusher arms and the scraping unit to retain the scraping unit in its upright position on the pusher arms and permit simultaneous articulation of the pusher arms in opposite directions in a vertical plane without affecting the upright position of the scraping unit.

13. The combination in a device of the class described, a pusher frame comprising a pair of spaced apart telescoping pusher arms adapted at their rear ends for articulate connection to a tractor and adapted at their front ends for articulately supporting a scraper and a telescoping cross beam articulately connected at its opposite ends each to a pusher arm behind the front end.

14. The combination in a device of the class described, a pusher frame including a pair of spaced apart telescoping pusher arms each comprising a fixed section adapted at their rear ends for articulate connection to a tractor and a telescoping section adapted at their front ends for articulately supporting a scraper and a telescoping cross beam articulately connected at its opposite ends each to the front end of a fixed section.

15. The combination in a device of the class described, a pusher frame, a pair of spaced apart pusher arms each adapted at its rear end for pivotal connection to a tractor for independent swinging movement about a common axis, a scraping unit mounted on the front end of the pusher frame for back and forth rocking movement thereon, whereby the scraping unit tends to rock forwardly when disposed in scraping contact with the ground and subsequently to rock rearwardly when a predetermined load has accumulated, means connected to the pusher frame and the scraping unit to limit forward rocking movement, and means disposed between the pusher frame and the scraping unit to initially

restrain rearward rocking movement and subsequently permit rearward rocking movement when a predetermined load has accumulated, and power operated means in combination with the pusher frame whereby the pusher arms may be swung independently in a vertical plane without imparting torsional strain thereto for transversely tilting the pusher frame and the scraping unit.

16. The combination in a device of the character described comprising a tractor including a body and a pair of track laying units disposed one at each of the opposite sides thereof and journaled behind their front ends on the body for independent vertical swinging movement, a pair of pusher arms disposed one on each side of the tractor, means articulately mounting the rear ends of the pusher arms on the track laying units, a scraping unit articulately disposed at the front ends of the pusher arms, means in combination with the pusher arms and the scraping unit to maintain the scraping unit in an upright position while allowing simultaneously swinging movement of the pusher arms in opposite directions in a vertical plane without affecting the perpendicular position of the scraping unit and power means articulately connected with the pusher arms whereby the pusher arms may be swung independently in a vertical plane about a common axis for raising, lowering and transversely tilting the scraping unit.

17. A material handling machine comprising a tractor including a body and a pair of track laying units disposed one at each of the opposite sides thereof and journaled behind their front ends of the body for independent vertical swinging movement, a pair of pusher arms disposed one at each of the opposite sides of the tractor, a scraping unit disposed at the front ends of the pusher arms, said pusher arms being articulately mounted at their rear ends to the tractor for independent vertical swinging movement, a cross beam disposed forwardly of the tractor behind the scraper, means articulately connecting the ends of the cross beam each to a pusher arm and power operated means of the track laying units and connected to the cross beam for raising, lowering and transversely tilting the scraping unit without imparting torsional strain thereto and means articulately mounting the scraping unit on the front ends of the pusher arms whereby the pusher arms may swing independently in a vertical plane about the common axis and power operated means to swing the pusher arms for transverse tilting of the scraping unit.

18. A material handling machine comprising a tractor, pusher arms disposed one at each of the opposite sides of the tractor, means articulately mounting the rear ends of the pusher arms on the tractor, a cross beam disposed forwardly of the tractor, means articulately connecting the ends of the cross beam each to a pusher arm, a scraper unit disposed forwardly of the tractor, means articulately mounting the scraping unit on the front ends of the pusher arms, means articulately connected to the pusher arms and the scraping unit to retain the scraping unit in its upright position on the pusher arms, and power operated means mounted on the tractor and connected to the cross beam for raising and lowering the front end of the pusher arms and the scraping unit.

19. A material handling machine comprising a tractor, a pair of pusher arms disposed one at each of the opposite sides of the tractor, means articulately mounting the rear ends of the pusher arms on the tractor, a cross beam disposed forwardly of the tractor, means articulately connecting the ends of the cross beam each to a pusher arm, a scraping unit disposed forwardly of the tractor, means articulately mounting the scraping unit on the front ends of the pusher arms, means articulately connected to the cross beam and the scraping unit to retain the scraping unit in its upright position on the pusher arms, and power operated means mounted on the tractor and connected to the cross beam for raising and lowering the front ends of the pusher arms and the scraping unit.

20. The combination in a device of the class described, a pusher frame adapted at its rear end for pivotal connection to a tractor, a scraping unit articulately mounted on the front end of the pusher frame for back and forth rocking movement thereon, whereby the scraping unit tends to rock forwardly when disposed in scraping contact with the ground, subsequently rocking rearwardly when a predetermined load has accumulated, means connected to the pusher frame and the scraping unit to limit forward rocking movement, and power operated means mounted on the tractor and connected to the pusher frame for raising and lowering the front end of the pusher frame and the scraping element.

21. A material handling implement comprising a tractor including a body and track laying units disposed one at each of the opposite sides thereof and supporting the body from the ground, pusher arms disposed one at each of the opposite sides of the tractor and articulately mounted at their rear ends on the tractor, a cross beam disposed forwardly of the tractor, means articulately connecting the ends of the cross beam each to a pusher arm, a scraping unit disposed forwardly of the tractor, means articulately mounting the scraping unit on the front ends of the pusher arms, means connected to the pusher arms and the scraping unit to retain the scraping unit in its upright position on the pusher arms, a cantilever bracket disposed with each of the track laying units, means pivotally mounting the rear ends of the brackets on the track laying units, supporting links pivotally mounted on the track laying units adjacent the forward ends thereof, means pivotally supporting the forward end of said brackets on the upper end of said supporting links, and power operated means connecting the brackets and the cross beam for raising and lowering the front end of the pusher arms and the scraping unit.

22. A material handling machine comprising a tractor, a pair of track laying units connected therewith, a pair of pusher arms one disposed at each of the opposite sides of the tractor, means articulately mounting the rear ends of the pusher arms on said track laying units, a rigidly constructed scraping unit disposed forwardly of the tractor, means articulately mounting the scraping unit on the front ends of the pusher arms and power operated means for swinging the pusher arms in opposite directions in a vertical plane to transversely tilt the scraping unit, and other means for retaining said scraper unit in its upright position on said pusher arms.

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