July 22, 1941. E. R. BARRETT 2,250,289

MATERIAL EXCAVATING, LOADING, TRANSPORTING, AND PLACING MACHINE

Filed Oct. 1, 1938 5 Sheets-Sheet 1

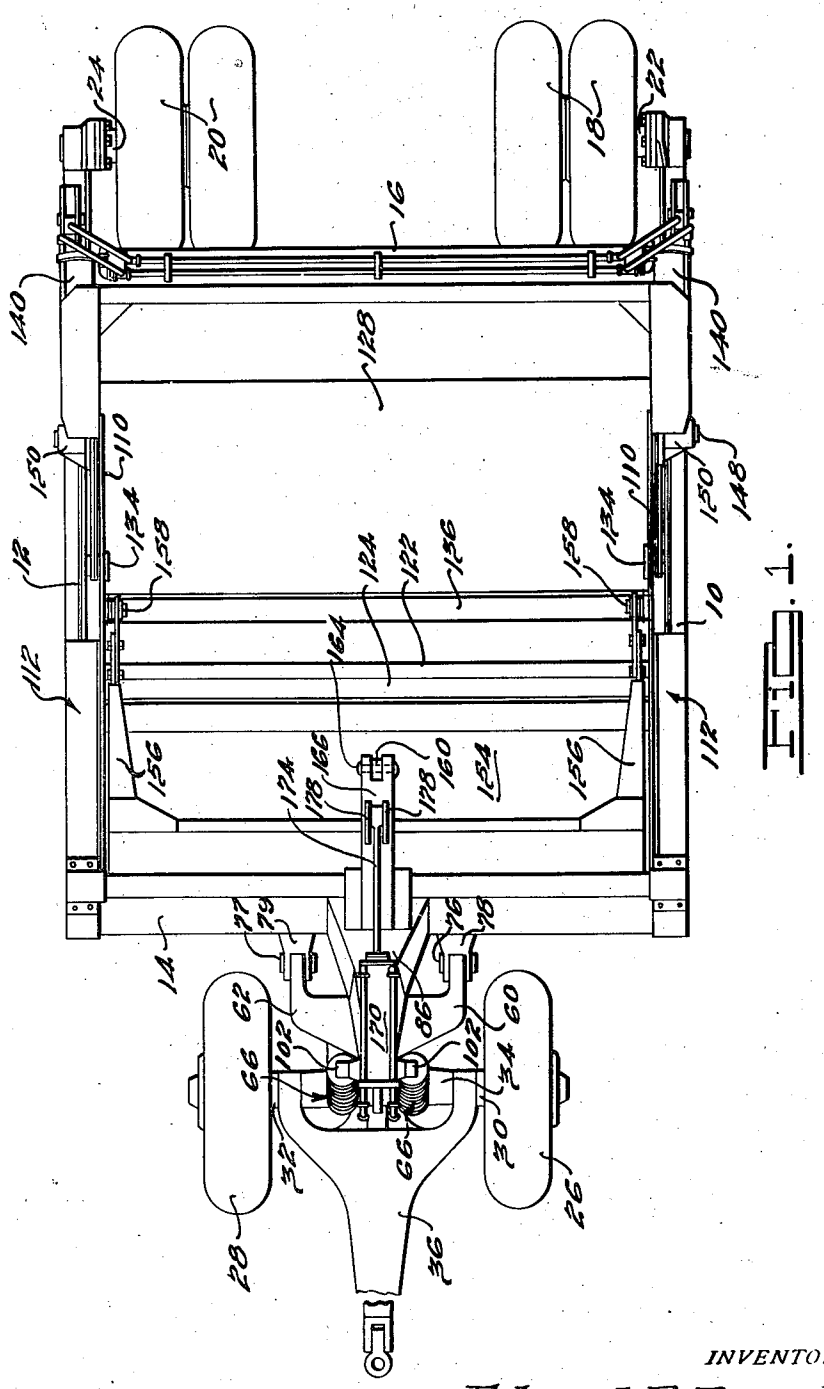


FIG. 1.

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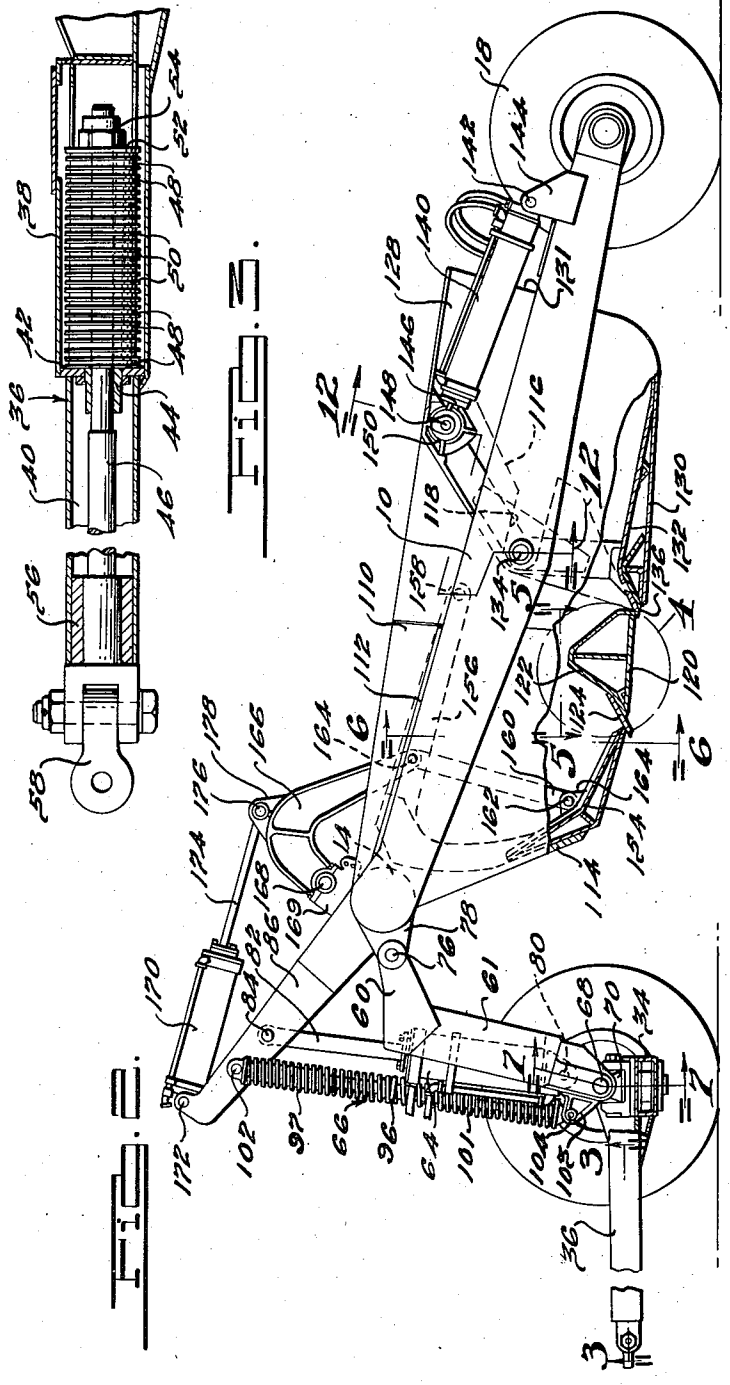


Fig. 2.

Fig. 3.

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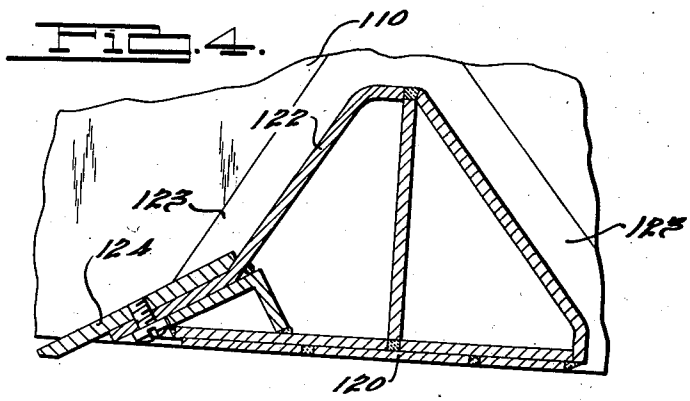


Fig. 4.

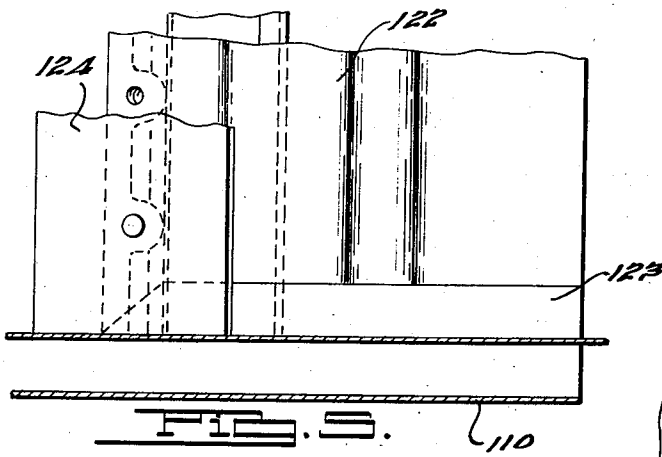


Fig. 5.

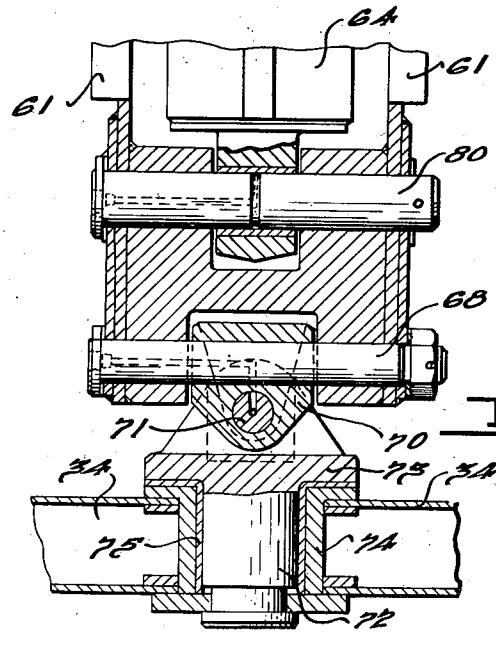


Fig. 7.

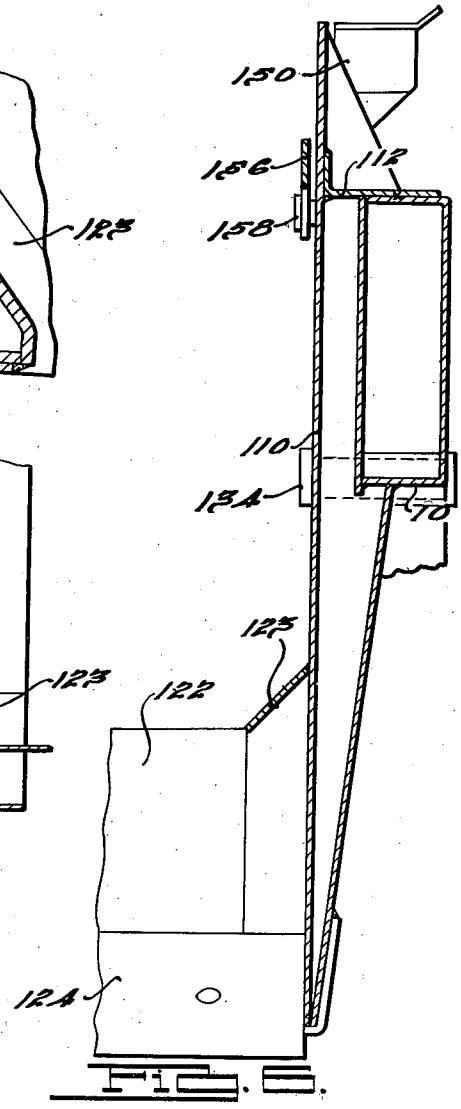


Fig. 6.

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Fig. 8.

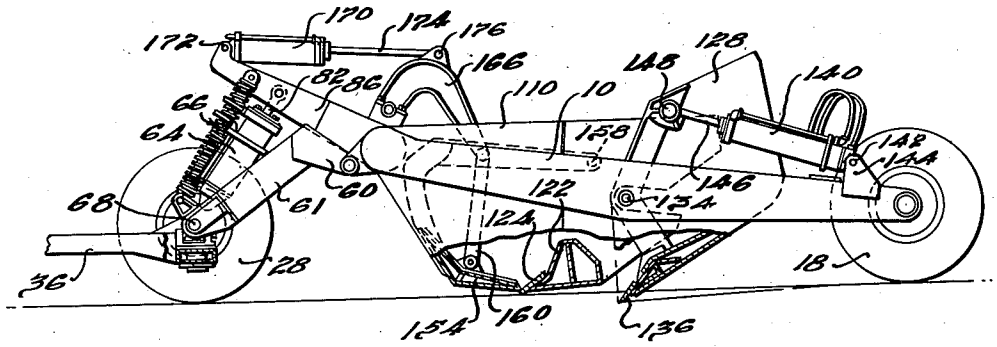


Fig. 9.

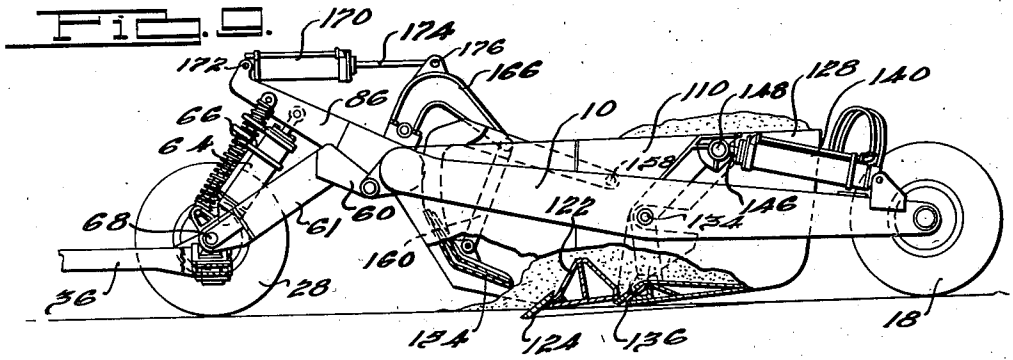
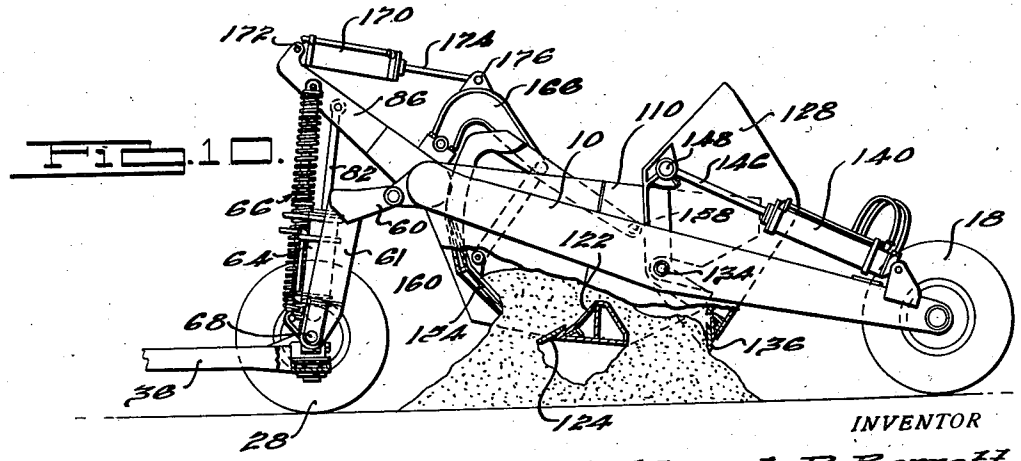


Fig. 10.



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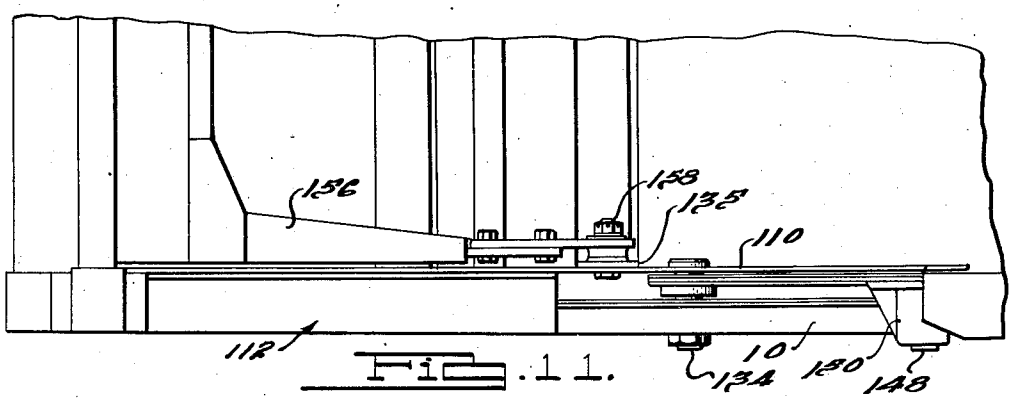


Fig. 11.

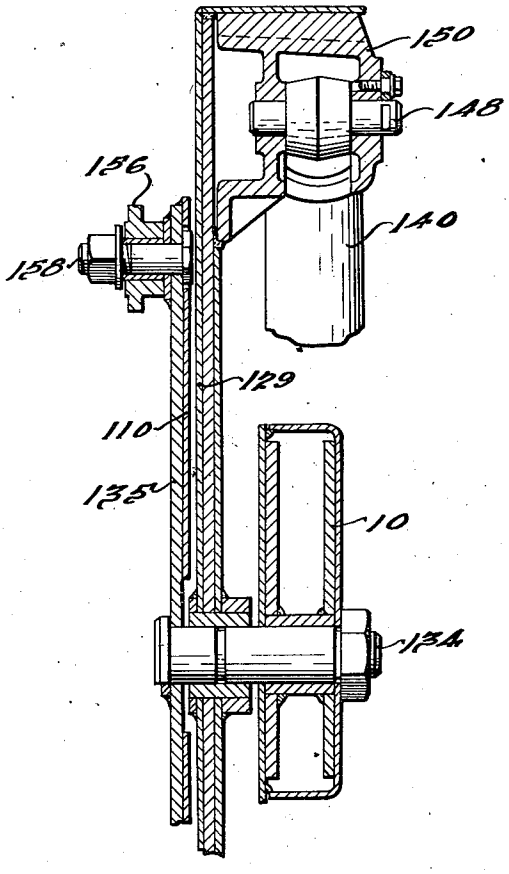


Fig. 12.

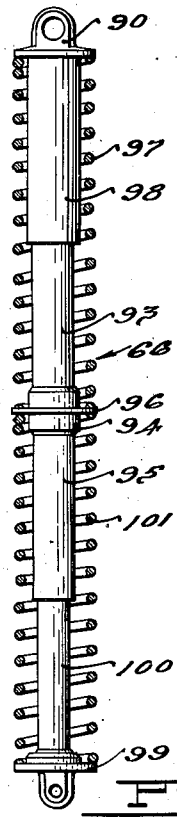


Fig. 13.

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Patented July 22, 1941 2,250,289

UNITED STATES PATENT OFFICE

2,250,289

MATERIAL EXCAVATING, LOADING, TRANSPORTING, AND PLACING MACHINE

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Application October 1, 1938, Serial No. 232,702

3 Claims. (Cl. 37—126)

This invention relates to improvements in scrapers and particularly relates to scrapers in which the scraper blade is associated with a dirt hauling scoop, arranged within a frame structure, which is utilized as a means for transporting the dirt graded or scraped from a surface.

Further, the present invention relates to the type of structure in which the scoop is pivotally connected directly to a main frame structure and is raised and lowered by an upward lifting and a lowering of the forward end of the frame, and in which the tilting of the scoop for filling, load hauling, and dumping is by a controlled adjustment about its supporting connection with the main frame.

The main objects of this invention are to provide a material excavating and transporting structure which will have a substantially greater capacity than heretofore; to provide a single bowl structure having a plurality of scraping blades so arranged that scraping and loading may take place successively at a plurality of points longitudinally of the receptacle; to provide a structure of greatly increased strength and rigidity than heretofore; to provide a structure in which the side wings are tied together by a hollow beam structure which serves as a mounting for one of the scraper blades, a baffle for facilitating the loading of material into the scoop, and as a strengthening member for resisting the stresses and strains to which a machine of this character is necessarily subjected.

A further object of the present invention is to provide an improved resilient connection between the scraper structure and the power means, such as a tractor, to which the scraper is attached so as to decrease the effect of shock on the machine parts, particularly when the digging blade encounters obstructions, such as rocks, and the like.

Other objects of the present invention will become apparent from the following specification, the drawings relating thereto, and from the claims hereinafter set forth.

In the drawings, in which like numerals are used to designate like parts in the several views throughout:

Figure 1 is a top plan view of a load hauling excavating machine embodying features of the present invention;

Fig. 2 is a side elevational view, with parts broken away showing parts in cross-section, of the structure illustrated in Fig. 1;

Fig. 3 is a fragmentary sectional view taken substantially along the line 3—3 of Fig. 2, looking in the direction indicated by the arrows;

Fig. 4 is an enlarged cross-sectional view illustrating the structure included in the broken circle 4 of Fig. 2;

Fig. 5 is a fragmentary, enlarged top plan view showing parts in cross-section taken substantially along the line 5—5 of Fig. 2, looking in the direction indicated by the arrows;

Fig. 6 is a fragmentary, cross-sectional view taken substantially along the line 6—6 of Fig. 2, looking in the direction indicated by the arrows;

Fig. 7 is a fragmentary cross-sectional view showing parts in elevation, taken substantially along the line 7—7 of Fig. 2;

Figs. 8 and 9 are side elevational views illustrating the parts in various positions of adjustment for performing the digging or excavating functions of the structure.

Fig. 10 is a side elevational view illustrating the position of the parts of the apparatus in dumping or unloading position;

Fig. 11 is an enlarged fragmentary top plan view of one side of the machine showing the details of construction, particularly of mounting the gate.

Fig. 12 is an enlarged fragmentary sectional view taken along the line 12—12 of Fig. 2, looking in the direction indicated by the arrows.

Fig. 13 is an enlarged view, partly in section and partly in elevation, of one of the spring units which aid in the support and movement of the front end of the structure.

Referring to the drawings, the main frame structure comprises longitudinal, opposite side beams 10 and 12 rigidly joined at their forward ends by a tubular cross beam 14, and joined adjacent their rear ends by a cross beam 16. Two sets of paired truck wheels 18 and 20 are mounted on horizontally and transversely aligned stub axles 22 and 24, respectively, which are fixed to the rear ends of the side beams 10 and 12, respectively, to support the rear end of the frame. The forward end of the frame is supported by a connection with a pair of steering wheels 26 and 28 mounted relatively close together on spindles 30 and 32, respectively, at opposite ends of a cross axle 34. A draw-bar 36, having a rearwardly directed yoke portion, is attached to the axle 34 for connection with a tractor or the like.

As shown particularly in Fig. 3, the draw-bar 36 is so constructed as to provide a resilient or shock absorbing connection between the scraper and a tractor to which it is attached, and includes a first housing portion 38 and a second

housing portion 40 fixed together to provide a unitary structure. A wall member 42 is fixed within the housing 38 adjacent its juncture with the housing 40 and has a substantially central opening therethrough within which a guide sleeve 44 is fixed. A draft rod 46 is disposed within the housings 38 and 40 and is slidable through the sleeve 44.

A plurality of disc members 48 of suitable resilient material, such as rubber, and having central openings therethrough, are slidably received over the inner end of the draft rod 46 and have interposed therebetween a plurality of metal disc members 50 which are also slidable on the draft rod 46. The resilient disc members 48 and the metal disc members 50 are arranged in alternate relationship to each other and are retained on the draft rod by means of a heavy washer 52 and a nut 54 which is threaded on the tip end of the draft rod 46. The disc members abut against the wall member 42 and are thus limited in their movement in that direction.

Another guide sleeve 56 is fixed within the housing 40 adjacent its forwardmost end and slidably receives therethrough the outer end of the draft rod 46. The exposed end of the draft rod 46 is enlarged and forms a shoulder that abuts against the forward end of the housing 40 to limit the inward movement of the draft rod. Outward movement of the draft rod 46 longitudinally of the housing members is permitted to the extent of compressibility of the resilient disc members 48. A removable, universal pivotal connection 58 is provided adjacent the forward end of the rod member 46 for removably and pivotally attaching the draw-bar 36 to a tractor, or the like.

The connection between the main frame and the axle 34 comprises a pair of arms 60 and 62 integrally secured to the upper end of a semi-cylindrical strut member 61, a hydraulic cylinder mechanism 64 and resilient connecting means generally designated 66. The strut member 61 is pivotally attached at its lower end by a horizontal pin 68 to a universal knuckle 70 which is pivoted on the medial part of a pin 71. The pin 71 is disposed at right angles to the pin 68 and is mounted at its ends in upright spaced arms of a fitting 73, which is centrally disposed of the axle 34. The fitting 73 includes a vertical king pin 72 which is pivotally mounted in a sleeve member 74 fixed to the axle member 34 centrally thereof. A bushing 75 of bearing material is interposed between the sleeve 74 and pin 72.

The arms 60 and 62 are angled rearwardly from the strut 61 and are pivotally attached by pivot pins 76 and 77, respectively, to ears 78 and 79, respectively, on the cross-beam 14 and are equally spaced at opposite sides of the media point of the beam, thus permitting these arms to swing in vertical planes only.

The hydraulic power mechanism 64 is pivotally mounted at its lower end on a cross-pin 80 which extends through a fitting welded into the lower end of the post 61. The power mechanism 64 includes a piston rod 82 which is pivotally attached at its outer upper end by a bolt 84 to a forwardly and upwardly directed extension 86 which is rigidly fixed to the cross-beam 14 substantially at its center.

The resilient connecting means 66 includes a pair of spring mechanisms or units, one disposed at each side of the forward extension 86. The spring units, which are both of the same construction, are shown and described in detail in the copending application of Jack B. Haile, filed August 10, 1938, Serial Number 224,131, and assigned to the assignee of the present invention.

A circular head or cap member 90 is pivoted to the extension 86 by a pin 102. A sleeve member 93 is integrally formed on one end of a collar 94, the other end of which is provided with a similar, oppositely extending, sleeve 95. The collar 94 has a radially extending, annular flange 96 integrally formed thereon, midway of its axial length, which serves as a seat for one end of a helical compression spring 97.

The other end of the spring 97 seats against the underside of the head member 90, and the spring is loosely guided by a sleeve 98 which is welded to the head 90. The outside diameter of the guide sleeve 98 is slightly less than the inside diameter of the spring convolutions.

A lower circular head member 99 is pivoted to the forwardly extending end of a bracket 103 by a pin 104, and has a concentrically positioned, axially extending, tube 100 rigidly welded thereto, which has sliding, telescoping fit within the sleeve 95. The head member 99 also serves as a seat for the lower end of a helical compression spring 101, the upper end of which seats against the underside of the flange 96. The springs 97 and 101 are of such strength and construction that they will support the machine when fully loaded, as will be hereinafter more fully explained.

By the application of a hydraulic medium to the mechanism 64, the piston rod 82 is extended from its retracted position, as shown in Fig. 9, to its extended position, as shown in Fig. 10. The strut 61 is thus swung from a rearwardly inclined position, as shown in Figs. 8 and 9, to a substantially vertical position, as shown in Fig. 10, to thereby elevate the forward end of the main frame.

The main body portion of the scraper includes a generally box-like scraping and carrying receptacle forming an intermediate section, a rear section, and a forward part. The intermediate section includes side wall members 110 which are fixed to the side beams 10 and 12 by means of angle members 112 which extend longitudinally of the side beam members for a portion of their lengths. A front wall member 114 interconnects the sides 110 adjacent the forward ends thereof and the rear end of the intermediate section is left open. The rear edges of the side members 110 are shaped, as indicated by the dotted lines 116, to provide a forwardly extending recess 118 in each of the sides.

A transversely extending bottom member 120 is disposed between and rigidly ties together the side wall members 110 intermediate the ends thereof. A transversely extending baffle member 122 is fixed to the top of the bottom member 120 and also connected to the side walls 110 by upwardly and outwardly inclined plate members 123, and has a substantially smooth upwardly and rearwardly inclined forward wall portion. The rear wall portion of the baffle member 122 slopes downwardly and rearwardly towards and is attached to the bottom member 120, thus forming a closed box section of substantially triangular cross section of great strength. A transversely extending scraper blade 124 is fixed to the forward leading edge of the baffle 122 adjacent the bottom thereof and is designed for the grading or scraping operation.

The adjustment of this blade relative to the ground is effected by the elevating and lowering of the main frame by actuation of the hydraulic

mechanism 64; and as the dirt passes upwardly over the blade 124, it is caused to pass upwardly over the smooth, rearwardly inclined surface of the baffle 122 and be disposed within the receptacle to the rear of the baffle. By the use of this upwardly and rearwardly inclined, smooth baffle, the capacity of the scraper is materially increased because in prior structures the capacity of such scrapers has been limited by the maximum angle which dirt, being forced upwardly over the outer surface of another pile of dirt, will assume. This angle is materially smaller than the angle of the inclined baffle 122, so that with the baffle 122 the capacity of the receptacle is materially increased.

The rear section of the receptacle is in the form of a scoop 128 which is of box-like form and which is suspended within the rearward part of the main frame. The scoop 128 comprises a bottom wall 130 having a plate member 132 disposed on the inner face thereof. The plate member 132 is upwardly and rearwardly inclined adjacent the leading lower edge of the bottom wall 130, and is downwardly and rearwardly inclined towards the rear of the scoop. This shape increases the capacity of the scoop in the same manner as the baffle 122 previously described. The scoop 128 also includes opposite side walls 129 and a back wall 131 leaving the scoop open at its forward end. The side walls 129 of the scoop overlap the side walls 110 to provide a communicating receptacle. The scoop 128 is suspended by means of pivot pins 134 which extend through the recesses 118 and are mounted, at their outer ends, in the side beams 10 and 12 at opposite sides of the scoop. The inner ends of the pins 134 are fixed in reinforcing plates 135 which are welded to the inner side of the walls 110 and 112. As mentioned above, the scoop opens forwardly and has fixed to its leading lower edge a grading or scraping blade 136.

The tilting of the scoop 128, for scraping or grading and for dumping its load, is under the control of a pair of hydraulic power cylinders 140 mounted longitudinally of the side beams 10 and 12 at opposite sides of the scoop. Each cylinder is pivotally mounted at its rear end by means of a pivot pin 142 to a bracket 144, which is fixed to its underlying side beam. The forward ends of the cylinders have piston rods 146 extending therefrom which are pivotally attached by pins 148 to brackets 150 fixed to opposite side walls 129 of the scoop at points substantially above the supporting pivots 134. Thus, by extending and retracting the piston rods, the scoop may be caused to pivot about the pivot pins 134 for adjustment to various positions, that is, for loading position, carrying position, and dumping position.

For closing the opening in the bottom forwardly of the scraper 124, an upwardly swinging gate 154 is provided. This gate is received between the side walls 110 and 112 adjacent the forward ends thereof. The gate 154 is pivotally mounted by means of rearwardly extending arms 156 at each side thereof, each of which is pivotally attached to its adjacent side wall 110 or 112 by means of pivot pins 158. The pins 158 also pass through the reinforcing plates 135, which add strength and rigidity to the side walls 110 and 112.

For raising the end gate 154 by pivoting it about the pivot pins 158, a link 160 is pivotally attached by pivot pin 162 to a bracket 164 fixed to the gate member 154 at substantially its transverse center. The link 160 extends upwardly within the receptacle and is pivotally attached by means of a pivot pin 164 to the lower rear end of a crank lever 166. Where it is desired to have a structure in which the gate may be closed by power, then the link 160 is rigid so as to withstand compression. However, where it is desirable to permit closing of the gate by gravity, then the link 160 may be provided with several links of chain or it may be a cable. The lever 166 is pivoted at 168 to a bracket 169 which in turn is fixed to the cross-member 14 at substantially its longitudinal midpoint. The rear lower edge of the gate is thus adapted to swing from and against the blade 124 as the gate 154 is swung about its pivots 158.

For actuating the gate between open and closed positions, there is provided an hydraulic cylinder 170 which is pivotally mounted at its forward end by a pivot pin 172 to the forward end of the extension 86. The cylinder 170 has the usual piston rod 174 extending rearwardly therefrom which is pivotally attached at 176 to a bracket 178, which is fixed to the lever 166. Upon retraction of the piston rod 174, the lever 166 is pulled upwardly about its pivot 168 and thus raises the link 160 upwardly and causes the gate 154 to move to its open position by pivoting about the pivot pins 158.

For a suitable control system for the hydraulic mechanisms disclosed, reference may be had to the patent to Barrett No. 2,203,939 in which the essential features of the control mechanism necessary for operating the hydraulic mechanisms disclosed in the present application are described in detail. By the structure above described a unitary receptacle is provided which is adapted to scrape at a plurality of points along its length, preferably in succession. This is accomplished by control of the hydraulic medium to the various cylinders so as to position the various parts of the mechanism for scrapping and/or transportation.

Referring to Figs. 8 to 10, the parts are illustrated in their various positions. In Fig. 8 the front end of the main frame is slightly raised by control of the hydraulic medium to the hydraulic mechanism 64 so that the cutting blade 124 is slightly raised above the ground level. The hydraulic mechanism 140 is actuated so as to pivot the scoop 128 so that the cutting blade 136 is in scraping position. As the scraper is drawn over the ground while the parts are in this position, the scraped dirt is caused to pass into the receptacle 128 over the scraping blade 136. When the scoop 138 has been substantially filled, it is pivotally rotated to its initial position by the hydraulic mechanism 140, as shown in Fig. 9, in which position the scraper blade 136 abuts against the rear lower edge of the transverse baffle member 122, thus closing the opening therebetween.

In Fig. 9, the parts are in such position that the forward end of the main frame is in its lowermost position. The scraping blade 124 is then in scraping position and as the receptacle is drawn over the ground, the blade 124 scrapes up the dirt which passes into the receptacle, upwardly, over the smooth, rearwardly inclined baffle member 122. The dirt is caused to pass over the baffle member into the rear of the receptacle until the rear thereof is filled, and when the entire scraper is filled, the gate 154 may be actuated by the hydraulic mechanism 170 to close the opening adjacent the scraper 124, or it may be allowed to close by gravity. At the same time, the hydraulic mechanism is actuated to raise the forward end of the frame to the

position shown in Fig. 10. The scraper may then be transported to a dumping location; and by then pivoting the gate 156 and the scoop 128 to the positions illustrated in Fig. 10, the load carried by the scraper may be dumped therefrom.

Formal changes may be made in the specific embodiment of the invention described without departing from the spirit and substance of the invention, the scope of which is commensurate with the appended claims.

What is claimed is:

1. A scraper structure comprising a rigid frame, means forming a transporting receptacle fixed to said frame, said means including a main body portion fixed with respect to said frame, a scoop pivotally mounted relative to the body portion at the rear thereof, and a swinging gate pivotally mounted relative to the body portion adjacent the front thereof, a transversely extending scraper element fixed to said scoop along the leading lower edge thereof, another transversely extending scraper element fixed to the main body portion adjacent the lower edge of said gate, and an upwardly and rearwardly inclined baffle member within the main body portion adjacent the bottom thereof extending transversely of said body portion immediately to the rear of said last named scraper element.

2. A scraper structure including side frames, side walls fixed to said side frames, a scoop pivotally mounted between said side frames, a scraper blade mounted on the forward leading edge of said scoop, a transverse member having an upwardly and rearwardly sloping front surface and a downwardly sloping rear surface fixed at its ends to and extending between said side walls forwardly of said scoop, a scraper blade mounted on the forward leading edge of said transverse member, said scoop scraper blade cooperating with the rear edge of said transverse member to retain material within said scoop, and a swinging gate cooperating with said transverse member scraper blade to retain material in said scoop.

3. A scraper structure comprising a rigid frame, means forming a transporting receptacle fixed to said frame, said means including a main body portion fixed with respect to said frame, a scoop pivotally mounted relative to the body portion at the rear thereof and a swinging gate pivotally mounted relative to the body portion adjacent the front thereof, a transversely extending scraper element fixed to said scoop along the leading lower edge thereof, another transversely extending scraper element fixed to the main body portion adjacent the lower edge of said gate, and an upwardly and rearwardly inclined baffle member within the main body portion adjacent thereof, extending transversely of the main body portion immediately to the rear of said last named scraper element, said baffle member being inclined at a greater angle with the horizontal than the angle of said last named scraper element.

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