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2,624,960

BOWL AND FRAME ADJUSTMENT FOR EARTH-MOVING SCRAPERS

Filed Sept. 27, 1946

4 Sheets-Sheet 1

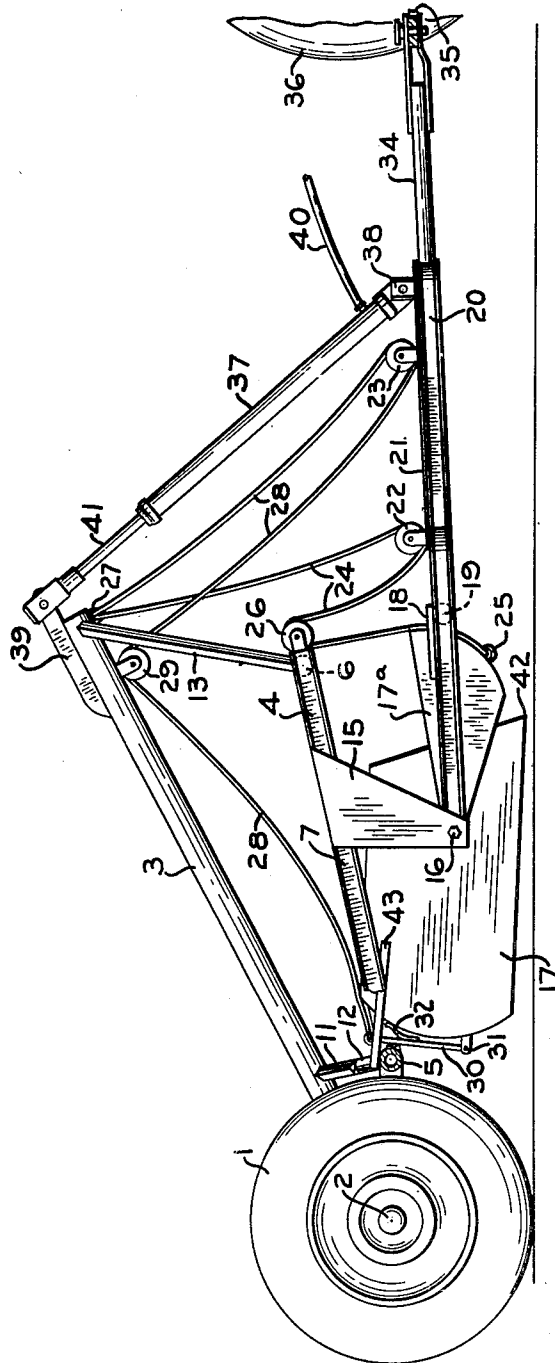


FIG-1

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4 Sheets-Sheet 2

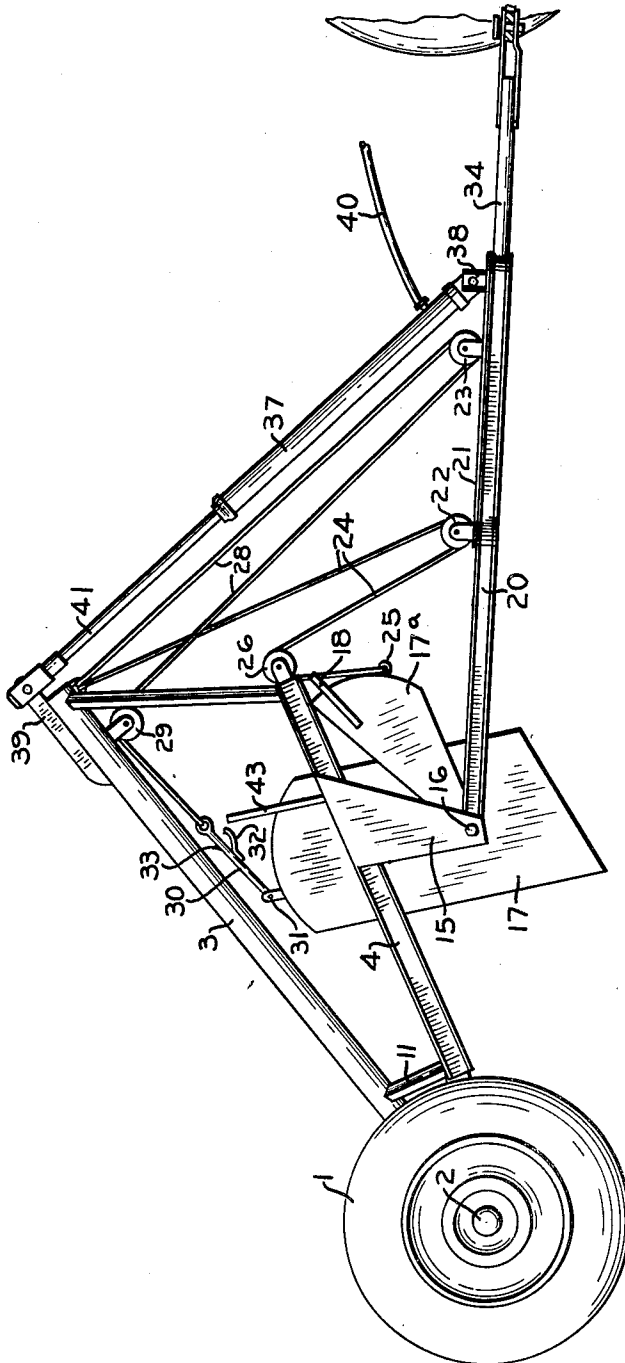


FIG. 2

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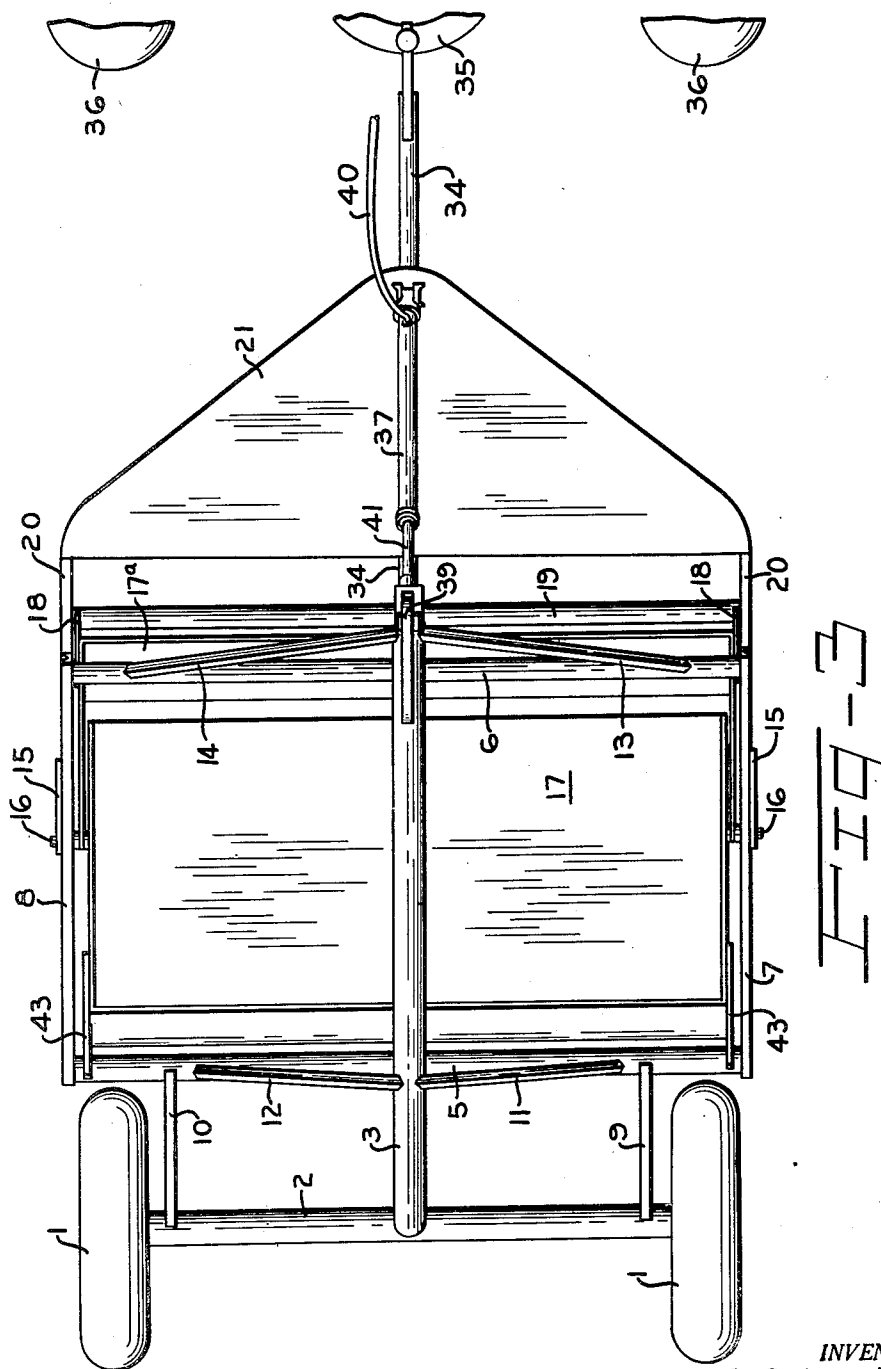
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4 Sheets-Sheet 3



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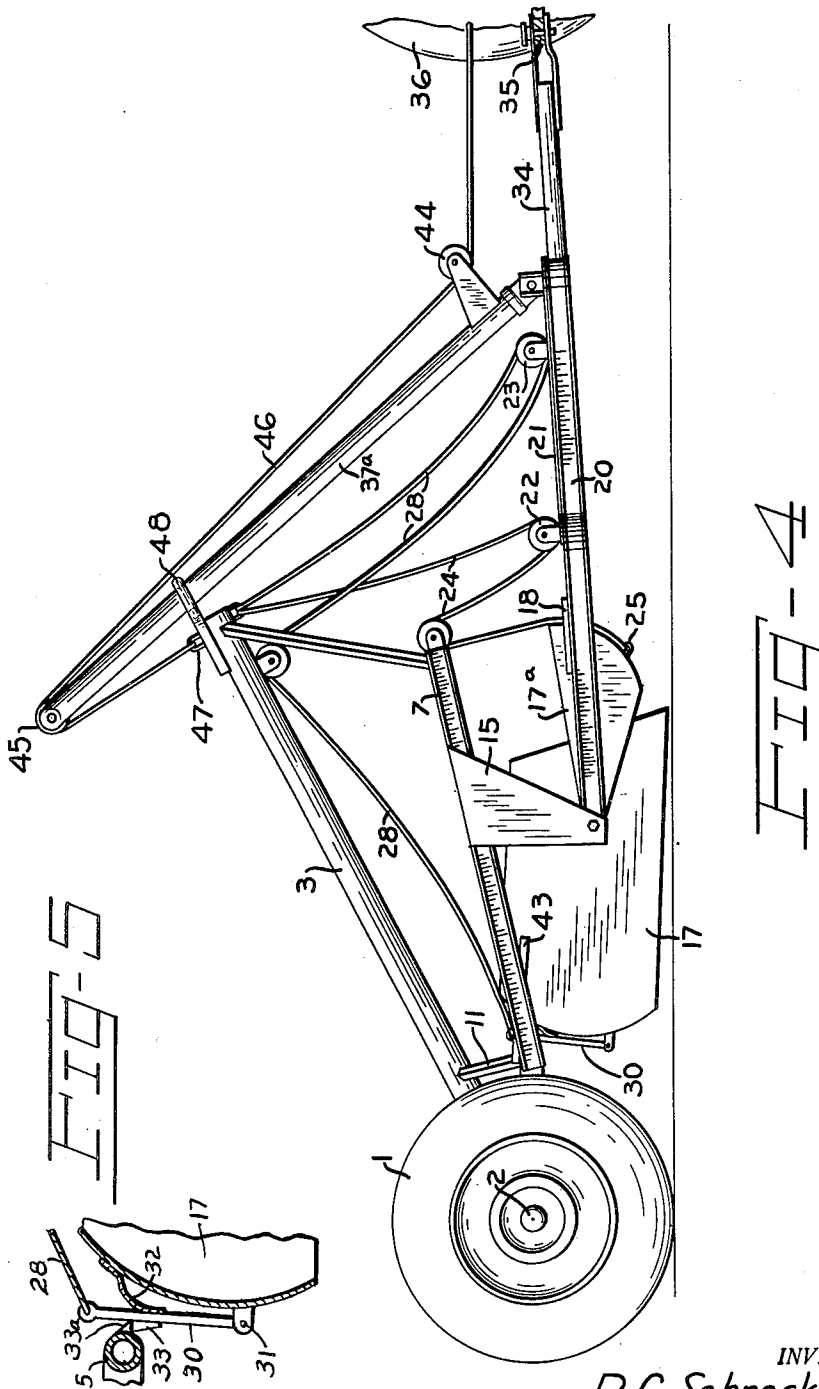
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BOWL AND FRAME ADJUSTMENT FOR EARTH-MOVING SCRAPERS

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4 Sheets-Sheet 4



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2,624,960

BOWL AND FRAME ADJUSTMENT FOR EARTH-MOVING SCRAPERS

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7 Claims. (Cl. 37-129)

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My present invention relates to apparatus for moving earth, stones, and other similar material from one location to another, and more particularly to apparatus for use in grading. Many patents have been granted on apparatus for the purpose indicated but all of these structures are subject to one objection or another, one of these objections being the extreme complication of the apparatus, another being expensive construction, and a third the lack of easy operation of the mechanism. It is therefore among the objects of this invention to provide a structure which is simple to make; to provide a structure which is easy to operate; to provide a structure of the type indicated in which the scraper pan can be let down to desired locations for loading, elevated to a position above the ground for transportation, and so constructed that it is easy to dump whereby to unload the scraper pan; to provide a structure which can be fabricated so as to be hydraulically operated, yet easily converted into a structure which can be mechanically operated; and such further objects, advantages, and capabilities as will hereafter appear and as are inherent in the construction disclosed herein. My invention further resides in the combination, construction, and arrangement of parts illustrated in the accompanying drawings and, while I have shown therein what is now regarded as the preferred embodiment of this invention, I desire the same to be understood as illustrative only and not to be interpreted in a limiting sense.

In the drawings annexed hereto and forming a part hereof,

Fig. 1 is a side elevation, partly broken away, of a structure embodying my present invention;

Fig. 2 is a side elevation of this structure in dumping position;

Fig. 3 is a plan view of this structure in the position shown in Fig. 1;

Fig. 4 is a view similar to Fig. 1, modified by the substitution of mechanical means for the hydraulic means of Fig. 1 for use in loading and unloading the scraper pan; and

Fig. 5 is a fragmentary detail view of the scraper pan latching means.

Broadly, this machine comprises a wheel-supported axle, a substantially rectangular frame secured thereto and extending forwardly therefrom, a rigid supporting member also connected to the axle and extending forwardly and upwardly therefrom, a scraper pan pivotally supported by and below the rectangular frame, a generally U-shaped frame overlapping the rec-

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tangular frame, pivotally connected thereto below the plane thereof, a tongue furnishing a means whereby the machine may be connected to a traction unit, and operating means whereby the two frames may be turned relatively to each other on their pivotal connection.

Reference will now be made in greater detail to the annexed drawings for a more complete description of this invention. A pair of wheels 1 support an axle 2 to which is rigidly connected a rigid or bracing support 3 and to which is also rigidly connected a substantially rectangular rigid frame 4 comprising the transverse beams 5 and 6 and the side frame members 7 and 8. The transverse beam 5 is connected by rigid connecting elements 9 and 10 to the axle 2, as shown in Fig. 3. This transverse beam 5 is also connected to the rigid support 3 by struts 11 and 12, while the forward transverse beam 6 is connected to the rigid support 3 by struts 13 and 14, thus forming a rigid, approximately pyramidal supporting structure of which the beam 6 and struts 13 and 14 constitute the base while the support 3 and the frame members 7 and 8 constitute the side edges. Of course this is only as it appears in Figures 1, 2, and 4, for it is clear from Fig. 3 that the side frame members 7 and 8 are parallel instead of coming together at a point.

To each of side frame members 7 and 8 is connected a bracket 15, preferably welded in place, and through the lower ends of these brackets 15 extend pivot members 16, projecting laterally from the side walls of the scraper pan 17. It is therefore clear that this scraper pan may turn on these pivot members in order to dump the contents thereof when it is desired to empty the pan. Also connected to the pivot members 16 is an apron 17a which may drop down, relatively to the pan, as the pan starts to rise, so as to form a closure for the front end of the pan to prevent inadvertent spilling of the load from the pan. Stops or arms 18, secured to the sides of the apron 17a reach forwardly to engage and rest on the transverse beam 19 connecting the sides of the generally U-shaped frame 20. A rigid plate 21, as shown most clearly in Fig. 3, covers the front end of this frame and serves as a support for the pulleys 22 and 23.

This U-shaped frame 20 is pivotally connected to the brackets 15 by the pivot members 16 and it will therefore be obvious that the frames 4 and 20, the pan 17, the apron 17a, and the brackets 15 may have relative pivotal movement in a vertical direction. As stated above, the

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apron 17a is stopped in its pivotal motion in one direction by the transverse beam 19 and the stops or arms 18. Pivotal motion in the opposite direction is caused by the flexible member 24 which may be a cable, rope, chain, or the like. This flexible member is connected, as shown at 25, to the lower portion of the apron 17a and passes from here over a pulley 26, mounted at the middle of the transverse beam 6. From here the cable passes through the pulley 22 and up to a securing means 27 fastened to the rigid support 3.

Another flexible member 28 has one end secured to the fastening means 27, from which it passes downwardly and forwardly through the pulley 23 mounted on the plate 21, thence upwardly and rearwardly to the pulley 29, mounted on the rigid support 3, and thence to the latching member or lever 30, pivotally connected at 31 to the back of the scraper pan 17. The latching member 30 has a spring 32 attached to one side thereof and a holding lug 33 projecting from the opposite side. As shown in Fig. 1, the spring 32 engages the back of the scraper pan 17 and forces the holding lug 33 into engagement with a cooperating lug 33a on the transverse beam 5 to hold the scraper pan against inadvertent tipping during the process of loading. However, when the flexible member 28 is tightened sufficiently, the lever 30 is pulled forwardly, releasing the lug 33 from the cooperating lug on the transverse beam 5. This will be apparent from Fig. 1.

As shown at 34 in Fig. 1, there is provided a tongue whereby this machine may be attached to a draft unit 35 of a traction unit, represented fragmentarily at 35 by parts of the rear wheels thereof. The tongue 34 is connected at its rear end to the transverse beam 19 and at its forward end portion to the U-shaped frame 25. A lifting means, shown in Figs. 1, 2, and 3 as a hydraulic means 37, and in Fig. 4 as a mechanical means 37a, is connected to brackets 38 located at the forward corner of the plate 21 and, at its upper end, as shown in Figs. 1, 2, and 3, to a bracket 39 projecting forwardly from the rigid support 3. A suitable hose 40 is connected to the lower end of the lifting means 37 and, at its other end, to a suitable source of hydraulic pressure.

It will therefore be clear that, as the pressure is admitted through the hose 40 into the cylinder of the lifting means 37, the piston of the latter, connected to the lower end of the piston rod 41, will be forced upwardly, raising the support 3 and turning it about the axis of the axle 2. Since this support is connected by struts 13 and 14 to the transverse beam 6, and the latter to the side frame members 7 and 8, the rectangular frame 4 will be raised, taking up the slack in the flexible member 24. This takes place because the pulley 26 rises more rapidly than the pulley 22. After the slack in flexible member 24 has been removed, further upward movement of the rigid support 3 will result in the apron 17a being raised. However, before that takes place, the scraper pan 17 will have been raised so that the front edge 42 thereof will be in substantial engagement with the lower corner of the apron 17a. As a result of this, the load in the pan 17 will be prevented from running out of the front edge of the scraper pan 17. It is clear that as the member 3 rises the slack will be taken out of the flexible member 28. As this is taking place, the brackets 15 and pivots 16 rise and, when the front edge 42 of the scraper

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pan 17 reaches a predetermined point, approximately nine inches (9") above the ground, the flexible member or cable 28 pulls the lever 30, bending the spring 32 sufficiently to release the holding lug 33 from the cooperating lug on the transverse beam 5 (see Fig. 1). When this takes place, further upward movement of the rigid member 3 causes turning of the scraper pan 17 about its pivot members 16, with subsequent dumping of the contents of the pan. When the rigid member 3 is again permitted to lower, the pan 17 returns toward the position shown in Fig. 1, from that shown in Fig. 2, and the stops 43 engage, at their rear ends, with the transverse beam 5, thus limiting the turning movement of the scraper pan 17. By lowering the rigid support 3 still farther, the edge 42 of the scraper pan 17 will be brought into contact with the ground and forward movement of the machine will cause loading of the pan. It is clear from the drawings that the stops 43 are secured to the upper rear portions of the scraper pan 17. The position shown in Fig. 1 is between a digging and a carrying or transporting position, while that shown in Fig. 2 is the unloading or dumping position.

In the structure of Fig. 4, the means 37a is a rigid member which is non-extensible in length, having a pulley 44 mounted near its forward end and a pulley 45 at its rearward end. A flexible member 46 is connected to an eye 47 at the forward end of the rigid member 3 and passes around the pulleys 45 and 44 to a winding means on a traction unit, typified in these drawings by wheels 36. This serves as a means for raising and lowering the rigid member 3 and the parts connected thereto, including the scraper pan 17 and the U-shaped frame 25. A loop 48 projecting forwardly from the rigid support 3 and around the means 37a prevents relative movement of members 3 and 37a.

In this specification and the appended claims, the word "beam" is used in a broad sense to denote a pipe, rod, shaft, or other rigid member.

There is no difference in principle of operation of the two structures shown in these drawings, the only difference being in the particular means for raising and lowering the scraper pan.

The elements 28, 37, 37a, 41, and 46 are means acting between the frames 4 and 20 to adjust them about the axle 2 and the pivots 16.

It is of course understood that the specific description of structure set forth above may be departed from without departing from the spirit of my invention as disclosed herein and as defined in the appended claims.

Having now described my invention, I claim:

1. In an earth mover of the type specified, for operation by a traction unit, a wheel-supported axle, a rigid frame attached to the axle and extending forwardly therefrom, a rigid member connected to the axle and extending forwardly above the frame, struts connecting the rigid member and the frame, brackets connected to the frame and extending downwardly therefrom, a scraper pan pivotally connected to the brackets to be turned about the pivots whereby to dump the pan, a roughly U-shaped frame having the ends of its arms pivotally connected to the pivots of the brackets, a flexible element connected at one end to the rear of the pan, at its other end to the rigid member, and intermediate to the U-shaped frame, and means for causing the frames

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to turn relatively about the pivots connecting the brackets and the U-shaped frame.

2. In an earth mover of the type specified, a wheel-supported axle, an approximately central, rigid support extending forwardly and upwardly from the axle to which it is rigidly secured adjacent its rear end, a transverse beam substantially parallel to the axle, secured thereto and located forwardly therefrom, struts connecting the rear portion of said beam to the rigid support, side frame members extending forwardly from the transverse beam and attached thereto at their rear end portions, a second transverse beam connecting the forward end portions of the side frame members, said rigid support extending forwardly and upwardly above the plane of said side frame members, upwardly and laterally inwardly converging struts connecting the second transverse beam and the forward end portion of the rigid support to complete a rigid frame, brackets extending downwardly from the side frame members and having pivot members mounted in their lower portions, a scraper pan, from the sides of which said pivots project laterally and support the pan from the brackets, pivotally, a spring-actuated latching member mounted on the rear wall of the pan, said latching member having a latching abutment, a latching abutment projecting from the first transverse beam into the path of the first latching abutment, means for raising the forward end of the rigid support, and means for disengaging the abutments and tilting the pan about its pivots after the forward end of the rigid support has been raised a normally fixed but adjustable distance.

3. An earth mover for attachment to a tractor unit, comprising a wheel-supporting axle, a rigid frame attached thereto and extending forwardly therefrom, brackets extending downwardly from the frame at opposite sides thereof for attachment to a scraper pan for support thereof, a tongue for attachment to the tractor unit, a scraper pan pivotally connected to said brackets, a roughly U-shaped frame rigidly connected to said tongue and having the rearward ends of its arms connected to the downwardly extending brackets, said tongue and U-shaped frame extending rearwardly beneath the forward portion of said rigid frame, upper frame means connected to the axle and extending upwardly and forwardly to a point above the forward edge of the pan, force-exerting supporting means connecting the upper forward portion of the upper frame means to the forward portion of the U-shaped frame, and flexible means connecting the U-shaped frame and the rear portion of the scraper pan and reacting against said upper frame means relative to said U-shaped frame for tilting the pan about its pivotal connection to the brackets when the upper frame means is raised relative to said U-shaped frame.

4. In an earth mover for attachment to a traction unit, having a wheel-supported axle; a rigid frame attached to the axle and extending forwardly therefrom, brackets extending downwardly from the frame at opposite sides thereof for attachment to a scraper pan and for support thereof, a tongue for attachment to the traction unit, a scraper pan pivotally connected to said brackets, rigid supporting means extending from said axle to a point above the forward end of the rigid frame, braces connecting the rigid frame and the supporting means, a roughly U-shaped frame connected to said tongue intermediate its ends and having the rearward ends of its arms

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connected to the downwardly extending brackets, said tongue and U-shaped frame extending rearwardly beneath the forward portion of said rigid frame, an extensible lifting means acting between the forward end of the U-shaped frame and the forward portion of the rigid supporting means to lift the rigid frame relatively to the U-shaped frame, and flexible means connecting the rigid supporting means, the tongue, and the rear portion of the scraper pan and functioning to tilt the pan about its pivotal connection to the brackets when the rigid frame is raised, said extensible lifting means being connected with the supporting means for causing lifting of the adjacent end of the frame to raise the pan away from the ground and cause dumping thereof, when the pan is raised beyond a certain point.

5. In combination, in an earth mover of the type indicated, a wheel-supported axle, an approximately rectangular frame connected at its rear end to said axle, a rigid frame member connected at its rear end to said axle and positioned approximately centrally above and extending longitudinally of the machine and making an acute angle with the plane of the said frame, said rigid frame member extending upwardly and forwardly from its connection with the axle to a point above the approximately rectangular frame, the forward end of said rigid frame member being positioned approximately centrally, laterally of the machine, above the forward portion of said rectangular frame, struts connecting said frame to the forward end portion of the rigid frame member to hold the parts rigid with relation to each other, a second frame having two arms, means for supporting the forward end of the second frame, means pivotally connecting the rear portions of said arms with said rectangular frame so as to enable the two frames to turn relatively to each other, about the pivotal connections, when the forward end of the rectangular frame is raised, and actuating means reacting between the rigid frame member and the second frame to relatively adjust the frames about their pivotal connections and cause lifting of the forward end of the rigid member.

6. An earth mover for attachment to a traction unit, comprising a wheel-supporting axle, a rigid frame attached thereto and extending forwardly therefrom, a supporting frame above the rigid frame, brackets extending downwardly from the rigid frame at opposite sides thereof for attachment to a scraper pan and for support thereof, a scraper pan pivotally connected to said brackets, a tongue for attachment to the traction unit, a roughly U-shaped frame connected to said tongue and having the rearward ends of its arms pivotally connected to the downwardly extending brackets, said tongue and U-shaped frame extending rearwardly beneath the forward portion of said rigid frame, means acting between the supporting frame and the forward portion of the U-shaped frame to relatively adjust the frames about their pivotal connection, and flexible means connecting the frames and the rear portion of the scraper pan and functioning to tilt the pan about its pivotal connection to the brackets when the frames are raised, the flexible means being connected at one end to the rear end of the pan, at its second end to the forward end of the supporting frame, and at intermediate points to the forward portion of the U-shaped frame and the forward portion of the supporting frame, whereby to cause dumping of the scraper pan as the means acting between the sup-

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porting frame and the U-shaped frame causes lifting thereof.

7. In an earth mover of the type specified, for operation by a traction unit, a wheel-supported axle, a rigid frame attached to the axle and extending forwardly therefrom, a rigid member connected to the axle and extending forwardly above and approximately centrally relative to the rigid frame, struts connecting the rigid member and the rigid frame, forwardly and rearwardly of the frame, brackets connected to the rigid frame and extending downwardly therefrom, a scraper pan pivotally connected to the brackets to be turned about the pivots whereby to dump the pan, an approximately U-shaped frame having the ends of its arms pivotally connected to said rigid frame, means acting between the forward portions of said rigid member and said U-shaped frame for causing the frame to turn relatively to each other about the pivotal connection between the U-shaped frame and the rigid

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frame, and motion-transmitting means connected with said U-shaped frame and said rigid member, and acting against said scraper pan for swinging the latter downwardly when said frames are raised.

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