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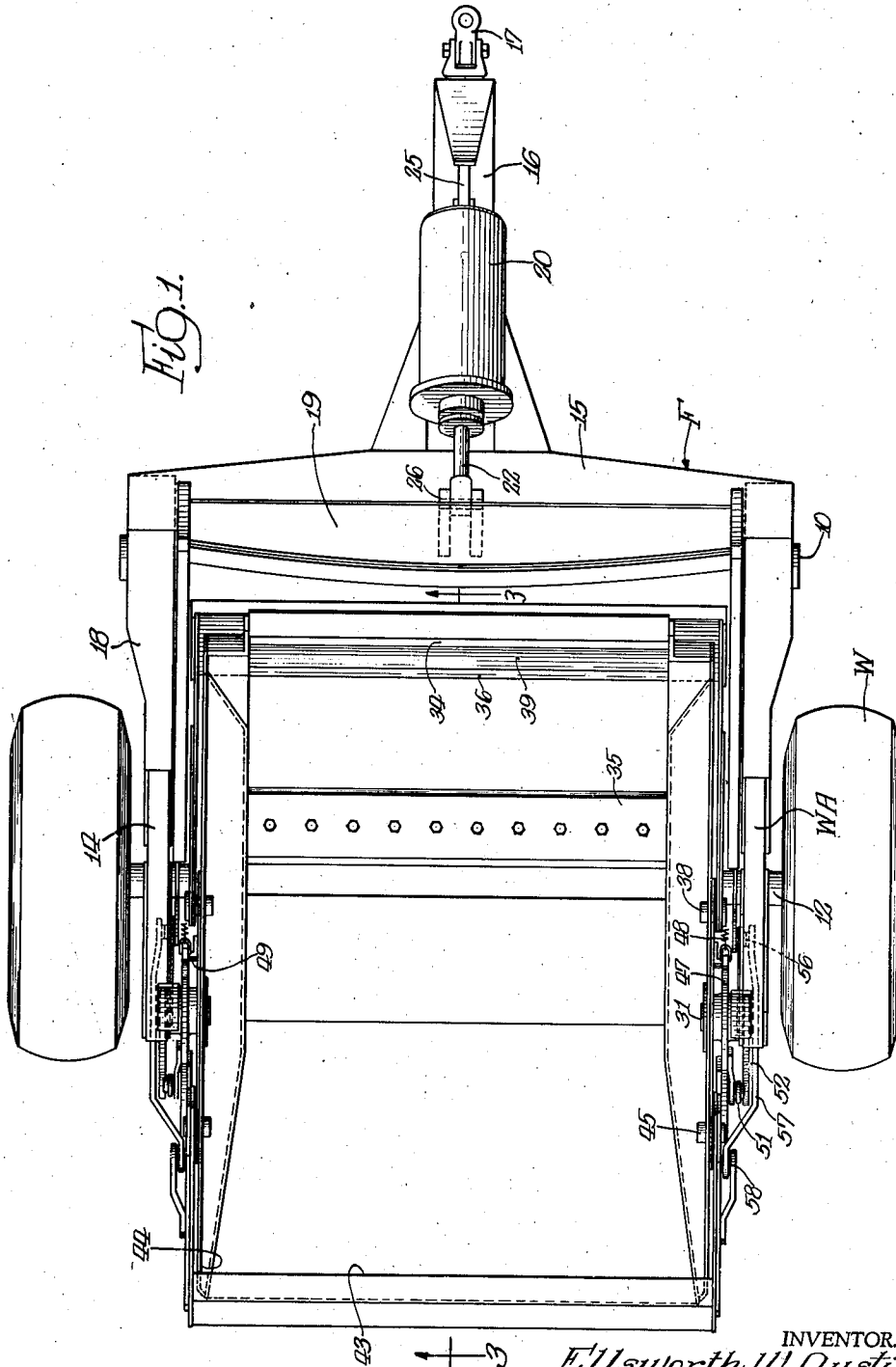
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2,215,026

EARTH MOVING DEVICE

Filed Feb. 13, 1939

3 Sheets-Sheet 1



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Sept. 17, 1940.

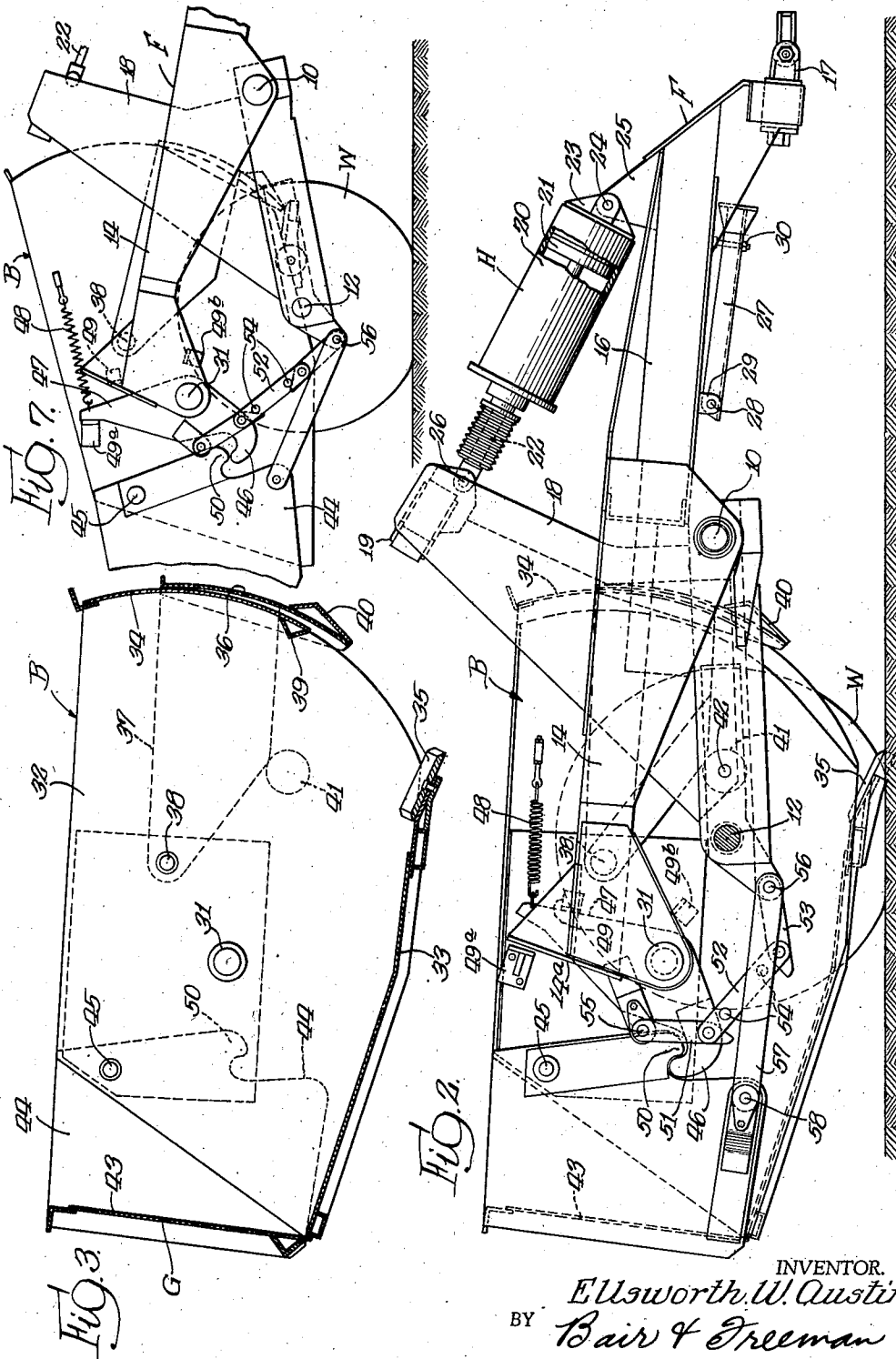
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EARTH MOVING DEVICE

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3 Sheets-Sheet 2



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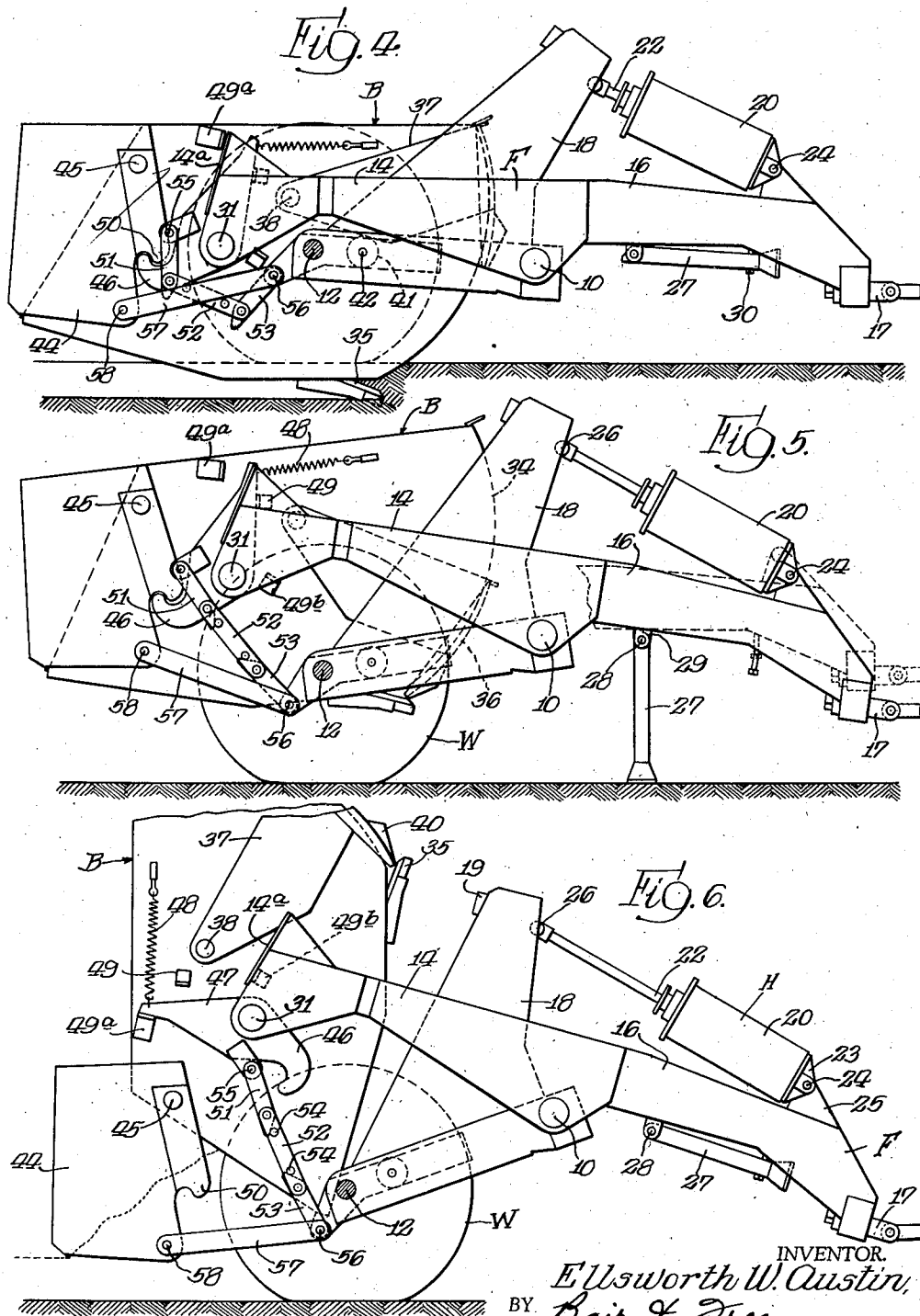
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3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

2,215,026

EARTH MOVING DEVICE

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Application February 13, 1939, Serial No. 256,164

18 Claims. (Cl. 37—133)

An object of my present invention is to provide an earth moving device of the scraper and carrier type wherein a wheel mounted frame is adapted to be drawn behind a tractor and to perform digging, carrying and dumping operations.

A further object is to provide an earth mover of the scraper type in which the scraper is arranged to dump at the rear and in the carrying position has a relatively high ground clearance and therefore a high dumping position making it possible to dump over a bank immediately behind the wheels.

Another object is to provide a simple arrangement of gate for the rear of the bowl which can be swung open for dumping operations and which is normally retained in latched position by latches that are spring-urged to the latched position, toggle link arrangements being provided for releasing the latches and for subsequently tipping the bowl to dumping position.

Another object is to provide a bowl which has a front apron adapted to open for digging operations and to close for carrying operations, there being a novel construction of bowl to prevent binding of the dirt against the apron and such construction consisting of a partial front wall arranged at the top of the bowl only and against which the earth may fall instead of frictionally engaging the apron.

Still another object is to provide a scraper in which a main frame is pivoted to wheel arms, there being a hydraulic extension unit operable to spread the wheel arms relative to the frame and thereby effect relative movement of the bowl to its various positions for dumping, carrying and digging earth.

Still another object is to provide a simple and inexpensive gate releasing and dumping mechanism consisting of toggle links connected with the latches for the rear gate and stops provided on the bowl with which the latches engage for the purpose of moving the bowl to dumping position after the latches are released, link connections being provided between the wheel arms of the earth moving device and the rear gate for the purpose of limiting the opening of the gate to a spreading position and for returning the gate to latched position as the bowl is lowered from dumping to the carrying position.

Still another object is to provide a supporting leg pivoted to the frame of the device in such manner that as the frame is adjusted relative to the wheel arms the front end of the frame carrying a coupler to be connected with the trac-

tor or the like is raised or lowered as desired for proper alignment of the coupler with the draw bar of the tractor, thus facilitating connection of the earth moving device to the tractor.

With these and other objects in view my invention consists in the construction, arrangement and combination of the various parts of my device whereby the objects contemplated are attained, as hereinafter more fully set forth, pointed out in my claims and illustrated in the accompanying drawings. Although the invention is susceptible of a variety of embodiments, it is unnecessary to fully describe and illustrate more than one in order to give a full understanding of the invention both from its structural and functional standpoints. Accordingly, I have illustrated a preferred and desirable embodiment of the invention in the accompanying drawings, in which:

Figure 1 is a plan view of an earth moving device embodying my invention;

Figure 2 is a side elevation thereof showing the machine in position just engaging the earth for digging operation;

Figure 3 is a sectional view on the line 3—3 of Figure 1 showing particularly the bowl together with its rear gate and front apron;

Figure 4 is a diagrammatic view showing the machine in digging position;

Figure 5 is a similar diagrammatic view showing the machine in position for carrying earth, and showing a supporting leg in supporting position;

Figure 6 is a similar diagrammatic view showing the machine in dumping position, and

Figure 7 is a similar diagrammatic view showing the position of the parts as they are returning toward carrying and digging positions.

On the accompanying drawings I have used the reference character F to indicate generally a frame and WA to indicate wheel arms pivoted thereto. The pivotal connections are indicated at 10. Journaled on stub shafts 12 extending from the wheel arms WA are the supporting wheels W for the earth moving device.

The frame F is yoke-shaped with its two arms indicated at 14, a cross member indicated at 15 and a forwardly extending portion indicated at 16. The portion 16 terminates in a coupler 17 for connection with the draw bar of a tractor (not shown). Each wheel arm WA has an extension 18, the upper ends of which are connected by a cross bar 19.

A hydraulic extension unit H is provided in

the form of a cylinder 20, a piston 21 and a piston rod 22. The cylinder 20 has ears 23 pivoted at 24 to a bracket 25. The bracket 25 is carried by the forward extension 16 of the frame F. The piston rod 22 is pivoted at 26 to the cross member 19 of the wheel arms.

A supporting leg 27 is pivoted at 28 to the frame F. The pivot pin 28 is supported by ears 29 secured to the forward extension 16 of the frame. The supporting leg 27 may be held in raised position by a bolt 30 or lowered to the position of Figure 5 when it is desirable to uncouple the earth moving device from the tractor.

From the construction of my earth moving device as thus far described it will be obvious that extension or contraction of the hydraulic unit H will spread or move relatively toward each other the wheel arms WA and the frame F. The spreading movement is shown progressively in Figures 4, 5 and 6. Accordingly as illustrated in Figure 5 by dotted lines the coupler 17 can be raised if necessary to align the coupler with the draw bar of the tractor. Therefore, the hydraulic unit H together with the supporting leg 27 form a convenient and readily operable means to enable one man to couple the earth moving device with the tractor and uncouple it therefrom.

I provide a bowl B having pivot studs 31 for pivotal mounting of the bowl relative to the rearwardly extending arms 14 of the frame F. The bowl B comprises side walls 32, a bottom wall 33 and a partial front wall 34. A digging blade 35 is secured to the lower front edge of the bottom wall 33 and the bottom wall, it will be noted, slants upwardly and rearwardly therefrom. This is to provide maximum clearance in the earth carrying position of Figure 5 and to provide a relatively high position for the lower rear edge of the bowl as it swings from the position of Figure 5 to the dumping position of Figure 6, thus enabling the operator to dump earth over a bank behind the wheels W.

A front apron 36 is provided with side plates 37 pivoted at 38 to the bowl B. The wall 34 as well as the apron 36 are curved substantially on a radius from the pivot 38. The lower edge of the bowl 34 is reinforced by an angle bar 39 while the lower edge of the apron 36 is reinforced by an angle bar 40.

The lower edges of the side plates 37 act as cam surfaces for coaction with rollers 41 which are journaled on studs 42 of the wheel arms WA. The coaction between the plates 37 and the rollers 41 is for the purpose of automatically controlling the position of the apron 36, as will hereinafter appear.

A rear gate G is provided for the bowl B and comprises a rear wall 43 and side walls 44. The walls 44 are pivoted at 45 adjacent the upper rear corners of the bowl B and overlap the sides 32 of the bowl to some extent, as shown by dotted lines in Figure 3.

Latches 46 are pivoted on the studs 31 and have extensions 47 with which springs 48 are connected. It is understood, of course, that there is a latch 46 for each side of the bowl B together with its attendant extension 47 and spring 48, as well as other parts that will now be described.

Stops 49 are provided on the bowl B for the extensions 47 under the bias of the springs 48. The latches 46 are adapted to normally engage hooks 50 on the gate G as shown in Figures 2, 4 and 5.

A toggle link connection is provided between each latch 46 and the wheel arms WA. The toggle links are formed in three sections indicated at 51, 52 and 53. The link 52 is provided with stop pins 54 which serve to limit extension of the toggle link, as shown in Figures 5 and 6, but permit contraction or collapse thereof as shown in Figures 2 and 4, when the pivot points 55 and 56 for the toggle links are brought closer together than the total length of the links.

There are also link connections 57 between the pivot pins 56 and pivot pins 58, which latter are mounted on the gate G. The links 57 serve to prevent excessive opening of the gate G and to return the gate to latched position at the proper time during the cycle of operation of the device.

Practical operation

In the operation of my earth moving device the hydraulic unit H may be contracted from the position shown in Figure 2 to the position shown in Figure 4 for the purpose of swinging the frame F toward the wheels W and thereby lowering the frame so that the blade 35 digs into the earth and the earth fills the bowl B as the machine is advanced. Stops 49a on the bowl engage stop plates 14a on the frame 14 to limit the downward tipping of the bowl during the filling operation. It will be noted in Figure 2 (same position also shown in Figure 3) that the side plates 37 are in engagement with the rollers 41 and therefore the apron 36 is elevated to permit entrance of the earth. The apron is further elevated in the Figure 4 position.

After the bowl has been suitably filled the hydraulic unit H is extended to the position of Figure 5 for raising the frame and thereby the bowl to a carrying position with the bowl well elevated above the ground. As the bowl is raised the side plates 37 of the apron 36 are also raised, thus permitting the apron to be closed by gravity and assume fully closed position prior to the Figure 5 position being reached. The front wall 34 of the bowl B partially holds the earth so that there is not excessive friction of the earth on the apron to prevent its proper closing. The wall 34 therefore performs an important function in the operation of the device.

When the Figure 5 position is reached, the links 51, 52 and 53 have been extended to their limit so that any further movement of the frame F away from the wheel arms WA will swing the latches 46 to unlatched position so that the gate G is thereby released for dumping. Such a position is shown in Figure 7 and it will be noted that the latch extension 47 has just engaged the stop 49a on the bowl B. Accordingly any further elevation of the bowl will result in the links 51, 52 and 53 effecting a turning movement on the bowl about the pivot 31. This will tip the bowl to dumping position as shown in Figure 6, this position being the extreme limit of movement because of stops 49b on the bowl engaging the stop plates 14a of the frame F.

In the dumping position of Figure 6 it will be noted that the links 57 retain the gate G against excessive rearward swinging movement and hold the gate in position for spreading the material being dumped. As the bowl is again lowered, for instance to the position shown in Figure 7, the links 57 pull the gate closed and cause its hooks 50 to engage the latches 46 and swing them against the bias of the springs 48 to latched position.

My structure provides a simple means to normally retain the rear gate latched and insure that no tipping of the bowl will occur until after the gate has been unlatched. Such insurance results from using the links 51, 52 and 53 as a common means to unlatch the gate and tip the bowl. The dumping arrangement is such that I secure good ground clearance for the bowl and am able to dump the bowl from a rearward position which permits the earth to roll down over a bank at the rear of the wheels. Although the bowl is carried in a relatively high position during the carrying operation, the gate G moves downwardly to a relatively low spreading position as shown in Figure 6, when the bowl is elevated to its maximum dumping position.

The partial front wall 34 aids materially in improving the performance of the apron 36 by preventing excessive friction of the earth thereagainst. By the use of the supporting leg 27 I have provided a very convenient and readily operable means to aid the operator in aligning the coupler with the draw bar of the tractor when coupling and uncoupling the machine relative to the tractor.

Having described one specific embodiment of my invention together with the operation thereof, I desire it to be understood that this form is selected merely for the purpose of facilitating disclosure of the invention rather than for the purpose of limiting the number of forms which it may assume. It is to be further understood that various modifications, adaptations and alterations may be applied to the specific form disclosed to meet the requirements of practice without in any manner departing from the spirit and scope of the present invention except set forth in the claims appended hereto.

I claim as my invention and desire to secure by Letters Patent of the United States:

1. In an earth moving device, a frame, wheel arms pivoted thereto, wheels carried by said wheel arms, means for spreading said wheel arms relative to said frame to elevate the frame relative to said wheels, a bowl pivotally mounted on said frame and comprising a bottom, a pair of side walls and a front wall, said front wall being arranged adjacent the top only of said side walls to provide space thereunder for earth to enter said bowl, a gate at the rear of said bowl and pivoted thereto adjacent the upper rear corners thereof, pivoted latches for said gate, means biasing said latches to latched position for normally retaining said gate closed relative to said bowl, common means for releasing said latches and tipping said bowl comprising collapsible elements connected with said latches at points spaced from their pivotal axes and with said wheel arms, said elements effecting pivoting and thereby unlatching of said latches against the action of said biasing means upon spreading of said wheel arms relative to said frame to a predetermined position, stops on said bowl for said latches to engage whereupon further spreading action effects tipping of said bowl to dumping position and connections between said wheel arms and said gate to return said gate to closed position upon movement of said frame toward said wheel arms.

2. In an earth moving device, a frame, wheels for supporting said frame, said wheels being movable relative thereto, means for elevating said frame relative to said wheels, a bowl pivotally mounted on said frame, a gate at the rear of said bowl and pivoted thereto at the upper rear corners thereof, movable latches for said gate,

means biasing said latches to latched position for normally retaining said gate closed relative to said bowl, common means for releasing said latches and tipping said bowl comprising collapsible elements operatively connected with said latches and wheels, said elements effecting movement and thereby unlatching of said latches against the action of said biasing means upon movement of said frame relative to said wheels to a predetermined position relative thereto and stops on said bowl for said latches to engage whereupon further movement of said frame relative to said wheels effects tipping of said bowl to dumping position.

3. In an earth moving device, a frame, wheels carrying said frame and adjustable relative thereto, means for elevating said frame relative to said wheels, a bowl pivotally mounted on said frame, a gate pivoted to the rear of said bowl, latches for said gate, means biasing said latches to latched position for normally retaining said gate closed relative to said bowl, means for releasing said latches and tipping said bowl comprising elements connected with said latches and operatively with said wheel to effect unlatching of said latches against the action of said biasing means upon initial elevation of said frame to a predetermined position, stops on said bowl for said latches to engage whereupon further elevation of said frame effects tipping of said bowl to dumping position and means to return said gate to closed position upon return of said frame from elevated position.

4. In an earth moving device, a frame, wheels adjustable relative to and supporting said frame, means for elevating said frame relative to said wheels, a bowl pivotally mounted on said frame and including a bottom and a pair of side walls, a gate at the rear of said bowl and operable relative thereto, movable latches for said gate, said latches being carried by said bowl, means biasing said latches to latched position for normally retaining said gate closed relative to said bowl and means for moving and thereby releasing said latches against the action of said biasing means upon elevation of said frame and bowl to a predetermined position relative to said wheels, said last means comprising operative connections between said latches and said wheels.

5. In an earth moving device, a frame, wheel arms pivoted thereto, wheels carried by said wheel arms at points spaced from the pivotal axes thereof, means for spreading said wheel arms relative to said frame to elevate the frame relative to said wheels, a bowl pivotally mounted on said frame, an openable gate at the rear of said bowl, means for normally retaining said gate closed relative to said bowl and common means for releasing said last means and tipping said bowl comprising connecting elements between said wheel arms and said retaining means, said connecting elements, upon initial spreading of said wheel arms relative to said frame effecting release of said retaining means, and, upon further spreading thereof, cooperating with said bowl to swing it about its pivotal mounting on said frame.

6. In an earth moving device, a frame, wheel arms pivoted thereto, wheels carried by said wheel arms at points spaced from the pivotal axes thereof, means for spreading said wheel arms relative to said frame to elevate the frame relative to said wheels, a bowl pivotally mounted on said frame, an openable gate at the rear of said bowl, means for normally retaining said

gate closed relative to said bowl and common means for releasing said gate retaining means and tipping said bowl comprising elements connected with said wheel arms and with said gate retaining means and stops on said bowl to be engaged by said gate retaining means, said gate retaining means being operated by spreading of said frame relative to said wheel arms to a predetermined position and engaging said stops to effect the tipping of said bowl to dumping position by further spreading movement thereof.

7. An earth moving device comprising a frame, wheel arms pivoted thereto, wheels journaled on said wheel arms, a hydraulic extension unit connected between said frame and said wheel arms to spread the wheel arms relative to the frame, a bowl pivotally mounted on said frame and including a bottom, a pair of side walls and a curved front wall, said bowl having space under said front wall for the entrance of earth to said bowl, a front apron curved to follow the curvature of said front wall and pivoted to said bowl for movement to a position forming a downward extension of said front wall when the bowl is elevated from digging position to carrying position, said apron having means of engagement with said wheel arms to elevate the apron to open the bowl as the bowl is moved downwardly to digging position, a gate at the rear of said bowl and pivoted thereby to whereby the lower edge of the gate may swing rearwardly for dumping earth from the rear of the bowl, latches for said gate, means biasing said latches to latched position for normally retaining said gate closed relative to said bowl, common means for releasing said latches and tipping said bowl comprising connections between said wheel arms and said latches, said connections effecting unlatching of said latches against the action of said biasing means upon movement of said wheel arms by said hydraulic extension means to a predetermined distance from said frame, stops on said bowl for said latches to engage whereupon further movement of said frame away from said wheel arms effects tipping of said bowl to dumping position and link connections between said wheel arms and said gate to return said gate to closed position upon movement of said frame toward said wheel arms.

8. An earth moving device comprising a wheel mounted frame, a bowl mounted on said frame and movable relative to the wheels thereof, said bowl including a bottom, a pair of side walls and a curved front wall, said front wall being arranged adjacent the top only of said side walls to provide space under the front wall for the entrance of earth to said bowl, a front apron curved to follow the curvature of said front wall and pivoted to said bowl for movement to a position forming a downward extension of said front wall when the bowl is moved from digging position to carrying position, a gate at the rear of said bowl and pivoted thereto whereby the lower edge of the gate may swing rearwardly for dumping earth from the rear of the bowl, means for normally retaining said gate closed relative to said bowl, said retaining means being mounted on said bowl for limited movement relative thereto, link means connected with said retaining means to initially release it and, after reaching its limit of movement, tipping said bowl to dumping position, and second link means connected with said gate, both of said link means being operatively connected with said wheels and operated successively by movement of said wheels relative to said bowl frame.

9. An earth moving device comprising a frame, wheel arms pivoted thereto, wheels journaled on said wheel arms, means to spread said wheel arms relative to said frame, a bowl pivotally mounted on said frame, a gate at the rear of said bowl and movable relative thereto to an open position for dumping earth from the rear of the bowl, latches for said gate, means for normally retaining said latches in latched position, common means for releasing said latches and for tipping said bowl through the medium of said latches, said bowl having stops engaged by said latches after they are unlatched to effect such tipping of the bowl by continued movement of the latches beyond unlatched position and link connections between said wheel arms and said gate to return said gate to closed position and relatch said latches upon movement of said frame toward said wheel arms.

10. In an earth moving device, a frame, a bowl pivotally mounted on said frame, a gate for one end of said bowl and pivoted thereto for dumping earth from the bowl when the gate is open, latches for said gate, means biasing said latches to latched position and common means for first releasing said latches and then causing them to engage and tip said bowl to dumping position.

11. An earth mover of the character disclosed comprising a wheel mounted frame, a bowl pivotally mounted relative thereto and adapted in different positions of pivotal movement to dig earth, carry it elevated above the ground surface and dump the earth from the rear of the bowl, a gate for the rear of the bowl, said gate being pivoted to the bowl, latches for normally retaining said gate in closed position and common means for releasing said latches and thereafter tipping said bowl from carrying to dumping position by engagement of said latches with said bowl with said rear gate swung open on its pivot connections to the bowl.

12. In an earth mover, a wheel mounted frame, a bowl pivotally mounted thereon and adapted in different positions of pivotal movement to dig, carry and dump earth therefrom, a gate for the bowl, said gate being openable relative to the bowl, latches for normally retaining said gate in closed position and means connected with said latches for releasing them and thereafter tipping said bowl from carrying to dumping position, said bowl having an abutment engaged by the latches to effect the movement of the bowl from carrying position to dumping position.

13. An earth mover of the character disclosed comprising a wheel mounted frame, a bowl pivotally mounted thereon and adapted in different positions of pivotal movement to dig earth, carry it elevated above the ground surface and dump the earth from the bowl, a gate pivoted to said bowl, latches for normally retaining said gate in closed position, common means for releasing said latches and thereafter engaging said latches with said bowl to tip it from carrying to dumping position with said rear gate swung open on its pivot connections to the bowl and links connected with said gate to limit the opening thereof and return the gate to closed position upon return of the bowl from dumping to carrying position.

14. An earth mover of the character disclosed comprising a wheel mounted frame, a bowl pivotally mounted thereon and adapted in different positions of pivotal movement to dig earth, carry it elevated above the ground surface and dump the earth from the rear of the bowl,

a gate for the rear of the bowl, said gate being pivoted to the bowl, latches for normally retaining said gate in closed position and common means for releasing said latches and thereafter engaging said latches with said bowl to tip it from carrying to dumping position with said rear gate swung open on its pivot connections to the bowl, said gate having link connection with said wheel mounted frame to limit the opening of the gate to a spreading position and to return the gate to closed position as the bowl is moved from dumping to carrying position.

15. An earth mover of the character disclosed comprising a frame, wheel arms pivoted thereto, a bowl pivotally mounted on said frame, a gate for said bowl, said gate being pivoted thereto, latches for normally retaining said gate in closed position, common means for releasing said latches and thereafter engaging said latches with said bowl and tipping the bowl from carrying to dumping position with said rear gate swung open on its pivot connections to the bowl, said gate having link connection with said wheel arms to limit the opening of the gate to a spreading position and to return the gate to closed position as the bowl is moved from dumping to carrying position.

16. In an earth moving device of the character disclosed, a frame, wheel arms pivoted thereto, wheels journaled on said wheel arms, means for spreading said wheel arms relative to said frame to elevate the frame relative to said wheels, a bowl pivotally mounted on said frame for movement to digging, carrying and dumping positions by movement of said frame relative to said wheel arms, a coupler carried by the front end of said frame for attachment to a tractor or the like, a supporting leg pivoted to said frame intermediate said wheels and coupler and adapted to assume a position parallel there-

to or a supporting position extending downwardly therefrom, the pivotal connection being spaced from the pivot of said frame to said wheel arms whereby relative movement between said frame and wheel arms effects raising or lowering of said coupler when said supporting leg is in supporting position to facilitate coupling thereof to the tractor.

17. In an earth moving device, a frame, wheel arms pivoted thereto, wheels journaled on said wheel arms, means for spreading said wheel arms relative to said frame to elevate the frame relative to said wheels, a coupler carried by one end of said frame for attachment to a tractor or the like, a supporting leg pivoted to said frame intermediate said wheels and coupler and adapted to assume a supporting position extending downwardly therefrom, the pivotal connection being spaced from the pivot of said frame to said wheel arms whereby relative movement between said frame and wheel arms effects raising or lowering of said coupler to facilitate coupling thereof to the tractor.

18. In an earth moving device of the character disclosed, a frame, wheels adjustable relative to and carrying said frame, means for moving said frame to elevate it relative to said wheels, a bowl pivotally mounted on said frame for movement to digging, carrying and dumping positions by such movement of said frame relative to said wheels, a coupler carried by said frame for attachment to a tractor or the like, a supporting leg mounted on said frame at a point between said wheels and coupler and extending downwardly from said frame, relative movement between said frame and wheels effecting raising or lowering of said coupler with said supporting leg serving as a pivot therefor to facilitate coupling thereof to the tractor.

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