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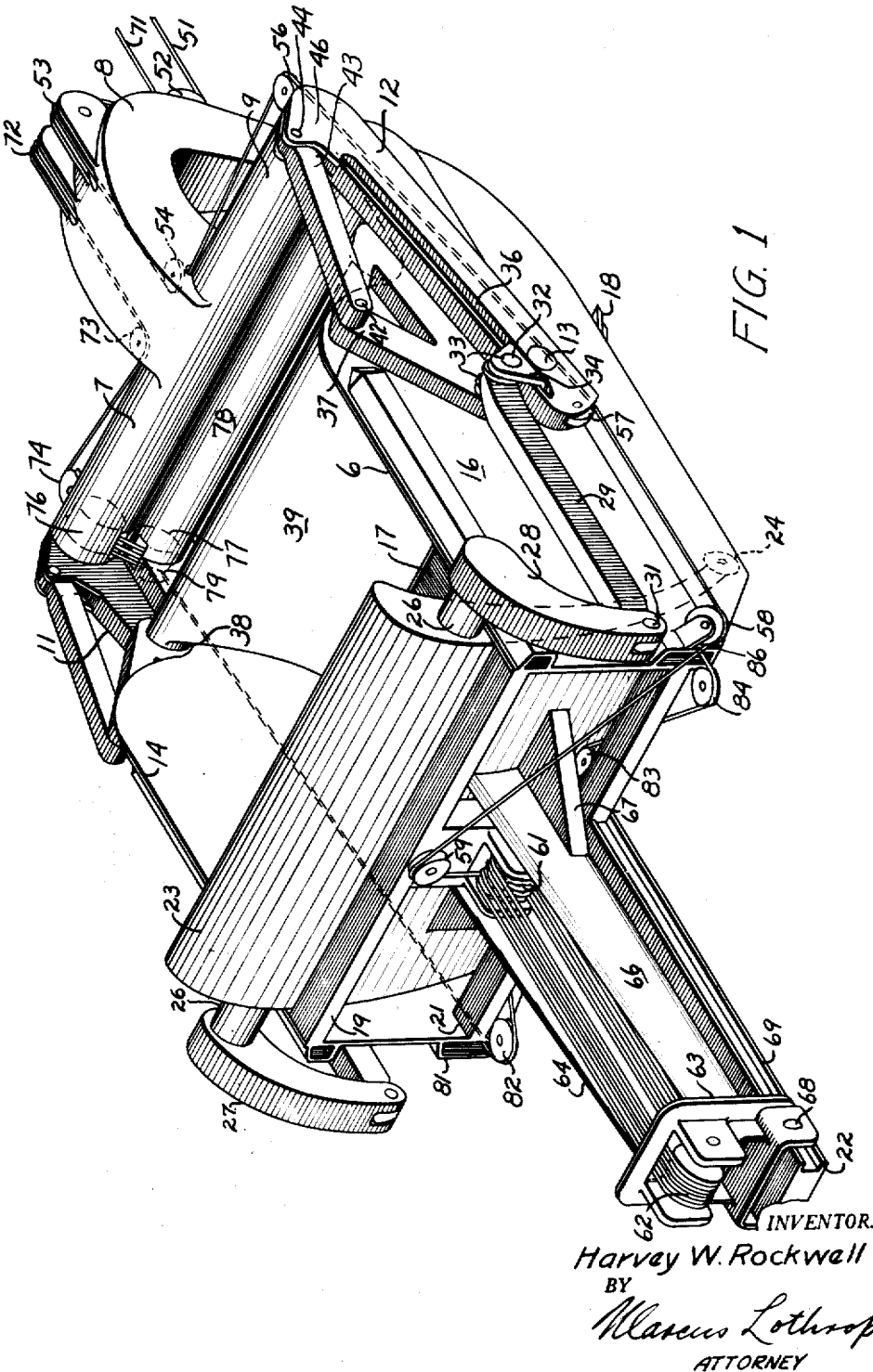
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2,394,483

EARTH MOVER

Filed May 26, 1943

2 Sheets-Sheet 1



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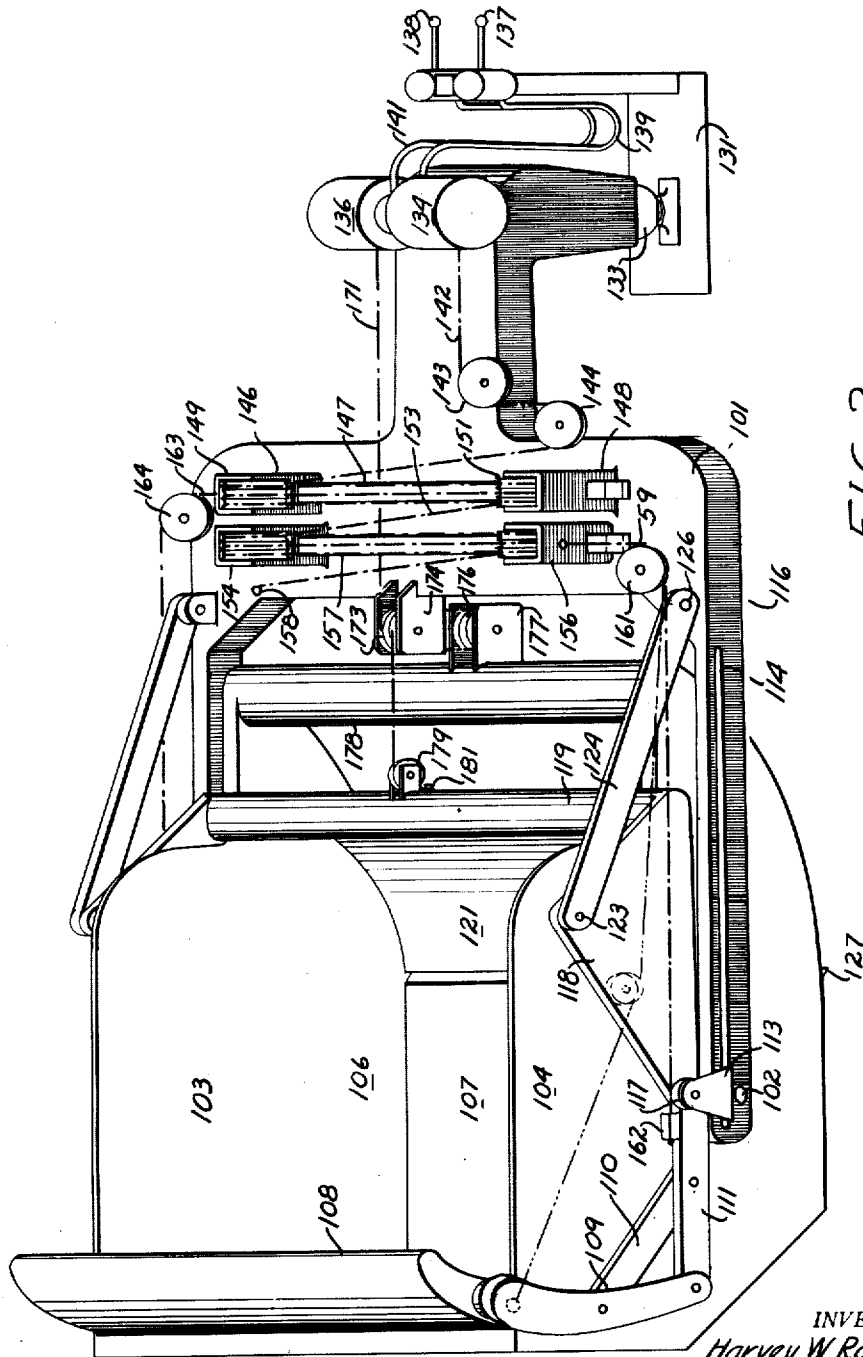


FIG. 2

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2,394,483

EARTH MOVER

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Application May 26, 1943, Serial No. 488,799

3 Claims. (Cl. 37-126)

My invention relates to earth movers of a type shown in the application of Ellsworth W. Austin, Serial No. 413,930, filed October 7, 1941, entitled "Earth mover." My invention is particularly concerned with an earth mover in which improved arrangements and dispositions of the various operating instrumentalities are obtained and in which the operating mechanism, for example, cable, is more beneficially disposed than normally.

It is an object of my invention in general to improve earth movers.

Another object of my invention is to provide an earth mover in which the main frame, main bowl, front apron and pusher have an improved inter-relationship.

Another object of my invention is to provide an earth mover in which the front apron has an improved mounting.

An additional object of my invention is to provide an earth mover in which the operating cables are protected from earth in the earth containing mechanisms.

It is a further object of my invention to provide an earth mover in which the operation of the interconnections between the pusher and the front apron is not disturbed by the load.

The foregoing and other objects are attained in the embodiments of the invention illustrated in the drawings, in which—

Fig. 1 is an isometric view of one form of earth mover in accordance with my invention, the view being from a rearward corner looking downwardly and forwardly with certain conventional portions of the mechanism, notably the wheels and axles, being omitted for clarity in disclosure and some portions being shown diagrammatically.

Fig. 2 is an isometric view showing a modified form of my earth mover, the view being from one side looking transversely and downwardly, conventional portions of the mechanism, such as axles and wheels, being omitted to increase the clarity of disclosure and parts of the mechanism being shown diagrammatically.

In its preferred form, the earth mover of my invention comprises a main bowl and a yoke frame articulated for relative pivotal movement about a horizontal axis, the main bowl being closed at the rearward end by a pusher and being adapted to be closed at the forward end by a front apron. The pusher and front apron are inter-related by a connecting linkage and the front apron particularly is mounted on the yoke frame as distinguished from the main bowl. Operating means, such as cables, are provided and

connected to the pusher and front apron mechanisms to insure the desired motion thereof.

Although the earth mover of my invention is disclosed herein in two equivalent modifications, the modification of Fig. 1 is especially adapted for machines in which a large proportion of the earth load is expelled by the pusher, and the modification of Fig. 2 is especially designed for machines in which a large proportion of the earth load is controlled by the front apron.

In the form of my invention disclosed in Fig. 1, there is provided an earth mover which normally is supported on wheels, not shown, at the forward and rearward ends. The device is intended to be drawn by any suitable source of propelling power, not illustrated, but entirely standard. The earth machine includes a main bowl portion 6 and a yoke frame portion 7 which together can be considered to constitute the main frame of the machine, although herein the yoke portion 7 may be considered as the main frame. The yoke comprises a forward arch 8, at its front end supported on steering wheels, which merges with a transverse frame tube 9 terminating in a pair of side arms 11 and 12 extending rearwardly and downwardly. Each of the side arms 11 and 12 is provided with a pivot pin 13 fastened to the adjacent one of the side walls 14 and 16 of the main bowl 6 so that relative pivotal movement between the frame 7 and the main bowl takes place about a transverse horizontal axis coincident with the axes of the pins 13. The side walls 14 and 16 constitute part of the enclosure of the main bowl 6 and are joined by a bottom wall 17 which terminates in a forwardly and downwardly inclined cutting edge 18. The side walls 14 and 16 and the bottom wall 17 at their rearward portions are joined by brace members 19 and 21 which merge with a support beam 22 designed to be supported from the rearward wheels, not shown.

The rear, otherwise open end of the main bowl 6, is closed by a pusher 23 constituted of a suitably contoured assemblage of plates and reinforcements designed to rest partly on rollers 24 at the lowermost extremities of the pusher and running upon the bottom wall 17 of the main bowl. From each side of the pusher 23, which rises above the tops of the side walls 14 and 16, extends one of a pair of support tubes 26, each of which is joined to an adjacent one of a pair of depending arms 27 and 28 which lie outside of the adjacent side walls 14 and 16.

The mechanism attached to each one of the arms 27 and 28 is identical except for reversed symmetry, so that only but one side of the mech-

anism is described. To the depending arm 28, for example, there is fastened a link bar 29 by means of a pivot pin 31. The link bar 29 is likewise connected by a pivot pin 32, not only to a pair of rollers 33, but likewise to a guide 34. The guide is adapted to run on and within a channel 36 provided in the side arm 12 of the yoke frame 7, so that when the pusher 23 is advanced and retracted within the main bowl, the guide 34 and the rollers 33 are translated in a rectilinear path to and fro along the side beam 12.

Also mounted on the pivot pin 32 is one end of a triangular side arm 37 which at its forward end merges with a cross tube 38 forming the upper boundary of a front apron 39, constituted by a curved sheet adapted when lowered to close the forward otherwise open end of the main bowl 6. The other point or apex of the triangular side arm 37 is connected by a pin 42 to a link 43, extending forwardly and joined at its foremost ends by a pivot pin 44 to ears 46 upstanding from the side beam 12.

The described mechanism is effective when the pusher 23 is moved forwardly, for example, to advance the side link 29, to advance the rollers 33 and the guide 34, and to move the triangular side link 37 so that its apex 42 moves in an arc about the pin 44 as a center as defined by the link 43, while the front apron 39 is correspondingly lifted or opened. Reversely, when the pusher 23 is moved rearwardly from forward position, the link 29 moves rearwardly likewise, the rollers 33 and slide 34 move rearwardly or downwardly along the side member 12, the apex pivot 42 is moved downwardly in an arc about the axis of the pin 44 and the front apron 39 is correspondingly closed. Thus, the pusher 23 and the front apron 39 partake conjointly of suitable motions.

The movements just described would not be effected by relative movement between the yoke frame and the main bowl if the axis of the pin 13 and the axis of the pivot pin 32 were coincident. That is, where raising and lowering of the cutting edge 18 is not to be accompanied by pusher and front apron movement, the pins 13 and 32 are disposed coaxially.

But it is preferred to locate the pins 13 and 32 with spaced or non-coincident axes. When the pin 32 is spaced above the pin 13, as shown, and the cutting edge 18 is lowered, the pins 31 and 44 are both in effect at fixed radial distances from the axis of the pin 13. Thus the pin 32 is made to advance the slide 34 on the yoke frame and lift the front apron with respect to the cutting edge. In practice, the pivot points are so chosen that a sufficient apron opening accompanies lowering of the cutting edge for normal purposes, without any forward movement of the pusher which is urged into rearmost position by the weight of the apron. Under this condition the brace member 19, or any other suitable member, serves as a stop for the pusher 23.

When the cutting edge is raised, the pusher is still held in rearmost position by the weight of the front apron, the lower edge of which finally abuts the raised cutting edge. The amount of apron motion thus produced can be any desired amount from zero when the axes of the pins 13 and 32 are coincident to a maximum when such axes are spaced a maximum distance apart and thus motion is distinct from the concurrent apron and pusher motion occurring when the pusher is advanced and retracted.

In order to produce the several motions described, any suitable mechanism can be utilized

and, for example, a cable mechanism is illustrated. This is normally operated by any suitable winch or power control mechanism, not shown. For example, there is a primary cable 51 which extends from a suitable operator-controlled power source around a pulley 52 and around a sheave wheel 53 into the interior of the arch 8. Within the arch the cable extends around a guide pulley 54 and emerges to pass around a guide pulley 56 at one corner of the frame 7. The cable then extends within the hollow side beam 12 and around a guide pulley 57 at the lowermost and rearmost extremity thereof. A corner guide pulley 58 then guides the pulley to a central guide pulley 59 mounted on the rear framework of the main bowl from whence the cable extends into and around a plurality of pulley assemblies 61 and 62. The pulley assembly 61 is mounted on the bowl frame, whereas the pulley assembly 62 is mounted on a guide forming the transverse rear member of rearwardly extending pusher beams 64 and 66, respectively. The pusher beams at the forward end are connected to the pusher 23 and are suitably reinforced by angle members 67, while at their rearward ends they merge with the transverse wall 63, carrying suitable guides 68 running in tracks 69 on the beam 22. The primary cable 51 after extending about the group pulleys 61 and 62 is suitably dead ended on either one of the group.

Thus, when the cable 51 is tensioned the group pulleys 61 and 62 are caused to approach each other, which means that the group 62 must move toward the group 61 thereby impelling the transverse connecting member 63, the beams 64 and 66 and the pusher 23 to advance toward the forward part of the machine. This motion is accompanied by motion of the linkages 29 and of the front apron 39 as previously described.

Also provided is a similar secondary cable 71 which is suitably reeved to extend around a pulley 72 on the arch 8 and also to extend about an interior pulley 73 within the arch. The emerging cable then extends around a corner pulley 74 and extends through the hollow interior of the cross tube 7, wherein is located a group 76 of pulleys. The cable passes around the pulleys of this group and also around the pulleys of an aligned group of pulleys 77 within the hollow cross tube 78 which joins the forward ends of the side walls 14 and 16, respectively. After having passed around the pulleys of the group 76 and 77, the secondary cable 71 passes around a guide pulley 79, thence through a hollow reinforcing channel 81 fixed to the side wall 14 and emerging therefrom is guided around a pulley 82 on the cross beam 21. From thence the secondary cable 71 extends around one of a pair of pulleys 83 mounted on the rearward side of the pusher 23 and then passes around a corner pulley 84 on the cross member 21. The cable then extends through the hollow interior of a side reinforcing channel 86 on the side wall 16, passes around a similar train of pulley groups, not shown but equivalent to and symmetrically disposed with respect to the pulley groups 76 and 77 within the hollow cross tube 7 and the cross tube 78, respectively. The secondary cable is then dead ended at a suitable point.

Operation of the secondary cable 71 causes the pulley groups 76 and 77 to approach each other when the cable is tensioned and the tension is also imparted to the pulley pair 83 so that a force is exerted upon the pusher 23, tending to retract or move it rearwardly. The tension is likewise transmitted to the duplicate pul-

ley groups on the other side of the machine so that the tubes 78 and 7 are caused to approach each other with equal force at their outer corners. During the tensioning of the cable 71, the cable 51 is normally slack if the pusher 23 remains in a single position, and hence by operating the cable 71 in tension, the cutting edge 18 is raised; whereas, if the cable 71 is slack and the cable 51 is not operated, the weight of the mechanism will cause the tubes 78 and 7 to separate and the cutting edge 18 to drop.

When the cable 71 is tensioned, not only is a force exerted to lift the cutting edge 18, but also it is exerted to retract the pusher 23 through the operation of the pulleys 83. By careful regulation of the relative tensions in the cables 71 and 51, the operator can utilize the secondary cable 71 to return or retract the pusher after it has been moved into a forward position. The force exerted on the pusher is balanced on opposite sides of the center line and the force exerted on the tube 78 is likewise evenly distributed laterally. Furthermore, the cables are not exposed in the vicinity of any load carried within the main bowl, so that fouling of the cables by the earth load or interference with their operation by contained material is precluded.

It is especially to be noted that the operating links 29, for example, and the links 43 are remote from any load within the main bowl, the interior of which is not encumbered by any moving operating mechanism.

In the form of the device shown in Fig. 2, the general arrangement is substantially the same, there being provided a yoke frame 101 connected by pivot pins 102 at opposite sides to the side walls 103 and 104 of the main bowl 106 which is provided likewise with a bottom plate 107. A pusher 108 closing the rearward portion of the main bowl is provided with side arms 109 depending externally of the side walls. Braces 110 join the side arms 109 rigidly to a pair of arms 111 pivoted to guide or slide mechanisms 113 which operate in suitable guide channels 114 in side beams 116 of the yoke frame 101. The arms 111 are coaxially connected by pivot pins 117 with the rearward portion of triangular side arms 118 merging at their forward ends with a cross tube 119 forming the support for a front apron 121 designed alternately to close and open the forward end of the main bowl 106.

The upper part of each of the side arms 118 is connected by a pivot pin 123 to one end of a link 124 extending forwardly and at its opposite end 126 pivoted to the yoke frame 101 so that the motion of the pusher 108 is communicated to the front apron 121 and causes a comparable motion thereof. That is, as in the Fig. 1 mechanism when the pusher 108 is moved forwardly, the front apron 121 is raised or opened and when the pusher is moved rearwardly, the front apron is lowered or closed. In addition, whenever the cutting edge 127 is lowered by relative pivotal movement of the main bowl 106 about the axis 102 with respect to the yoke frame 101, the links 124 are effective as the cutting edge is lowered to open or raise the front apron 121.

In this modification, although the remaining structure as so far described is somewhat the same as described in connection with Fig. 1, still there is provided no rearward guide for the pusher like the beam 69. Instead, the roller-supported pusher is held in its proper path by the rigidly connected members 109, 110 and 111 at opposite sides of the frame which are in turn

connected pivotally to the rigid, unitary, and relatively stiff apron.

Furthermore, the cable control mechanism is somewhat different. In this instance the yoke frame 101 is designed to be articulated to a draft vehicle 131, represented diagrammatically in Fig. 2, by means of a ball joint 133 through which power is transmitted from the draft vehicle to a pair of cable drums 134 and 136, respectively, each of which is controlled by the operator through a controller 137 and 138. Flexible connections 139 and 141 transmit the controlling impulses from an operator on the vehicle 131 to the drums 134 and 136 on the frame 101. From the drum 134 a primary cable 142 extends around a pair of guide pulleys 143 and 144, respectively, to a traveling pulley block 146 arranged to run on a rail 147 extending transversely on the yoke frame 101. At the opposite end of the stationary rail 147 there is arranged a stationary pulley block 148. Each of the blocks 146 and 148 is provided with a plurality of pulleys 149 and 151 respectively, and the primary cable 142 is respectively reeved therearound. The primary cable 142 then extends as indicated at 153 to a similar stationary pulley block assembly 154 and from thence to a traveling pulley block assembly 156 mounted on a second stationary rail 157. The primary cable then extends to a dead end connection 158 on the yoke frame.

When the primary cable 142 is tensioned, the movable pulley blocks 146 and 156 move on their respective tracks toward their opposite stationary pulley blocks with equal tension thereon. The pulley block 156 is provided with a cable 159 extending around a guide pulley 161 to a suitable connection 162 on the link 111. Comparably, the movable pulley block 146 is connected by a cable 163 which passes around a guide pulley 164 to a similar connection on the opposite link 111, not shown. There is therefore exerted equal tension on the cables 159 and 163 whenever the primary cable 142 is tensioned and the links 111 are drawn forwardly, thus moving the pusher forwardly and raising the front apron 121. When the cable 142 is slack the parts can be restored to their previous positions.

A secondary cable 171 extends from the drum 136 to one of a plurality of sheaves 173 mounted in a bracket 174 on the yoke frame 101 and also extends around a plurality of sheaves 176 mounted in a bracket 177 on a cross tube 178 joining the side walls 103 and 104 of the main bowl. From the pulleys 173 and after having passed around the pulleys 176, the secondary cable 171 extends over a guide pulley 179 connected with the cross tube 119 on the front apron and is dead ended as at 181 on the front apron. Since these connections are all central, the forces exerted on the front apron and on the connecting tube 178 and the supporting yoke 101 are all evenly distributed. When it is desired to lower the cutting edge 127 with respect to the yoke 101, the cable 171 is slack and the pulley groups 173 and 176 separate. Conversely, when the cutting edge is to be raised, the cable 171 is tensioned and the cable blocks approach and finally substantially meet. Also when the front apron 121 opens, it withdraws the secondary cable 171 from the pulley 176 so that when it is desired to return the front apron to its lowermost position, the cable 171 need only be tensioned. Since the front apron motion is accompanied by motion of the pusher 108, the effect is to restore the pusher to its rearmost position when the cable

171 is tensioned. By regulating the relative tension between the cables 171 and 142 an operator may completely manipulate the machine.

I claim:

1. An earth mover comprising a main bowl 5 having side walls, a yoke frame pivoted in said main bowl, a front apron movably mounted on said yoke frame, a pusher mounted on said main bowl to move between said side walls, arms on said pusher disposed outside said side walls, and 10 links outside said side walls connecting said pusher and said front apron.

2. An earth mover comprising a main bowl 15 having side walls, a pusher mounted on said main bowl for translatable movement therein, a front apron mounted to move toward and away from said main bowl, arms on said pusher dis-

posed outside said side walls, and links outside said side walls connecting said pusher and said front apron.

3. An earth mover comprising: a main bowl 5 having side walls; a yoke frame pivoted on said main bowl; a slide member slidably disposed on said yoke frame; a pusher mounted on said main bowl for movement between said side walls and provided with arms overhanging said side walls; 10 links pivotally connecting said arms with said slide members; a front apron movably mounted across the forward end of said main bowl provided with arms overhanging said side walls and pivotally connected with said slide members; and 15 links pivotally connecting said latter arms with said yoke frame.

HARVEY W. ROCKWELL.

Certificate of Correction

Patent No. 2,394,483.

February 5, 1946.

HARVEY W. ROCKWELL

It is hereby certified that errors appear in the printed specification of the above numbered patent requiring correction as follows: Page 4, first column, line 6, claim 1, for "in said" read *on said*; and second column, line 1, claim 2, for "links" read *links*; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 21st day of May, A. D. 1946.

[SEAL]

LESLIE FRAZER,

First Assistant Commissioner of Patents.

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