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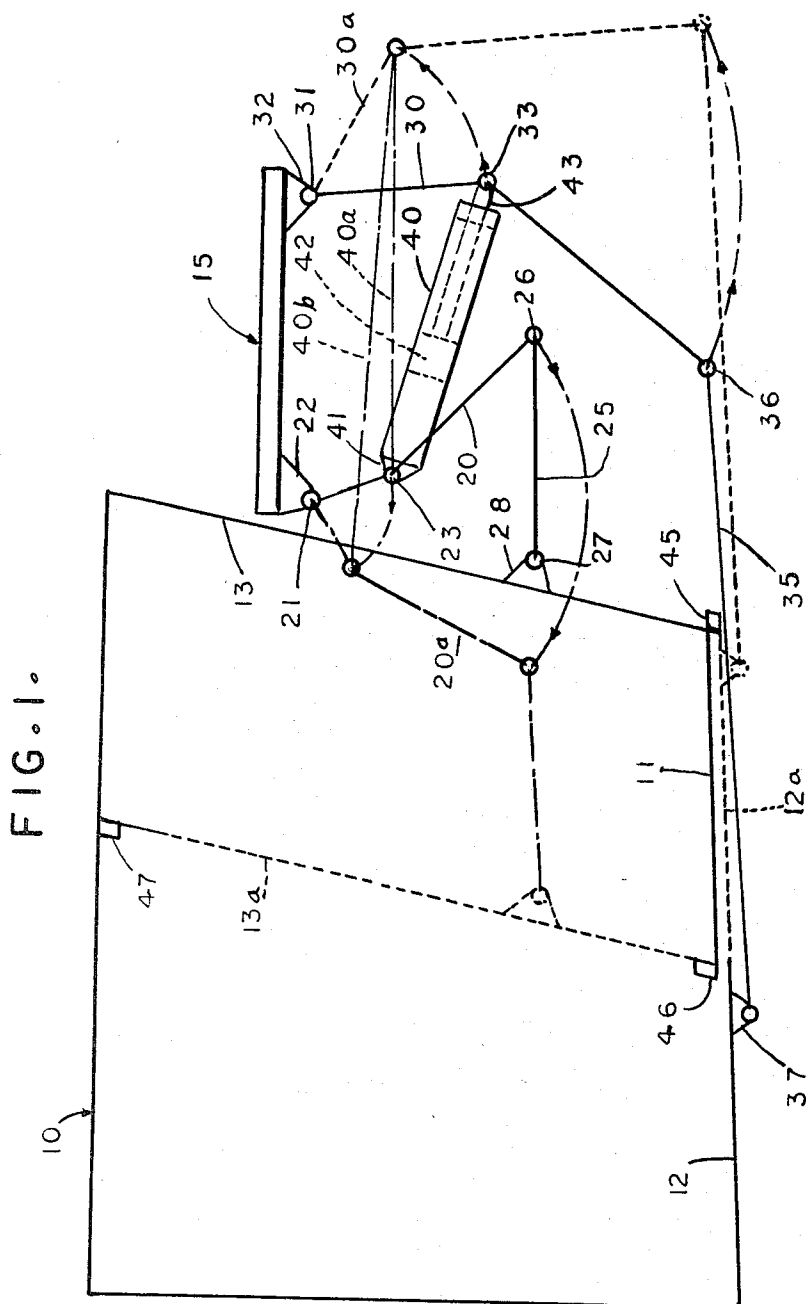
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EJECTOR MECHANISM FOR SELF-LOADING SCRAPER

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This invention relates to a self-loading scraper, and more particularly to an ejector mechanism for emptying the load-receiving receptacle of such a scraper.

Typical self-loading scrapers of the type with which this invention may be used are shown in U.S. Patents to Walch, 2,179,532, Hancock et al., 2,988,832, and Hancock, 3,066,429.

The load-receiving receptacles of the scrapers shown in these patents each has a movable front floor, a movable rear wall and an ejector mechanism, including two or more hydraulic cylinders, for moving the floor and wall from "fill" positions to "eject" positions, and return.

One object of the invention is to provide an ejector mechanism for actuating the movable front floor and movable rear wall of the receptacle in a self-loading scraper, the mechanism such that only a single hydraulic cylinder is employed to move the floor and wall from fill positions to eject positions, and return.

Another object is to provide an ejector mechanism of the kind described, including a single hydraulic cylinder, the mechanism functioning under loaded condition first to move the front floor from forward fill position substantially to rearward eject position before the rear wall begins to move from rearward fill position toward forward eject position. The reverse movements of the floor and rear wall occur more or less simultaneously, depending on the frictional characteristics of the floor and wall under unloaded condition.

Still another object is to provide an ejector mechanism, including a single hydraulic cylinder without utilizing a sequencing valve, characterized by economy, simplicity and comparative freedom from uncertainty in operation.

Other objects, advantages and details of the invention will be apparent as the description proceeds, reference being had to the accompanying drawings wherein two forms of the invention are shown. It will be understood that the description and drawings are illustrative only, and that the scope of the invention is to be measured by the appended claims.

In the drawings:

FIG. 1 is a diagrammatic illustration of ejector mechanism embodying the invention.

FIG. 2 is an elevational view of a modified form of ejector mechanism embodying the invention.

FIG. 3 is a sectional view on line 3—3 of FIG. 2.

FIG. 4 is an elevational view of the mechanism shown in FIG. 2.

Referring to the diagrammatic illustration of FIG. 1, the numeral 10 designates the load-receiving receptacle of a self-loading scraper of the type shown in the aforesaid U.S. patents. As more fully shown and described in said patents, receptacle 10 becomes filled with dirt or other terrestrial material as the scraper is pulled over the ground. Thereafter, the scraper is moved to a place for depositing the material contained in the receptacle, and the material is ejected from the receptacle in conventional manner.

In the form of the invention illustrated diagrammatically in FIG. 1, receptacle 10 has a stationary rear floor 11 and a movable front floor 12. The two floors may have about equal length measured axially of the scraper. The illustrated forward position of movable floor 12 is the fill position, and, as will be seen, floor 12 is moved rear-

wardly to the broken line position 12a below stationary floor 11 to eject a portion of the load.

Receptacle 10 also has a movable rear wall 13. The illustrated position of wall 13 is the rearward or fill position, the wall being movable forwardly to the broken line position 13a to eject the portion of the load remaining after rearward movement of floor 12.

The side walls of receptacle 10 and the forward mechanisms for scraping, elevating and distributing the scraped material are conventional, and form no part of the present invention. Accordingly, they are not illustrated. Similarly, movable front floor 12 and movable rear wall 13 are conventional, as indicated in the mentioned patents. They are illustrated, however, in view of the cooperation they have with the ejector mechanism of the invention.

A fixed upper frame 15, forming part of the scraper itself, is disposed rearwardly of receptacle 10. Elements of the ejector mechanism are pivoted to frame 15, as will be seen.

The following described components of the present ejector mechanism are illustrated in FIG. 1 in two positions, namely, a first position corresponding with the fill positions of movable front floor 12 and movable rear wall 13, and a second position corresponding with the eject positions of floor 12 and rear wall 13. The components of the mechanism and the movable floor and wall are shown in full line in the fill positions, and in broken line in the eject positions.

Still referring to FIG. 1, a first link means 20 has one end pivoted at 21 to a part 22 of frame 15 adjacent movable rear wall 13. As shown, link means 20 has an angulation at 23 intermediate its ends.

A second link means 25 has one end pivoted at 26 to the free end of first link means 20. The other end of link means 25 is pivoted at 27 to a part 28 carried on movable rear wall 13. As will be seen, link means 20 and 25 are actuated to move wall 13 back and forth between its fill and eject positions.

A third link means 30 has one end pivoted at 31 to a part 32 on frame 15 rearwardly of the aforesaid part 22 to which first link means 20 is pivoted. As shown, third link means 30 has an angulation at 33 intermediate its ends, this angulation, as well as the aforesaid angulation 23 of first link means 20, being more or less optional.

A fourth link means 35 has one end pivoted at 36 to the free end of third link means 30, and the other end pivoted to a part 37 carried by movable front floor 12. As will be seen, third and fourth link means 30 and 35 are effective when moved to actuate movable floor 12 between its forward fill position and rearward eject position.

A single hydraulic cylinder 40 has one end 41 pivotally connected to first link means 20 intermediate the ends of the link means. As shown, cylinder end 41 is connected to first link means 20 at angulation 23. Cylinder 40 includes usual piston 42 and piston rod 43, the assembly hereinafter sometimes referred to as cylinder 40.

The other end of cylinder 40, namely, piston rod 43, is pivotally connected to third link means 30 intermediate the ends of the link means. As shown, piston rod 43 is connected at angulation 33 of the third link means.

While hydraulic cylinder 40 is shown as being connected at one end to a first linkage comprising link means 20 and 25 and at the other end connected to a second linkage comprising link means 30 and 35, it is of course possible that the ends of cylinder 40 be pivotally connected to the floor 12 and rear wall 13 with other equivalent arrangements.

Piston 42 and piston rod 43 of hydraulic cylinder 40 are in retracted position within the cylinder in FIG. 1, and under this condition movable floor 12 is in forward fill position and movable rear wall 13 is in rearward fill position, as shown.

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First link means 20 and third link means 30 also constitute levers by reason of the aforesaid connections thereto of the opposite ends of hydraulic cylinder 40. The leverage characteristics of link means 20 and 30 are such that they cooperate to provide the desired sequence of floor and wall movement in response to actuation of cylinder 40.

Thus, when cylinder 40 extends, third link means 30 first is pivoted counterclockwise from the illustrated full line position to the broken line position designated 30a. The respective lever arms of the link means 20 and 30 are so chosen in view of the lesser resistance to movement encountered by movable floor 12, compared to rear wall 13a, that first lever means 20 associated with wall 13 remains substantially stationary until after third lever means 30 reaches position 30a and front floor 12 is retracted to position 12a. At this point, third link means 30 or floor 12 engages a stop, such as stop 45 positioned to be engaged by floor 12. At this time the axis of cylinder 40 occupies the position shown by broken line 40a.

Piston rod 43 of cylinder 40 continues to extend after movement of link means 30 and floor 12 is stopped. This continued extension results in clockwise rotation of first link means 20 from the position illustrated in full line to the broken line position designated 20a. Rear wall 13, of course, moves with first link means 20 from the illustrated full line position to broken line position 13a where further movement is arrested by stop means such as stops 46 and 47 that are engaged by wall 13. When all movement is stopped, the axis of cylinder 40 occupies the position shown by broken line 40b.

Apart from the leverage characteristics of link means 20 and 30, it will be understood, as suggested above, that when receptacle 10 is loaded, floor 12 encounters less load resistance to movement than does rear wall 13. Thus, if link means 20 and 30 had exactly the same leverage characteristics, floor 12 normally would complete its movement to its rearward eject position before wall 13 started its movement toward its forward eject position. However, it is usually desirable to design the leverage characteristics of the two link means so they cooperate to insure this desired sequence of movement.

After the load is ejected from the receptacle by the movements of floor 12 and wall 13 as above described, cylinder 40 is actuated in reverse to restore the floor and wall to their original fill positions. Assuming no undue friction in the slide tracks (not shown) of the floor and wall, the two elements normally will move to their fill positions more or less simultaneously when cylinder 40 is retracted.

Referring now to FIGS. 2-4, the form of the invention there shown is modified so as to provide clearance in the space occupied in the FIG. 1 form by the lower portion of third link means 30 and the right-hand portion of fourth link means 35. As will be seen, however, the two forms of mechanism both embody the present invention. FIGS. 2-4 differ from FIG. 1 in that the illustrated components of the mechanism are shown in two-dimension.

Referring to FIGS. 2-4, the illustrated pertinent portions of load-receiving receptacle 50 are stationary rear floor 51, movable front floor 52 and movable rear wall 53. A fixed upper frame 55 is disposed rearwardly of receptacle 50, as shown in FIGS. 2 and 4.

First link means 60 has one end pivoted at 61 to a part 62 of frame 55 adjacent movable rear wall 53. In this form of the invention, first link means 60 does not have a pronounced angulation between its ends, as was the case with first link means 20 in the FIG. 1 form.

A second link means 65 has one end pivoted at 66 to the free end of first link means 60. The other end of link means 65 is pivoted at 67 to a part 68 carried on movable rear wall 53. As before, link means 60 and 65 are actuated to move wall 13 back and forth between its fill and

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eject positions, and as seen in FIGS. 3 and 4, these link means are disposed centrally of the scraper.

As further seen in FIGS. 3 and 4, first link means 60 may comprise a pair of spaced links 60a and 60b, while link means 65 may comprise a single link having its right-hand end disposed between the links 60a and 60b.

A third link means 70 has one end pivoted at 71 to a part 72 on frame 55 rearwardly of the aforesaid part 62 to which first link means 60 is pivoted. As shown in FIG. 4, third link means 70 comprises a pair of spaced links 70a and 70b. A transverse bar 73 is secured to the free end of a third link means 70, or the free ends of links 70a and 70b.

The fourth link means of the FIGS. 2-4 form, referring to the nomenclature established in describing the FIG. 1 form, includes an angulated fifth link means 75 having one end pivoted at 76 to frame 55 adjacent rear wall 53. As shown, fifth link means comprises a pair of spaced links 75a and 75b (FIGS. 3 and 4).

Fourth link means also includes a sixth link means 80 having one end pivoted at 81 to the free end of fifth link means 75 and the other end pivoted at 82 to movable front floor 52. As in the case of fifth link means 75, sixth link means 80 is shown as a pair of spaced links 80a and 80b.

The fourth link means also includes a seventh link means 85 having one end pivoted at 86 to transverse bar 73 which constitutes the other or free end of third link means 70. The other end of seventh link means 85 is pivoted at 87 to fifth link means 75 intermediate the ends thereof. As shown, seventh link 85 comprises a pair of spaced links 85a and 85b, as in the case of the fifth and sixth link means 75 and 80.

A hydraulic cylinder assembly 90 has one end pivoted at 91 to first link means 60 intermediate the ends thereof and the other end pivoted at 92 to the central portion of transverse bar 73, this bar, as mentioned, constituting the free or other end of third link means 70.

The operation of the form of the invention shown in FIGS. 2-4 is essentially the same as that of the FIG. 1 form. When cylinder 90 extends, third link means 70 first is rotated in counterclockwise direction, producing counterclockwise rotation of fifth link means 75 and consequent movement of movable floor 52 from forward fill to rearward eject position. After floor 52 has reached the latter position, continued action of cylinder 90 rotates first link means 60 in clockwise direction, producing movement of rear wall 53 from rearward fill position to forward eject position. Reverse action of cylinder 90 causes the floor and wall elements 52 and 53 to return to their original fill positions.

From the above description it is thought that the construction and advantages of this invention will be readily apparent to those skilled in the art. Various changes in detail may be made without departing from the spirit or losing the advantages of the invention.

Having thus described the invention, what is claimed as new and desired to secure by Letters Patent is:

1. In a scraper having a load-receiving receptacle including a front floor movable between a forward fill position and a rearward eject position, a rear wall movable between a rearward fill position and a forward eject position and a fixed frame disposed rearwardly of said receptacle,

an ejector mechanism comprising:

a hydraulic cylinder;
a first linkage movably connecting the fixed frame, the rear wall and said hydraulic cylinder; and
a second linkage movably connecting the fixed frame, the front floor and said hydraulic cylinder whereby actuation of said hydraulic cylinder actuates movement of the front floor between the forward fill position and rearward eject position, and the rear wall between the rearward fill position and forward eject position.

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2. The ejector mechanism of claim 1 wherein the lever-
age characteristics of said first and second linkages co-
operate with the resistance to movement of said front
floor and said rear wall under load condition to insure
that said floor substantially completes its rearward move-
ment before said rear wall starts its forward movement.

3. The ejector mechanism of claim 1 wherein said
hydraulic cylinder includes a cylinder end and a rod end,
and said first linkage is pivotally connected to said cy-
linder end and said second linkage is pivotally connected
to said rod end.

4. In a self-loading scraper having a load-receiving
receptacle including a front floor movable between a
forward fill position and a rearward eject position and a
rear wall movable between a rearward fill position and a
forward eject position and a fixed frame disposed rear-
wardly of said receptacle,

an ejector mechanism comprising:

a first link means having one end pivoted to said frame;
a second link means having one end pivoted to the
other end of said first link means, and the other
end of said second link means pivoted to said rear
wall;

a third link means having one end pivoted to said
frame;

a fourth link means connected between the other end of
said third link means and said front floor; and

a single hydraulic cylinder having one end pivotally
connected to said first link means intermediate the
ends thereof and the other end pivotally connected
to said third link means, the piston of said hydraulic
cylinder retracted when said floor is in forward fill
position and said rear wall is in rearward fill posi-
tion.

5. The ejector mechanism of claim 4 wherein the lever-
age characteristics of said first and third link means co-

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operate with the resistance to movement of said front
floor and said rear wall under loaded condition to insure
that said floor substantially completes its rearward move-
ment before said rear wall starts its forward movement.

6. The ejector mechanism of claim 4 with the addition
of stop means limiting the rearward movement of said
front floor.

7. The ejector mechanism of claim 4 wherein said
fourth link means includes a fifth link means having one
end pivoted to said frame adjacent said rear wall, a sixth
link means having one end pivoted to the free end of said
fifth link means and the other end pivoted to said front
floor, and a seventh link means having one end pivoted to
the free end of said third link means and the other end
pivoted to said fifth link means intermediate the ends
thereof.

8. The ejector mechanism of claim 7 wherein said third
link means comprises a pair of laterally spaced links hav-
ing corresponding ends pivoted to said frame and a cross
bar connecting the other corresponding ends, and said
fifth, sixth and seventh link means also comprise pairs of
laterally spaced links.

9. The ejector mechanism of claim 4 with the addition
of stop means limiting the rearward movement of said
front floor and stop means limiting the forward movement
of said rear wall.

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