Aug. 15, 1950 D. I. HAYES 2,518,471

MUCKING AND LOADING DEVICE

Filed June 6, 1947 4 Sheets-Sheet 1

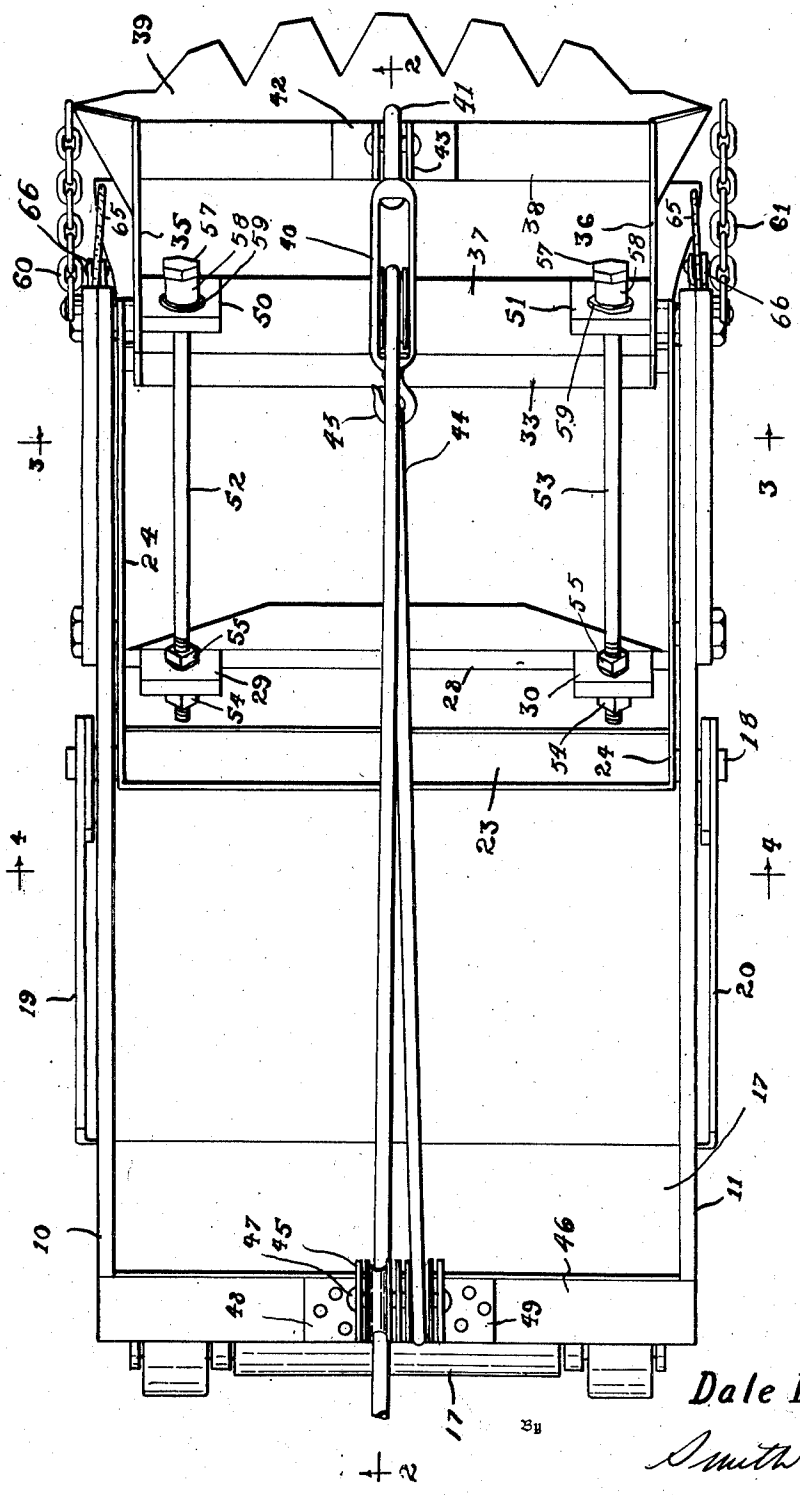


Fig. 1.

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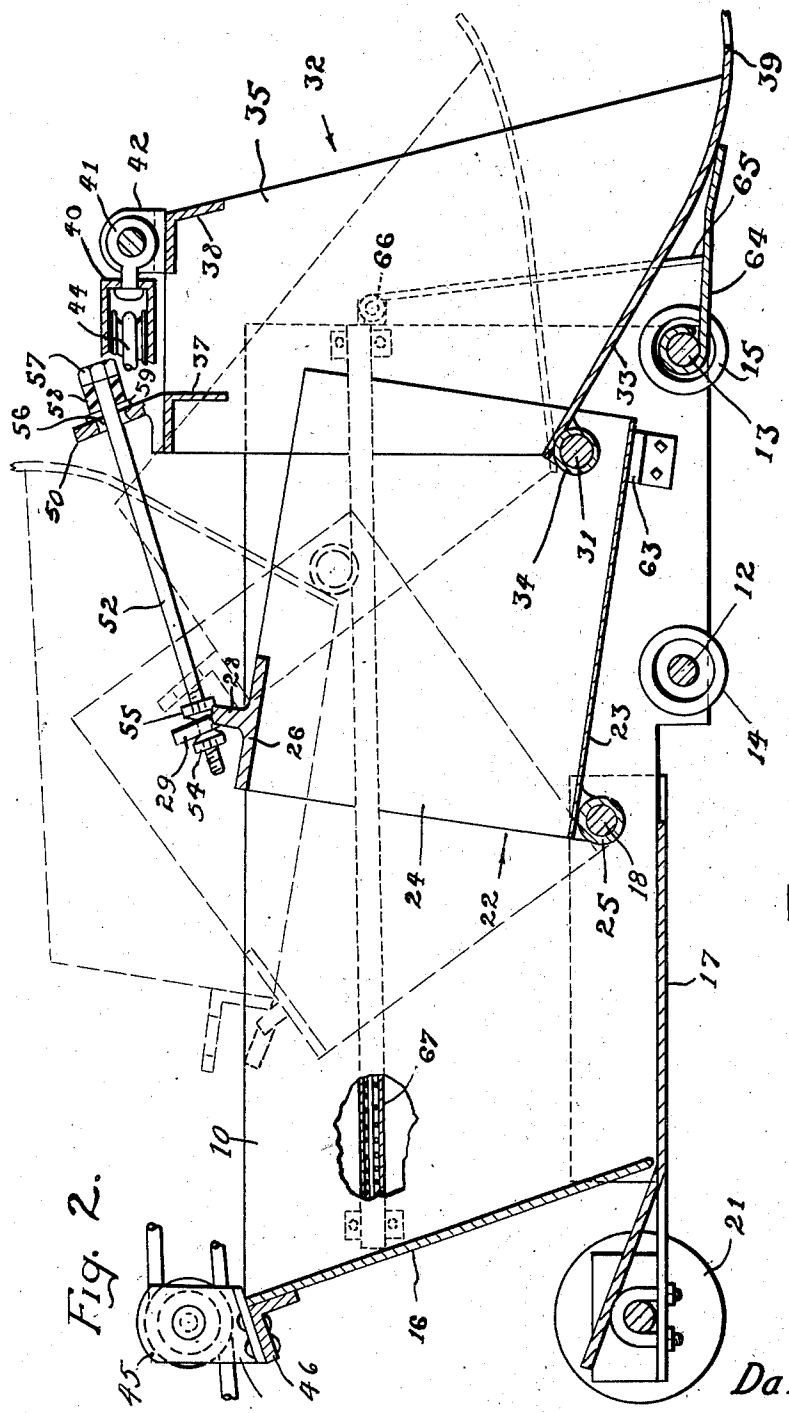


Fig. 2.

Fig. 9.

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Fig. 3.

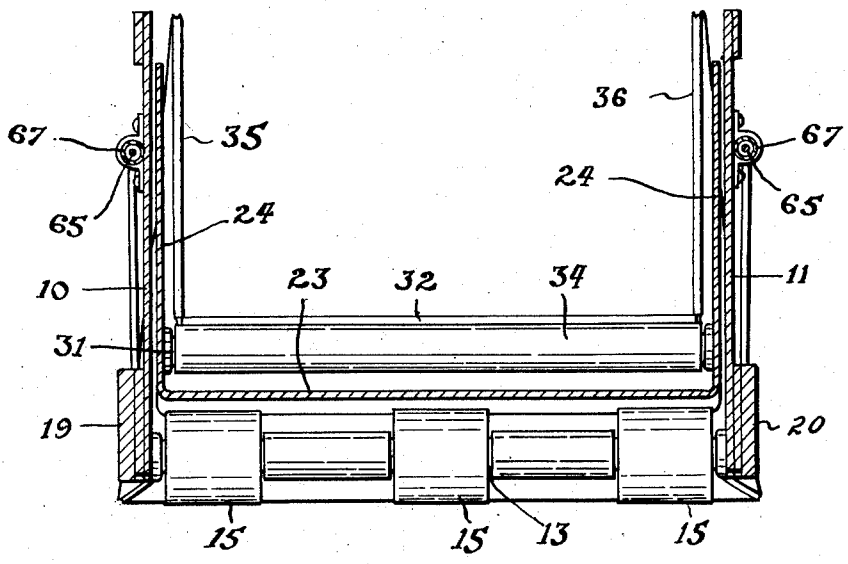
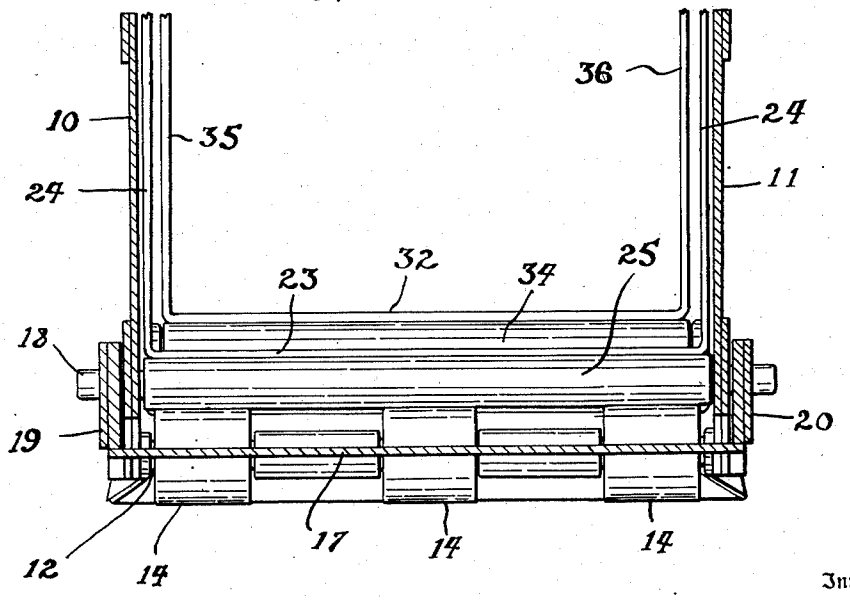


Fig. 4.



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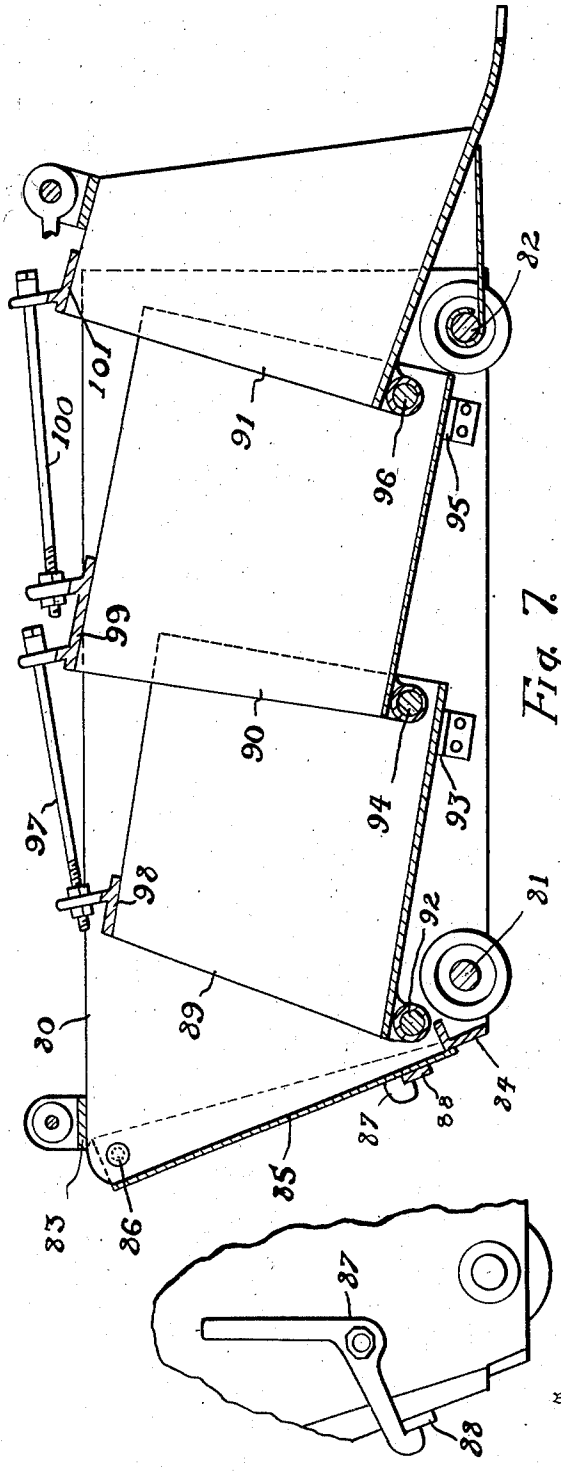


Fig. 7.

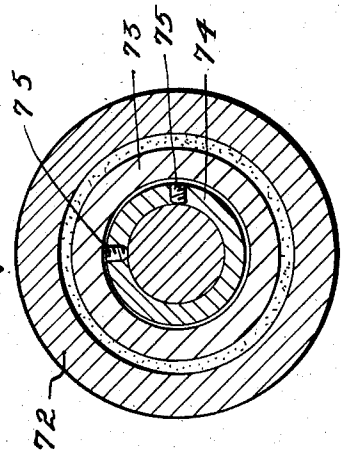


Fig. 6.

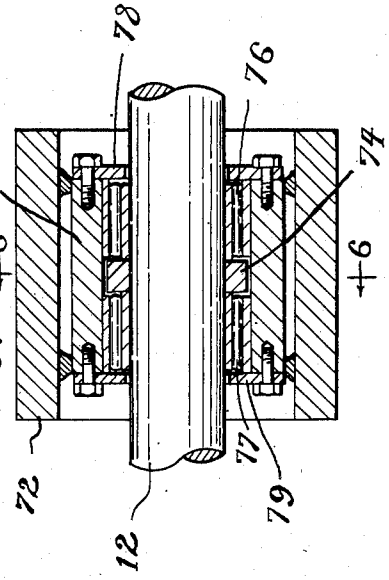


Fig. 5.

Fig. 8.

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Patented Aug. 15, 1950 2,518,471

UNITED STATES PATENT OFFICE

2,518,471

MUCKING AND LOADING DEVICE

Dale I. Hayes, Spokane, Wash.

Application June 6, 1947, Serial No. 752,981

7 Claims. (Cl. 214—78)

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My invention relates to improvements in a mucking and loading device.

It is the purpose of my invention to provide a loading machine with a novel mechanism for picking up loose material such as rock, ore, sand, gravel, coal and the like from the ground and crowding it into the body of the machine with a minimum amount of lifting and moving of the material.

My invention is particularly applicable to mucking operations in mines since it needs little head room for operation and is mounted to roll over the floor of the mine stope, room, or tunnel without the necessity of providing tracks.

More particularly, it is the purpose of my invention to provide a loading machine having a shovel which is pivotally mounted upon a crowding and transferring trough which is, in turn, pivotally mounted so that the shovel can be advanced into the material to be loaded, then tilted back to dump its contents on the trough and again advance into the material until the trough itself is full enough to require tilting it back to crowd the load further back into the body of the machine whereupon both the shovel and the trough can be tilted to accomplish this crowding.

In removing blasted rock from the face of the mine stope or tunnel, it is highly desirable to have a device that can work right up to the face of the stope or tunnel to pick up the material and store it until a substantial load is obtained, and then moved back with the load to a pit or other dumping place. A machine contemplated by my invention embodies a shovel, a loading trough and a main frame or body, the body being mounted on a suitable means such as rollers in order that it may be moved along a surface with ease into and out of the loading position where the loose material to be picked up is located. In a machine of this character it is essential that the shovel be so mounted that it may work freely up and down under the control of the operator to force its way into the loose material in a substantially horizontal direction.

Shovels of this character, of course, have been used in machines where the shovel is loaded and then raised and carried over a container into which the shovel load is dumped. However, so far as I am aware, I am the first to provide a loading machine wherein a shovel is crowded into the loose material then tilted back to transfer its load to a tilting trough as many times as is necessary to crowd the trough full and the shovel and trough can then be tilted together to crowd the load further and complete the loading of the

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vehicle body to which the trough and shovel are mounted.

According to my invention the shovel and trough are so mounted as to provide control of the shovel to limit and direct the digging tendency of the shovel to a point where the shovel will clear a path in advance of the machine to substantially the level of the surface along which the machine is rolling. The machine is so equipped that a single control takes care of the lifting and lowering of the shovel necessary to fill it properly and the tilting of the shovel and trough to crowd the material picked up back into the body of the machine.

In such operations as mucking in a mine, the machine is utilized with cable controls by which the machine can be drawn up to the face of the stope and there caused to move to and fro until it is loaded and then rolled back to a dumping place where the body of the machine may be emptied. All of this is made possible by the nature of the construction embodying, in combination with the machine body, a pivoted trough member which in turn has the shovel pivoted at its forward lower edge, the shovel and trough being interconnected at the top to limit downward movement of the shovel or upward buckling at the junction of the shovel with the trough.

The novel features that I consider characteristic of my invention are set forth with particularity in the claims. The invention itself, however, both as to its organization and its method of operation, together with additional objects and advantages thereof, will be understood from the description of a specific embodiment when read in connection with the accompanying drawings, in which:

Figure 1 is a plan view of a loading machine embodying my invention;

Figure 2 is a sectional view through the machine taken on the line 2—2 of Figure 1;

Figure 3 is a sectional view taken on the line 3—3 of Figure 1 with the upper portion of the shovel broken away;

Figure 4 is a sectional view taken on the line 4—4 of Figure 1 with the upper portions of the trough and shovel being broken away;

Figure 5 is a sectional view taken longitudinally through one of the wheels or rollers used to support the machine;

Figure 6 is a cross sectional view taken on the line 6—6 of Figure 5;

Figure 7 is a view similar to Figure 2 of a modified form of the invention wherein unloading is accomplished by a rear gate;

Figure 8 is a fragmentary view illustrating a conventional latch for the rear gate shown in Figure 7; and

Figure 9 is an enlarged fragmentary sectional view of a part of the machine.

Referring now to the drawings and particularly to Figures 1 and 2, my invention is shown as embodied in a loading or mucking machine that is particularly adapted for removing loose rock and fine material which will be created by blasting at the face of the mine stope or tunnel. The same machine is, of course, applicable to the loading and transporting of any loose material which may be picked up by a shovel. Other means may be used for moving the machine and suitable power for the moving and operation of the machine may be applied in any known manner since my invention is confined to the machine itself and is not concerned with the particular exterior means employed for effecting operation of the shovel and transportation of the machine.

The machine comprises two side frames 10 and 11 preferably constructed of suitable strong material such as steel plate suitably reinforced to withstand the rough uses to which a machine of this character is subjected. The side plates 10 and 11 mount two axles 12 and 13 upon which wheels or rollers such as 14 and 15 are journalled to support the forward end of the machine. At the rear end of the machine the side frames are connected by a cross plate 16. The rear end of the machine is closed at the bottom by a bottom plate 17 that is hinged to the side plates by a shaft 18. This bottom plate has side flanges 19 and 20 located outside the side frames 10 and 11 and extends beyond the cross plate 16 where it is supported by wheels 21. In dumping the machine the bottom 17 can be opened by moving the wheels 21 over a dump pit so as to allow them and the bottom plate 17 to drop down.

The shaft 18 also pivots a trough member 22 which comprises a bottom plate 23 and two side plates 24 which extend upwardly from the bottom plate 22 and forwardly from the shaft 18 along the inner surfaces of the side frames 10 and 11. A suitable pivotal mounting for the trough 22 which is described above, comprises a pipe 25 welded to the under surface of the bottom plate 28 and surrounding the shaft 18. The side plates of the trough are connected together at their rear top edges by a cross bar 26 which is welded at its ends to the side plates. This cross bar has an upstanding rib 28 on which two lugs 29 and 30 are provided, the lugs being bent at a slight angle to the rib 28 as illustrated.

At the forward end of the trough near the bottom plate 23 thereof I mount a shaft 31 for supporting a shovel 32. The ends of the shaft 31 are secured in the side plates 24. The shovel 32 has its bottom plate 33 mounted on the shaft 31 by a pipe 34 surrounding the shaft and welded at the bottom plate 33. The shovel 32 has its side walls 35 and 36 extended upwardly above the side frames 10 and 11 and connected together by cross members 37 and 38 which are suitably welded to the side plates. The digging or shoveling front edge 39 of the shovel is shown as serrated in the usual manner and, of course, the common practice of providing a hardened and suitably reinforced digging portion for the shovel is followed in constructing the shovel.

Means for rocking the shovel about its pivot is provided. This means comprises a tackle block 40 swiveled by an eye-pin 40 to two upstanding ears 42 provided on the cross member 38. The tackle block has a hook 43 to receive one end of a cable 44 and the cable is trained around a second tackle block 45 which is mounted on an angle iron 46 provided at the top rear end of the machine. The tackle block 45 as shown comprises two pulleys journalled on a pin 47 that is carried by brackets 48 and 49 secured to and projecting upwardly from the angle iron 46.

The cross member 37 has a pair of upstanding lugs 50 and 51 thereon. These lugs and the lugs 29 and 30 serve as mounting means for two tie rods 52 and 53 that are used to limit the downward swinging movement of the shovel 32 about the pivot 31. The tie rods are secured in the lugs 29 and 30 by nuts 54 and 55 threaded on the tie rods and adapted to engage opposite sides of the lugs 29 and 30. The lugs 50 and 51 have elongated slots 56 therein for receiving the tie rods so that a limited amount of play up and down is provided. The tie rods have their heads 57 cushioned by rubber cushions 58 bearing against washers 59 that overlie the slots 56.

In Figure 2 of the drawings I have shown the dotted line positions that may be assumed by the shovel and the trough as the machine is loading and crowding the material back into the space over the bottom plate 17 between the side frames 10 and 11. The loading operation starts with the parts in the full line position shown in Figure 2 and by manipulation of the cable 44 the shovel can be made to work its way into the material. The machine is drawn forward by any suitable means such as the chains 60 and 61 which are secured to the side frames 10 and 11 and connected to a suitable cable which is usually trained over a tackle block anchored at the face of the stope or tunnel. When the shovel is loaded it is tilted up by tightening the cable 44 so as to dump the material gathered on the shovel back upon the trough 22. The trough 22 and the shovel are supported against downward movement by supporting brackets 63 which are mounted on the side frames 10 and 11 beneath the forward end of the trough 22. The tendency of the trough and shovel to buckle where they are pivoted together by the shaft 31 is prevented by the rods 52 and 53. The length of the rods 52 and 53 can be adjusted by means of the nuts 54 and 55 threaded thereon so as to limit the lower position of the shovel as desired by the operator. The loading progresses by filling the shovel and then using the cable 44 to rock the shovel about the shaft 31 and to rock both the trough and the shovel about the shaft 18 to crowd the material back into the body of the machine onto the bottom plate 17 and against the back plate 16. When the machine is loaded it is drawn back to dumping position by means of a cable 44 where the bottom plate 17 is permitted to drop to empty the machine. The machine is then drawn forward by the chains 60 and 61 and the loading operation is repeated.

It is desirable to avoid the piling up of material around the front wheels or rollers 15. In order to avoid the possibility of rock crowding down between the shovel 32 and the front wheels during the filling operation, I pivot a plate 64 on shaft 13 and spring load this plate so that it tends to follow the shovel upward. The spring loading is accomplished by securing two small cables 65 to the opposite side edges of the plate 64 and running these cables upwardly over pulleys 66 that are mounted at the forward end of the side frames 10 and 11. The cables are mounted in pipes 67 and pass through a series

of springs 68 separated by spacers 69 to the rear ends of the pipes 67. There are two of the pipes 67, one at each side of the machine and both pipes are provided with springs in the manner shown in Figure 9. The rear ends of the cables 65 are provided with heads 70 that bear against the rear spring 68 and are thus always under tension to lift the plate 64 when the shovel is raised. Of course, in the uppermost position of the shovel, the shovel moves away from the plate 64 which is stopped by reaching the upper limit to which the cables 65 can move it. However, when the shovel is again lowered it engages the plate 64 and forces the plate down against the tension of the springs 68. A multiplicity of springs 68 is used in order to simplify the adjustment of the amount of tension on the cable 65 and to simplify the acquisition of the springs and replacement thereof in the event that a spring fails. A cap 71 is provided on the rear end of each pipe 67 to provide access to the cable.

Any suitable type of support may be used to mount the machine for movement over the ground. The wheels or rollers shown are merely examples of known supports. Other supports of a skid type or caterpillar type would serve equally well. For purposes of illustration I have shown in Figures 5 and 6 one type of roller and bearing that is used. The roller is made up with a heavy tubular section 72 and to this section is welded a bearing support sleeve 73. A spacing ring 74 is secured on the axle such as 12 or 13 by suitable set screws 75. Two roller bearings 76 and 77 are inserted in the sleeve 73 on opposite sides of the ring 74 and, retaining plates 78 and 79 are bolted to the ends of the sleeve 73 to keep the bearing in place. As shown, I provide at least three of the rollers on each shaft to give adequate support to the machine and its load. It is obvious, of course, that various types of supporting means may be used for carrying the machine within the scope of my invention as the invention is not concerned with the details of the supporting means.

Referring now to Figures 7 and 8, in this form of the invention I have illustrated my improvements as applied to a machine wherein rear dumping is employed. In this machine side frames 80, similar to the side frames 10 and 11 are provided and these side frames are connected together by axles 81 and 82 and a top cross bar 83. There is also a rear angle iron cross bar 84 connecting the side frames. The machine is provided with a rear gate 85 pivoted at 86 and closing the rear end of the machine. Suitable latches 87 are pivoted on the side frames 80 and engage laterally extending bars 88 on the gate 85. In this form of the invention the entire bottom of the machine is formed by pivoted troughs and a shovel. There are two pivoted troughs 89 and 90 and the shovel is indicated by the numeral 91. A rear shaft 92 pivots the rear lower end of the trough 89, the shaft being mounted in the side frames 80. The front end of the trough 89 is limited in its downward movement by brackets 93 on the side frames 80. The trough 90 is pivoted at its rear lower end by a shaft 94 which is secured to the side walls of the trough 89. Downward movement of the trough 90 is limited at its front end by brackets 95 which are secured on the side frames 80. The shovel 91 is pivoted on a shaft 96 that is carried by the side walls of the trough 90. In order to prevent buckling up of the parts about the shafts 94 and 96 the troughs 89 and 90 are linked together by connecting rods 97 which are similar in all respects to the connecting rods 52 and 53. Cross bars 98 and 99 on the troughs 89 and 90 respectively are used to mount the rods 97. In a like manner the shovel 91 is connected at its top to the trough 90 by rods 100 which extend between upright ears provided on the cross bar 99 of the trough 90 and a cross bar 101 on the shovel.

The same cable means or other suitable means may be used for tilting the shovel and the troughs in the same manner as they are tilted in the main form of the invention. In this form of the invention, however, it will be noted that in order to empty the machine after the shovel and the first trough 90 have been manipulated to load the machine the rear gate 85 will be opened at the dump and then the material will be crowded out of the machine by swinging the shovel 91 and the two troughs 89 and 90 upwardly until the rear trough is moved to an angle that will cause the material to be discharged from it.

It is believed that the nature and advantages of my invention will be clear from the foregoing description. Having thus described my invention, I claim:

1. A loading machine comprising in combination a main vehicle body including side frames, a trough between said frames pivoted at its lower rear end to said body, a shovel pivoted at its lower rear end in the lower front end of the trough, stop means on the body limiting the downward movement of the front end of the trough, means limiting the downward movement of the shovel about its pivot, and cooperating members on the shovel and trough operable to engage when the shovel is raised about its pivot a predetermined amount whereby to cause further raising of the shovel to lift the trough about its pivot and crowd material thereon rearwardly in said body.

2. In a loading machine, the combination with a body adapted to receive and store loose material, of a loading mechanism comprising a trough pivoted in said body, a shovel having its rear end extending into the trough and pivoted therein to move up and down with respect to the trough, the trough and shovel having means thereon limiting the upward movement of the shovel about its pivot in the trough, and means limiting the downward movement of the shovel about its pivot.

3. In a loading machine the combination with a body adapted to receive and store loose material, of a loading mechanism comprising a trough pivoted in said body, a shovel having its rear end extended into the trough and pivoted therein to move up and down with respect to the trough, the trough and shovel having means thereon limiting the upward movement of the shovel about its pivot in the trough, and means limiting the downward movement of the shovel about its pivot, said last named means comprising a link member between the tops of the trough and the shovel.

4. A loading machine comprising in combination, two side frames, cross tie means connecting said side frames, including axles spaced apart lengthwise of the frames, supporting rollers journalled on said axles, a trough pivotally supported adjacent its rear end between said side frames, a shovel having its rear end open and overlapped with the forward end of the trough, means pivotally mounting the shovel on the trough, means to swing the shovel upward about its pivot on the trough and cooperating means on the trough and shovel limiting the swinging movement of the shovel with respect to the trough.

5. In a loading machine having a main body

to receive loose materials, the combination with the body, of a trough having a bottom wall and having side walls fitting closely to the sides of the body, said trough being open at both ends, means pivotally mounting said trough in the body, a shovel having a bottom and side walls and open at the rear end, the rear ends of the bottom and side walls of the shovel being overlapped with the forward ends of the trough bottom and side walls, means pivotally mounting the shovel on the trough and means for tilting the shovel and trough about their pivots, said trough and shovel being provided with cooperating members at the top thereof for limiting the upward swinging movement of the shovel with respect to the trough.

6. In a loading machine having a main body to receive loose materials, the combination with the body, of a trough having a bottom wall and having side walls fitting closely to the sides of the body, said trough being open at both ends, means pivotally mounting said trough in the body, a shovel having a bottom and side walls and open at the rear end, the rear ends of the bottom and side walls of the shovel being overlapped with the forward ends of the trough bottom and side walls, means pivotally mounting the shovel on the trough, and means for tilting the shovel and trough about their pivots.

7. In a loading machine having a main body to receive loose materials, the combination with the body, of a trough having a bottom wall and having side walls fitting closely to the sides of the body, said trough being open at both ends, means pivotally mounting said trough in the body, a second trough of like character having its rear end extended into the first trough and pivoted therein, a shovel having a bottom and side walls and open at the rear end, the rear end of the shovel being overlapped with and pivoted in the second trough, and means interconnecting the tops of said troughs and the shovel for limiting the swinging movement of the second trough and the shovel about their pivots.

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