L. C. WOOD.

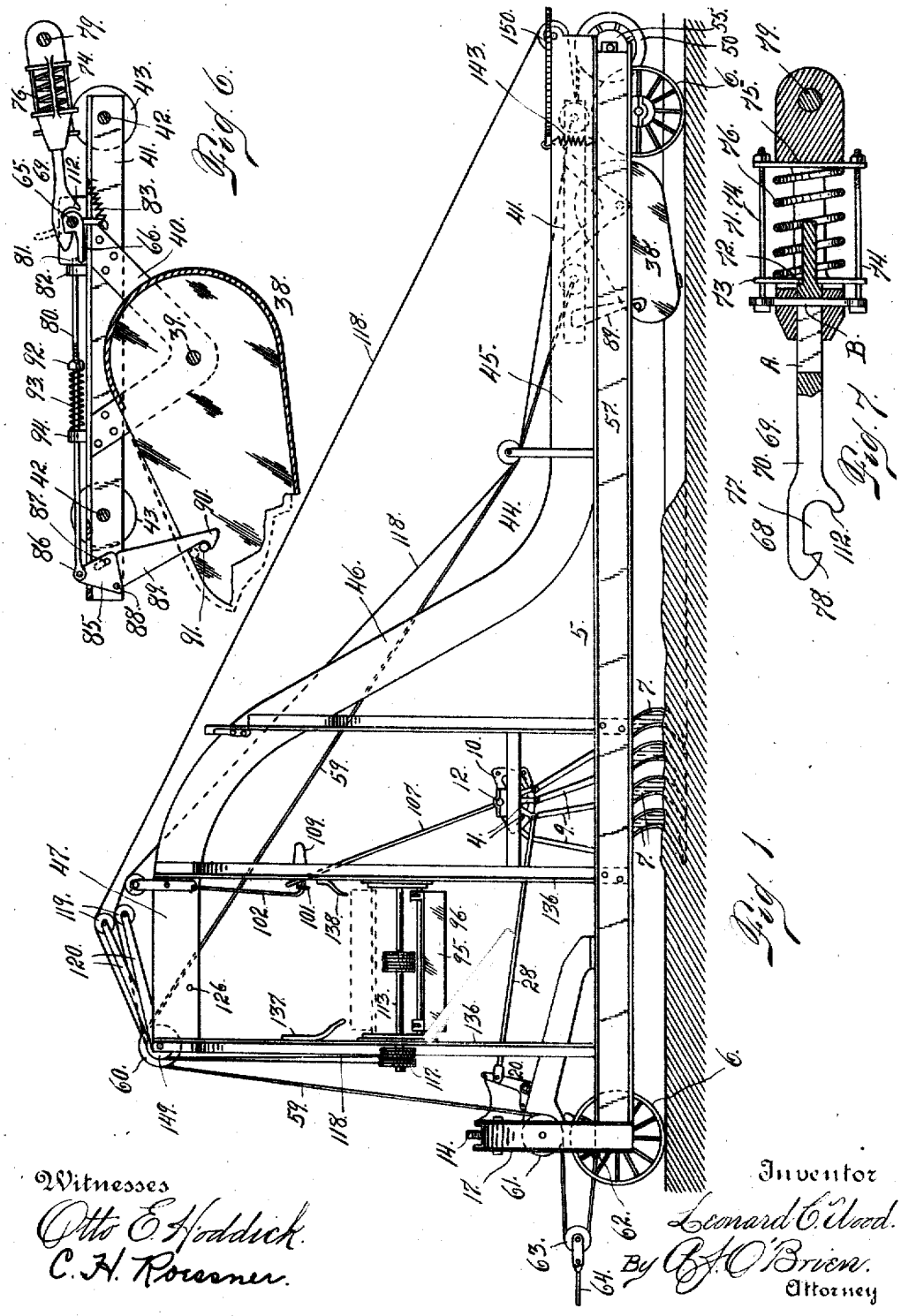
EXCAVATING MACHINE.

APPLICATION FILED SEPT. 9, 1910.

1,004,549.

Patented Sept. 26, 1911.

4 SHEETS—SHEET 1.



Witnesses

Otto E. Hoddick.

C. H. Rossner.

Inventor

Leonard C. Wood.

By C. J. O'Brien.

Attorney

L. C. WOOD.

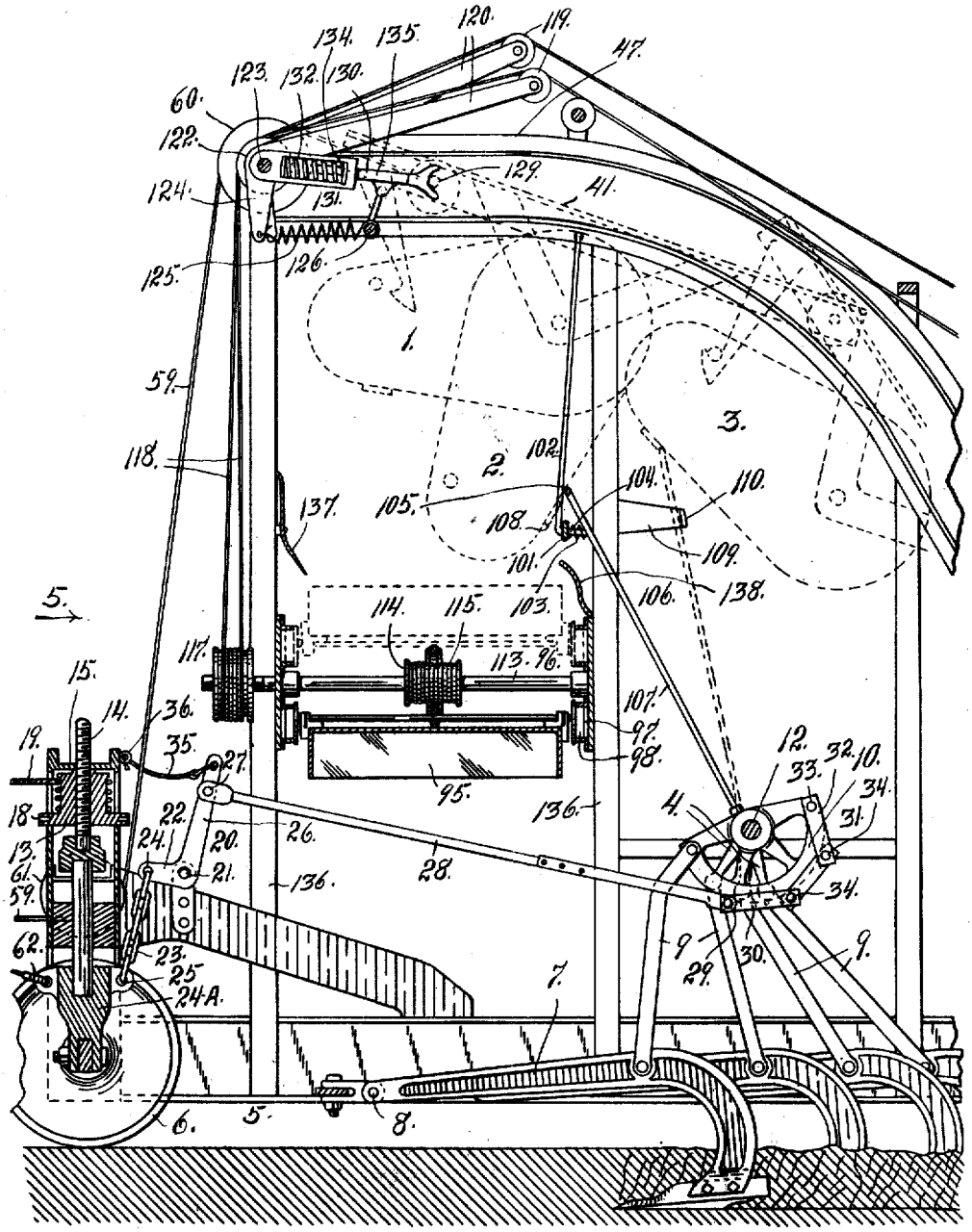
EXCAVATING MACHINE.

APPLICATION FILED SEPT. 9, 1910.

1,004,549.

Patented Sept. 26, 1911.

4 SHEETS—SHEET 2.



Witnesses

Otto E. Hoddick.

C. H. Roscoe

Fig. 2.

Inventor

Leonard C. Wood.

By C. J. O'Brien.

Attorney

L. C. WOOD.

EXCAVATING MACHINE.

APPLICATION FILED SEPT. 9, 1910.

1,004,549.

Patented Sept. 26, 1911.

4 SHEETS—SHEET 3.

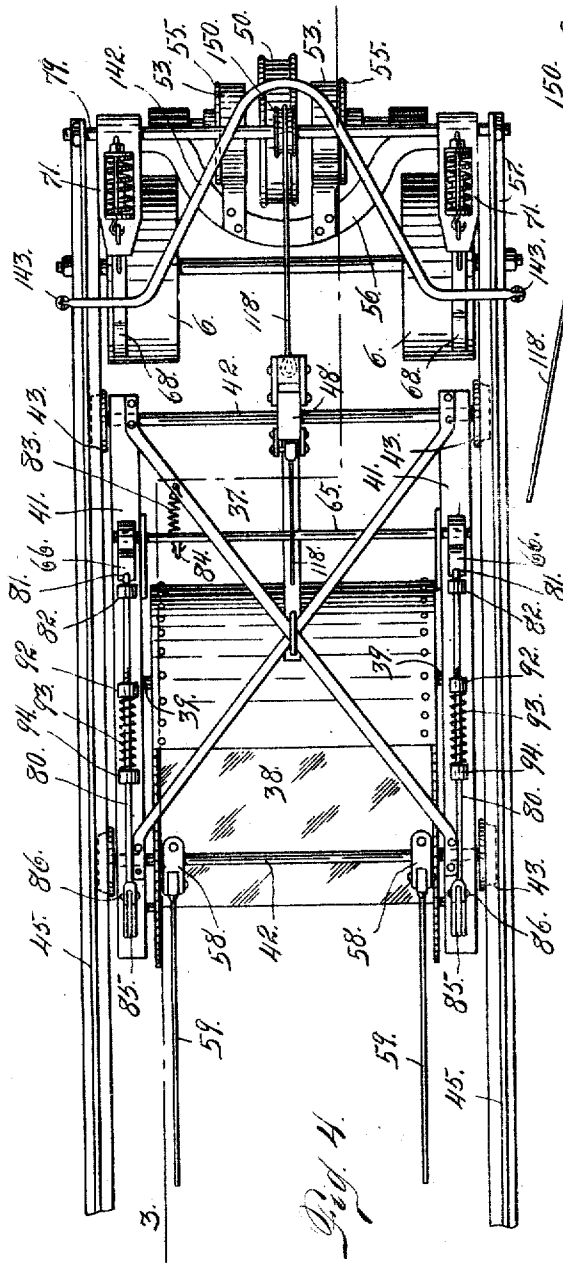


Fig. 4.

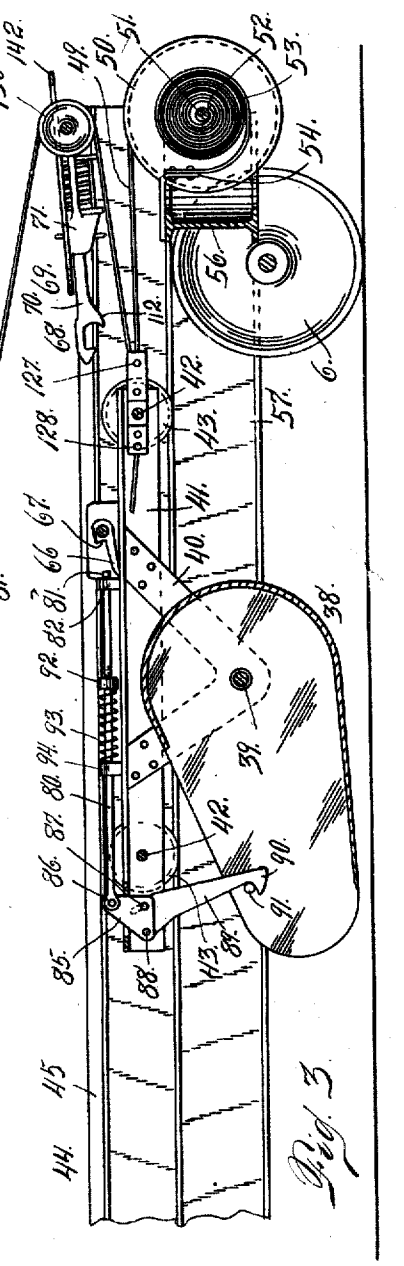


Fig. 3.

Witnesses

Otto E. Haddick.

C. H. Roessner.

Inventor

Leonard C. Wood.

By A. J. O'Brien.

Attorney

L. C. WOOD.

EXCAVATING MACHINE.

APPLICATION FILED SEPT. 9, 1910.

1,004,549.

Patented Sept. 26, 1911.

4 SHEETS—SHEET 4.

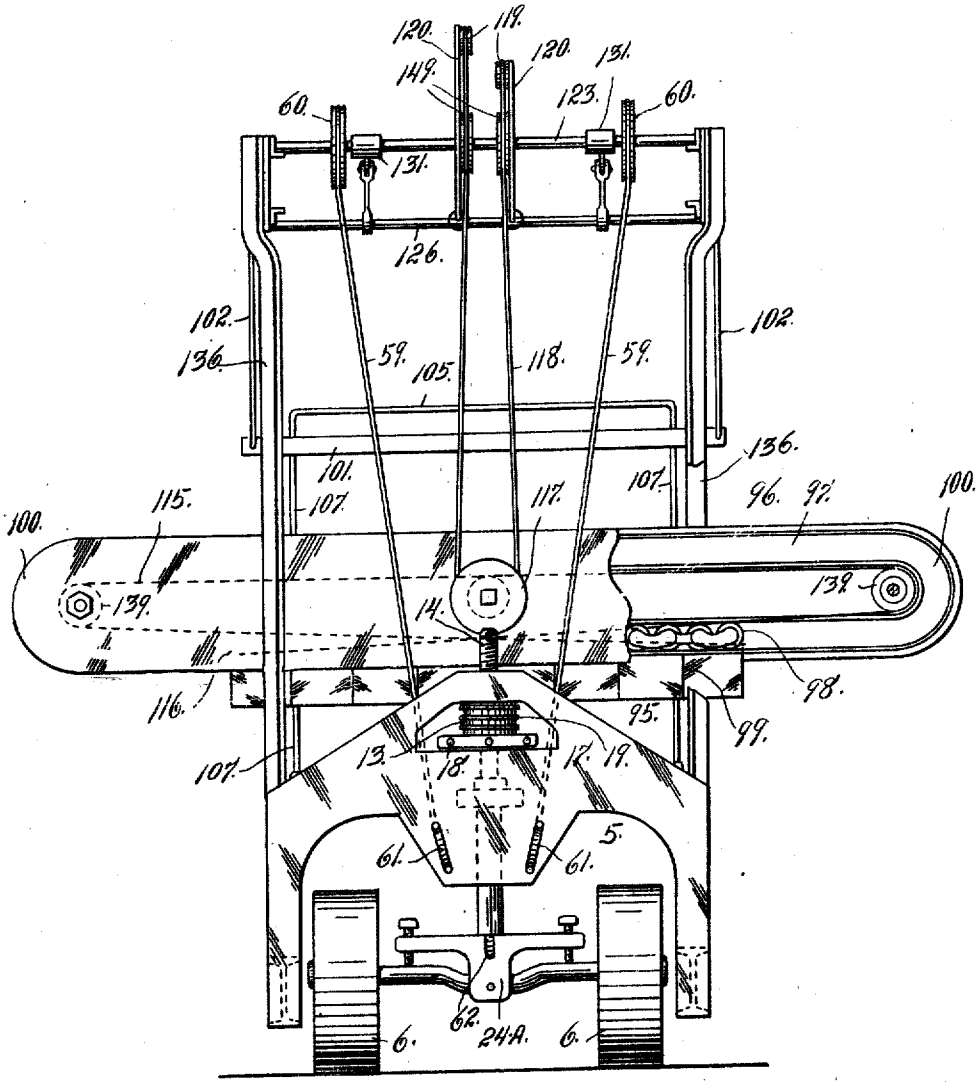


Fig. 5.

Witnesses

Otto E. Hoddick.

C. H. Rossener.

Inventor

Leonard C. Wood.

By C. J. O'Brien.

Attorney

UNITED STATES PATENT OFFICE.

LEONARD C. WOOD, OF ALDEN, IOWA.

EXCAVATING-MACHINE.

1,004,549. Specification of Letters Patent. Patented Sept. 26, 1911.

Application filed September 9, 1910. Serial No. 581,210.

To all whom it may concern:

Be it known that I, LEONARD C. WOOD, a citizen of the United States, residing at the city of Alden and State of Iowa, have invented certain new and useful Improvements in Excavating-Machines; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

My invention relates to improvements in excavating machines of the general construction set forth in my application for patent filed April 16, 1910, Serial Number 555,817, allowed August 18, 1910.

My present invention consists of certain improvements over the original construction as hereinafter set forth in detail.

The machine comprises a vehicle upon which earth-loosening means, as plows, are mounted in advance of a scraper bucket which is normally locked against movement with relation to the vehicle, but which as it enters the dirt is automatically unlocked from the vehicle and allowed to travel thereon upwardly upon a track at the top of which it is automatically dumped, provision being made for automatically returning the bucket to its rearmost position upon the vehicle. In the construction as illustrated two cables are connected at one extremity with the bucket carriage and at their opposite extremities with the body of the vehicle at the front end of the latter. An antifrictional device is applied to the cable forward of the vehicle and this device is connected with a suitable motor or engine, (not shown) comprising the power for operating the machine. As the power is first applied the pull is upon the vehicle and also upon the bucket carriage, but as the carriage is locked on the vehicle against relative movement, the vehicle moves carrying the bucket with it until the bucket enters the dirt, when it is automatically unlocked from the vehicle. As soon as this occurs, as it requires more power to move the vehicle than the carriage, the vehicle stops and the power applied to the cables acts upon the bucket carriage and draws the same to the top of the frame where it is automatically dumped as heretofore explained. A coil spring is carried by a drum located at the rear of the machine. A cable wound upon this drum is unwound or paid out as the bucket carriage moves forwardly, resulting in rotating the drum and placing the coil spring under tension. The consequence is that by the time the bucket carriage reaches its forward and upward limit of movement, the spring is under strong tension and as soon as the power acting upon the cable ceases to act, the recoil of the spring will return the bucket to its normal position, the carriage being automatically locked upon the vehicle by retaining hooks which are also spring-held for buffer purposes. After the bucket reaches its forward limit of movement certain hooks are disengaged from its forward extremity to allow it to dump. As the bucket swings down to the dumping position it strikes against a buffer device and as it is moved rearwardly by the recoil of the aforesaid spring, it engages a swinging stirrup-shaped support which lifts its forward end and causes it to reinterlock with the supporting hooks so that it is in the proper position for reloading during the remainder of its rearward travel, and is ready for immediate use as soon as it reaches its rearward position upon the vehicle.

Having briefly outlined my improved construction, I will proceed to describe the same in detail, reference being made to the accompanying drawing in which is illustrated an embodiment thereof.

In this drawing: Figure 1 is a side elevation of my improved machine. Fig. 2 is a sectional view of the vehicle portion thereof, with the bucket shown by dotted lines in a number of positions, the parts being shown on a larger scale. Fig. 3 is a vertical longitudinal section of the rear portion of the machine, said section being taken on line 3—3 Fig. 4. Fig. 4 is a top plan view of the same. Fig. 5 is a front end elevation of the machine, or a view looking in the direction of arrow 5, Fig. 2. Fig. 6 is a sectional view in detail showing the bucket, its carriage and the retaining buffer hooks carried by the vehicle, the parts being shown on the same scale as in Figs. 3 and 4. Fig. 7 is a sectional view in detail taken through the buffer hook mechanism.

The same reference characters designate the same parts in all the views.

Let the numeral 5 designate the lower rectangular framework or body of a vehicle

which, as shown in the drawing, is supported by ground wheels 6. Upon this vehicle are mounted plows 7 which are pivotally connected at their forward extremities to the vehicle body as shown at 8, their rear portions being connected with links 9. The opposite extremity of the link of the central plow is pivotally connected with a segmental wheel 10 journaled on a transverse shaft 12, while the links connected with the other plows are pivotally connected with rock arms 4 carried by the shaft 12, the rock arms being properly distributed upon the shaft for the purpose. The forward extremity of the frame 5 may be raised and lowered by means of a nut 13 mounted on a screw 14 adapted to engage from below the top 15 of an arch-shaped forward frame member 17. This nut may be operated by a hand spike adapted to enter openings 18, or by means of a cable 19 wound thereon, as may be desired.

As the frame travels downwardly the plows which are mounted thereon travel therewith. It is, however, important that the plows should be supported in such a manner that they may move downwardly faster than the frame, and in order to accomplish this I employ the following mechanism. A bell crank lever 20 is fulcrumed on the front part of the frame as shown at 21, the short arm 22 of this lever having one extremity of a chain 23 connected therewith as shown at 24, the opposite extremity of the chain being connected with a bolster 24 as shown at 25. The long arm 26 of this lever is pivotally connected as shown at 27 with the forward extremity of a rod 28 whose opposite extremity is pivotally connected as shown at 29 with a link 30, which is the forward link of a short chain 31, the rearmost link 32 being pivoted to the segmental wheel 10' as shown at 33. These links are double and straddle the periphery of the wheel 10 and the link pins 34 engage the periphery of the wheel and actuate the latter together with the shaft 12 when the rod 28 is moved rearwardly. Now as the nut 13 is lowered upon the screw 14, the forward extremity of the framework or body of the vehicle moves downwardly by gravity carrying the bell crank lever 20 therewith. Assuming that the chain 23 is taut at the beginning of the downward movement, this chain would have a tendency to slacken, since its lower end is connected with the bolster 24, which remains stationary. Under these circumstances the plows move downwardly as the chain slackens since the bell crank lever is allowed to turn freely on its fulcrum, and the plows move down faster than the frame since the downward movement permitted by the slackening of the chain 23, whereby the bell crank lever is released and its long arm allowed to move in response to the pull of the rod 28, is a downward movement of the plows in addition to that which they would naturally have if they traveled only with the frame. It will be understood that this additional movement is permitted by virtue of the fact that the forward extremities of the plows are pivotally connected with the framework of the vehicle. Again during the upward movement of the frame resulting from turning the screw 14 in the opposite direction, the chain 23 being taut will pull upon the short arm of the bell crank lever and actuate the lever, its long arm being caused to move forwardly, and acting upon the segmental wheel 10 through the instrumentality of the rod 28, will cause the plows to rise faster than the upward movement of the frame. The upper extremity of the arm 26 of the bell crank lever is connected by means of a cable 35 with the forward extremity of the vehicle frame as shown at 36, in order to limit the rearward travel of the long arm 26 of the said lever.

Normally locked against movement on the vehicle is a carriage 37 upon which is mounted a scraper bucket 38, the rear extremity of the bucket being trunnioned as shown at 39 on depending V-shaped brackets 40 whose upper extremities are secured to the parallel side bars 41 of the carriage. These side bars are connected in front and rear by shafts or axles 42 upon whose extremities are journaled wheels 43 which travel in tracks 44 mounted on the vehicle and stationary therewith. These tracks have bottom horizontal members 45, upwardly and forwardly extending portions 46 and top horizontal portions 47.

To the central portion of the rear axle 42 of the carriage is connected as shown at 48, the forward extremity of a cable 49, which is connected with a drum 50 fast on a shaft 51, to which is connected as shown at 52 the inner extremity of a power spring 53 whose opposite extremity is connected as shown at 54 with a curved bar 56 carried by the side bars 57 of the vehicle body. As shown in the drawing there are two housing members 55 (see Fig. 4), and consequently two power springs 53 for the return of the bucket carriage, the said springs being placed under tension as the carriage moves forwardly upon the tracks 44.

To the forward axle 42 of the bucket carriage 37 are connected, as shown at 58, the rear extremities of two cables 59 whose forward extremities pass over pulleys 60 mounted at the forward and upper extremity of the track. From these guide pulleys 60 the cables 59 pass downwardly under pulleys 61 journaled in the forward arch-shaped part 17 of the vehicle frame, their opposite extremities being connected with the lower part of the frame as shown at 62. Between

the point 62 where the cable extremities are connected with the frame and the pulleys 61, are located anti-frictional devices 63 which engage loops formed in the cables, the said anti-frictional devices being connected in any suitable manner with a cable 64 extending to an engine or motor (not shown) for operating the machine.

Upon the upper rearward portion of the bucket carriage 27 is mounted a shaft 65 to whose extremities are secured pawls 66, having offsets 67 adapted to be engaged by the extremities 68 of two retaining hooks 69 having shanks 70 slidable in frames 71, the said shanks being shouldered as shown at 72 to engage a plate 73 slidable upon rods 74. Between the plate 73 and the rear end 75 of this frame is located a spiral spring 76, which is compressed and forms a buffer as the bucket carriage returns to the rear extremity of the machine under the influence of the coil springs 53. The rear portions of the pawls 66 are shaped to enter recesses 77 formed in the forward extremities of the retaining hooks, these hooks having depending offsets 78 adapted to engage the shoulders or offsets 67 of the pawls 66 when the carriage is locked on the frame as illustrated in Figs. 1 and 6.

The retaining hooks 69 are so connected with the pawls 66 that a pull upon the bucket carriage would cause the pawls together with the shaft 65 upon which they are mounted to rotate, thus releasing the carriage from the vehicle. Attention is called to the fact that the rear extremities of the retaining hooks 69 are pivotally mounted on a rod 79 whose extremities are supported by the rear ends of the members of the track 44.

In order to prevent the dogs from moving upwardly and releasing the bucket carriage in response to the pull of the cables 59 before the bucket enters the earth, the carriage is provided with spring-actuated rods 80, whose rear extremities 81 protrude through lugs 82 mounted on the carriage, the protruding ends 81 occupying positions just above the forward extremities of the pawls 66. The pawls are normally held in position to interlock with the rear extremities of the rods 80, by a spring 83, one extremity of which is connected with a crank arm 84 fast on the rock shaft 65.

The forward extremities of the rods 80 are connected as shown at 86 with triangular-shaped plates 85 pivotally mounted on the framework of the carriage as shown at 87. One corner of each of these plates is pivotally connected as shown at 88 with a depending hook 89, the lower end of the hook being shaped as shown at 90 to engage a pin 91 mounted on the forward extremity of the scraper bucket 38. Attention is called to the fact that the trunnions 39 of the bucket are located at the rear portion thereof so that it is necessary in order to maintain the bucket in the upright position or in the position to hold its load, that its forward extremity be supported.

When the machine is at work, and as soon as the bucket enters the earth, its forward end is drawn downwardly with sufficient force, which acts upon the hooks 89, to turn the triangular plates 85 and move the rods 80 forwardly sufficiently to disengage their rear extremities 81 from the pawls 66. As soon as this occurs the bucket carriage will be released from the vehicle and the pull cables 59 will act upon the bucket carriage to move the same forwardly upon the vehicle, the carriage following the track 44 as hereinafter explained.

Each rod 80 is provided with a stop 92 which is engaged by the rear extremity of a spiral spring 93 whose forward extremity engages a lug 94 fast on the bucket carriage. The rods 80 slide freely in the lugs 94, consequently as the rods are moved forwardly to disengage the pawl 66 for the purpose of unlocking the bucket carriage from the vehicle, the springs 93 are placed under tension, but as soon as the carriage is released and travels forwardly and upwardly on the track with its load, the rods 81 will be returned to their normal position. As soon, however, as the carriage is released from the vehicle and the pull of the retaining hooks 69 upon the pawls 66 ceases, the said pawls will be returned to their normal position by the recoil of the spring 83 acting upon the pawl-carrying rod 65.

After the bucket carriage has reached its upward limit of movement upon the track members 44, it successively assumes the positions 1, 2 and 3 indicated by dotted lines in Fig. 2. Just as the carriages reaches its upward limit of movement, the bucket-supporting hooks 89 are disengaged from the pins 91 and the bucket is then in the position 1, but immediately swings upon its trunnions 39 to the dumping position or position 2, its load being discharged into a traveling pan 95 mounted upon a transversely arranged conveyer frame 96, having an endless track 97 formed in its opposite sides to receive anti-frictional devices 98 carried by the pan, the latter being jointed as shown at 99 to follow the abrupt turns 100 of the opposite extremities of the conveyer frame.

When the bucket has assumed the position 2, it strikes against a buffer plate 101 mounted upon the lower extremities of rods 102 and engaging springs 103 carried by the hook-shaped extremities 104 of said rods. As soon as the bucket is dumped, the power applied to the pull cables 59 ceases to act, and the bucket carriage together with the bucket begins its return movement. The bucket after engaging the buffer 101 imme-

diately engages the upper transverse member 105 of a stirrup-shaped supporting device 106, the lower extremities of the rods 107 of this device being connected to turn freely on the shaft 12. As the bucket continues its rearward movement, the device 106 moves with it to the dotted line position in Fig. 2, since the bottom of the bucket is provided with a transverse stop plate 108 which engages the member 105. Consequently the forward portion of the bucket rides upon and is lifted by the swinging stirrup-shaped device 106 until the pins 91 are in position to engage the lower extremities of the supporting hooks 89 as shown in position 3 in Fig. 2. The device 106 is then stopped from farther rearward movement by a stationary member 109 having a part 110 lying in the path of the rod 107. The device 106 then returns to its normal position ready to act upon the bucket when the operation is repeated. After the forward portion of the bucket is again interlocked with the supporting hooks 89, the bucket carriage continues its rearward movement upon the track members 44 and under the influence of the springs 53, until the carriage is again interlocked with the vehicle through the instrumentality of the retaining buffer hooks 69. Attention is called to the fact that as the bucket carriage returns to its rearward limit of movement, the rear portions of the pawls 66 strike the hook-shaped extremities of the retaining hooks 69, causing the said extremities to rise sufficiently to allow the rear ends of the pawls to enter the recesses 77, the said pawls striking with some force against the rear walls 112 of said hooks. The buffer spring 76, however, yields sufficiently to prevent any injury to the mechanism under the circumstances stated.

In order to operate the pan 95 for the discharge of the dirt delivered to it by the bucket after each discharge, provision is made for causing the receiving pan to travel upon the transversely arranged conveyer frame 96, from the dotted line position shown in Figs. 1 and 2, to the full line position shown in Figs. 1, 2 and 5, and the mechanism adapted to accomplish this purpose will now be described.

Centrally journaled in the conveyer frame 96 is a transverse shaft 113 upon the center of which is mounted a spool or drum 114 around which passes one or more convolutions of a cable 115, one extremity of which is secured to one end of the pan 95 as shown at 116, while its opposite extremity is secured to the opposite end of the pan.

At the outer extremity of the shaft 113 beyond the framework of the conveyer, is located a removable drum 117 around which passes a cable 118, the two runs of the cable first engaging pulleys 149 mounted on shaft 123, from which they pass to pulleys 119 mounted at the extremities of the long arms 120 of bell crank levers 122 fulcrumed on the shaft 123 and having their short arms 124 connected by means of spiral springs 125 with stationary members 126. This cable 118 extends rearwardly, passing over guide pulleys 150, its extremities being connected with the rear part of the carriage as shown at 127 and 128 respectively. Hence as the carriage travels upon its track, it actuates the cable 118 for operating the pan 95, and the arrangement is such that during the forward travel of the bucket, the pan is returned from its position underneath the conveyer frame to its upright position ready to receive the contents of the loaded bucket as soon as the latter is in position to dump. Again as the bucket carriage moves rearwardly, the operating cable 118 is moved in the reverse direction, and the pan is moved from its upright position to the inverted position on the conveyer frame.

In case it should be desired to cause the pan 95 to travel around the opposite extremity of the conveyer frame, it is only necessary to remove the drum 117 from the squared extremity of the shaft 113 upon which it fits, and reverse its position, whereby the depending runs of the cable 118 will be crossed at the forward end of the machine, thus causing the spool or drum 117 to travel in the reverse direction.

When the bucket carriage reaches its forward limit of travel, stops 129 thereon engage buffer members 130, the shanks of the said members being slidable in frames 131 in which are located springs 132 which yield in response to the thrust of the bucket carriage, since the shank of each buffer within the buffer frame 131 is acted on by a stop 134 carried by the shank 135 of the buffer device.

The transversely arranged conveyer frame is supported upon uprights 136 mounted on the front extremity of the vehicle body. These uprights are equipped on one side of the pan 95 with a laterally arranged housing plate 137, to keep the dirt from falling over the adjacent side of the flexible pan 95. An additional housing plate 138 is also mounted on the opposite side of the frame for the same purpose. The plate 137 occupies a higher position than the plate 138, owing to the fact that the discharge of the dirt from the bucket when in the position 2 (see Fig. 2), would have a tendency to throw the dirt over the side of the pan adjacent the housing plate 137.

Attention is called to the fact that the operating cable 115 connected with the flexible pan 95, passes around pulleys 139 located at the opposite extremities of the conveyer frame. The draft cables 59 pass over guide pulleys 60 mounted on a shaft 123 located

at the upper extremity of the forward portion of the upright frame, the said pulleys being mounted on the shaft 123.

Attention is called to the fact that the buffer action of the retaining hooks 69, is permitted by virtue of the fact that the shanks 70 of the hooks are slotted as shown at A, to receive a guide pin B carried by the frame 71. These buffer hooks 69 are prevented from swinging forwardly too far as the bucket carriage suddenly returns to its rearward limit of movement, by a bent bar 142 to whose extremities are connected spiral springs 143, the opposite extremities of the springs being connected with the adjacent portions of the track members 44.

From the foregoing description the use and operation of my improved machine will be readily understood. Assuming that the bucket carriage is in its normal position at the rear end of the vehicle frame and locked upon the vehicle as illustrated in Figs. 1 and 6, as power is applied to the draft cable 59, there is a pull both upon the vehicle and upon the bucket carriage. However, as the carriage is located upon the vehicle, the power applied to the draft cable causes the vehicle to travel forwardly until the scraper bucket 38 enters the earth which has been loosened by the plows 7. As soon as the forward end of the bucket enters the earth the contact with the latter has a tendency to pull the forward end of the bucket downwardly, and this movement acting upon the supporting hooks 89 and the triangular plates 85, serves to actuate the rods 80 sufficiently to release the pawls 66, whereby the latter are allowed to move upwardly to the dotted line position in Fig. 6, thus disengaging the carriage pawls from the buffer hooks. Now as less power is required to cause the loaded bucket and its carriage to move forwardly on the track, than to move the vehicle, the latter ceases to move and the power of the draft cable acts upon the carriage to cause it to move to its forward and uppermost position upon the framework of the structure. As soon as this occurs the supporting hooks 89 are disengaged from the bucket by coming in contact with the rod 126. The bucket then turns upon its trunnions to the position 2 in Fig. 2, allowing its contents to drop into the pan 95. The bucket will then begin its rearward movement with the carriage by virtue of the recoil of the springs 53, which causes the cable 49 to be rewound upon the drum 50. Just as the bucket and carriage commence their rearward movement, the bucket first strikes a buffer bar 101 and immediately thereafter engages the transverse top member of the U shaped swinging frame 106 which moves with the bucket and simultaneously lifts the latter to the dotted line position designated 3 in Fig. 2, whereby the pins 91 of the bucket are caused to reëngage the hook-shaped extremities of the supporting hooks 89. The bucket and carriage then continue their rearward travel and when they reach their rearward limit of movement the pawls 66 interlock with the retaining buffer hooks 69 and the bucket and carriage are in position to repeat the operation just described.

Having thus described my invention, what I claim is:

1. The combination with a vehicle, of a bucket mounted to travel back and forth thereon, means for imparting both the forward and rearward travel to the bucket, a pan arranged to receive the material from the bucket and to reciprocate transversely on the vehicle to discharge the material so received, a cable having both extremities connected with the bucket, and a drum reversely connected in operative relation with the pan, the cable being connected with the drum to cause the latter to rotate in either direction depending upon the position of the drum, substantially as described.

2. The combination with a vehicle, of a bucket mounted to travel back and forth thereon, means for imparting both the forward and rearward travel to the bucket, a pan arranged to receive the material from the bucket, an endless track upon which the pan is adapted to travel in reverse directions, the pan while at one limit of movement being in position to receive the material from the bucket and at its other limit of movement in an inverted position for discharging the material so received, and means connected with the pan and operated by the travel of the bucket for imparting travel to the pan in reverse directions, substantially as described.

3. The combination with a vehicle, of a bucket mounted to travel back and forth thereon, means for imparting both the forward and rearward movement to the bucket, a pan arranged to receive the material from the bucket, a loop shaped track on which the pan is adapted to travel in reverse directions, the pan while at one limit of movement being in position to receive the material from the bucket, and while at its opposite limit of movement in an inverted position for discharging the material so received, and means connected with the pan and operated by the travel of the bucket for alternately bringing the pan to the receiving and discharging positions, substantially as described.

4. The combination with a vehicle, of a carriage mounted to travel thereon, a bucket trunnioned on the carriage, means mounted on the carriage and detachably connected with the forward extremity of the bucket for supporting the latter in the upright

position, means for releasing the said supporting means from the bucket to allow the latter to dump, a swinging frame adapted to engage the bucket after dumping when the carriage travels rearwardly for restoring the connection between the bucket and the supporting means, and means for limiting the rearward movement of the frame, substantially as described.

5. The combination with a vehicle, of a carriage mounted to travel thereon, a bucket trunnioned on the carriage, means connected with the forward part of the bucket for supporting the latter in the upright position, means for releasing the supporting means from the bucket to allow the latter to dump, and a swinging frame mounted upon the vehicle and adapted to actuate the bucket as the latter travels rearwardly for automatically restoring the connection between the bucket and said supporting means.

6. The combination with a vehicle, of a carriage mounted to travel thereon, a bucket trunnioned on the carriage, means mounted on the carriage and detachably connected with the forward part of the bucket for supporting the latter in the upright position, and a swinging frame mounted on the vehicle for automatically restoring the connection between the bucket and said supporting means.

7. The combination with a vehicle, of a carriage mounted to travel thereon, a bucket trunnioned on the carriage in the rear of its center of gravity, means mounted on the carriage and detachably connected with the forward part of the bucket for supporting the latter in the upright position, and means mounted on the vehicle for automatically restoring the connection between the bucket and said supporting means, said means comprising a swinging frame arranged to lift the forward part of the bucket as the latter moves rearwardly, after dumping, into interlocking engagement with said supporting means.

8. The combination with a vehicle, of a carriage mounted to travel thereon, a bucket trunnioned on the carriage, means mounted on the carriage and detachably connected with the forward part of the bucket for supporting the latter in the upright position, means for releasing the said supporting means from the bucket to allow the latter to dump, and means for restoring the connection between the bucket and said supporting means, comprising a U-shaped swinging frame which the bucket engages after dumping.

9. The combination with a vehicle, of a carriage mounted to travel thereon, a bucket trunnioned on the carriage in the rear of its center of gravity, means mounted on the carriage and detachably connected with the bucket for supporting the latter in the upright position, means for releasing the said supporting means from the bucket to allow the latter to dump, and a U-shaped depending buffer adapted to engage the forward extremity of the bucket as it turns on its trunnions to assume the dumping position.

10. The combination with a vehicle, of a carriage mounted to travel back and forth thereon, means for imparting forward movement to the carriage, and a buffer mounted at the forward extremity of the vehicle and provided with a forked extremity apted to engage the front axle of the carriage as the latter reaches its forward limit of travel, substantially as described.

11. The combination with a vehicle, of a carriage mounted to travel thereon, means for normally locking the carriage against movement in respect to the vehicle, said means including buffer hooks pivotally mounted on the vehicle and adapted to interlock with pawls pivotally mounted on the carriage, and means mounted on the carriage for normally locking the pawls against turning to release the hooks.

12. The combination with a vehicle, of a bucket mounted to travel back and forth thereon, means for imparting both the forward and rearward travel to the bucket, a pan arranged to receive the material from the bucket and to reciprocate transversely on the vehicle to discharge the material so received, a cable having both extremities connected with the bucket, and a drum reversibly connected in operative relation with the pan, the cable being connected with the drum to cause the latter to rotate in either direction depending upon the position of the drum, substantially as described.

13. The combination with a vehicle, of a bucket mounted to travel back and forth thereon, means for imparting both the forward and rearward travel to the bucket, a pan arranged to receive the material from the bucket and to reciprocate transversely on the vehicle to discharge the material so received, a cable having both extremities connected with the bucket, the said cable being connected in operative relation with the pan to cause the latter to reciprocate, and spring actuated arms mounted upon the vehicle and carrying rollers over which the cable passes, the said arms being arranged to take up the slack of the cable, substantially as described.

14. The combination with a vehicle, of a bucket mounted to travel back and forth thereon, means for imparting both the forward and rearward travel to the bucket, a pan arranged to receive the material from the bucket and to reciprocate on the vehicle to discharge the material so received, a cable having both extremities connected with the

bucket, the cable being also connected with the pan to cause the latter to reciprocate, substantially as described.

15. The combination with a vehicle, of a bucket mounted to travel back and forth thereon, the bucket being trunnioned, means detachably connected with the forward extremity of the bucket for supporting the latter in the upright position, means for releasing the said supporting means from the bucket to allow the latter to dump, and a swinging frame mounted on the vehicle and adapted to engage the bucket on its rearward travel for automatically restoring the connection between the bucket and the said supporting means, substantially as described.

16. The combination with a vehicle, of a bucket mounted to travel thereon, means for normally locking the bucket against movement in respect to the vehicle, said means including buffer hooks pivotally mounted on the vehicle and adapted to interlock in operative relation with the bucket, and means for normally holding the buffer hooks in operative relation with the bucket, substantially as described.

17. The combination with a vehicle, of a carriage mounted to travel thereon, means for normally locking the carriage against movement in respect to the vehicle, said means including buffer hooks pivotally mounted on the vehicle, pawls pivotally mounted on the carriage and with which the buffer hooks interlock, and a spring-held locking device mounted on the carriage and normally engaging the pawls for locking the pawls against turning, and means for releasing the said locking device from engagement with the pawls, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

LEONARD C. WOOD.

Witnesses:
A. J. O'BRIEN,
F. E. BOWEN.