

[54] VEHICLE MOUNTED EARTH SEPARATING AND CONVEYING SYSTEM

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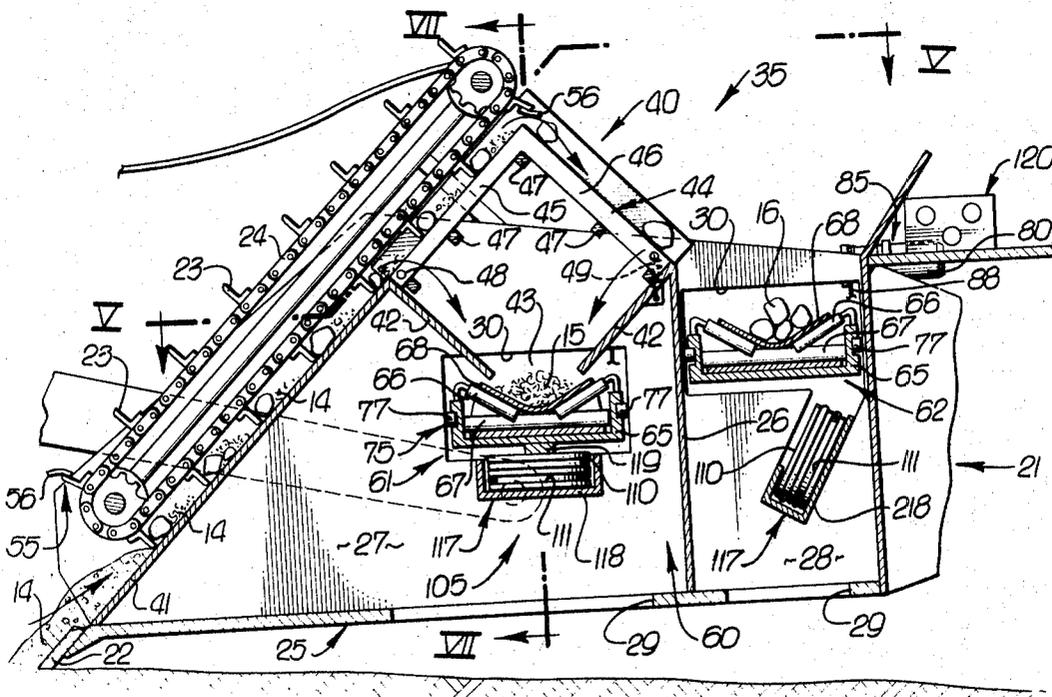
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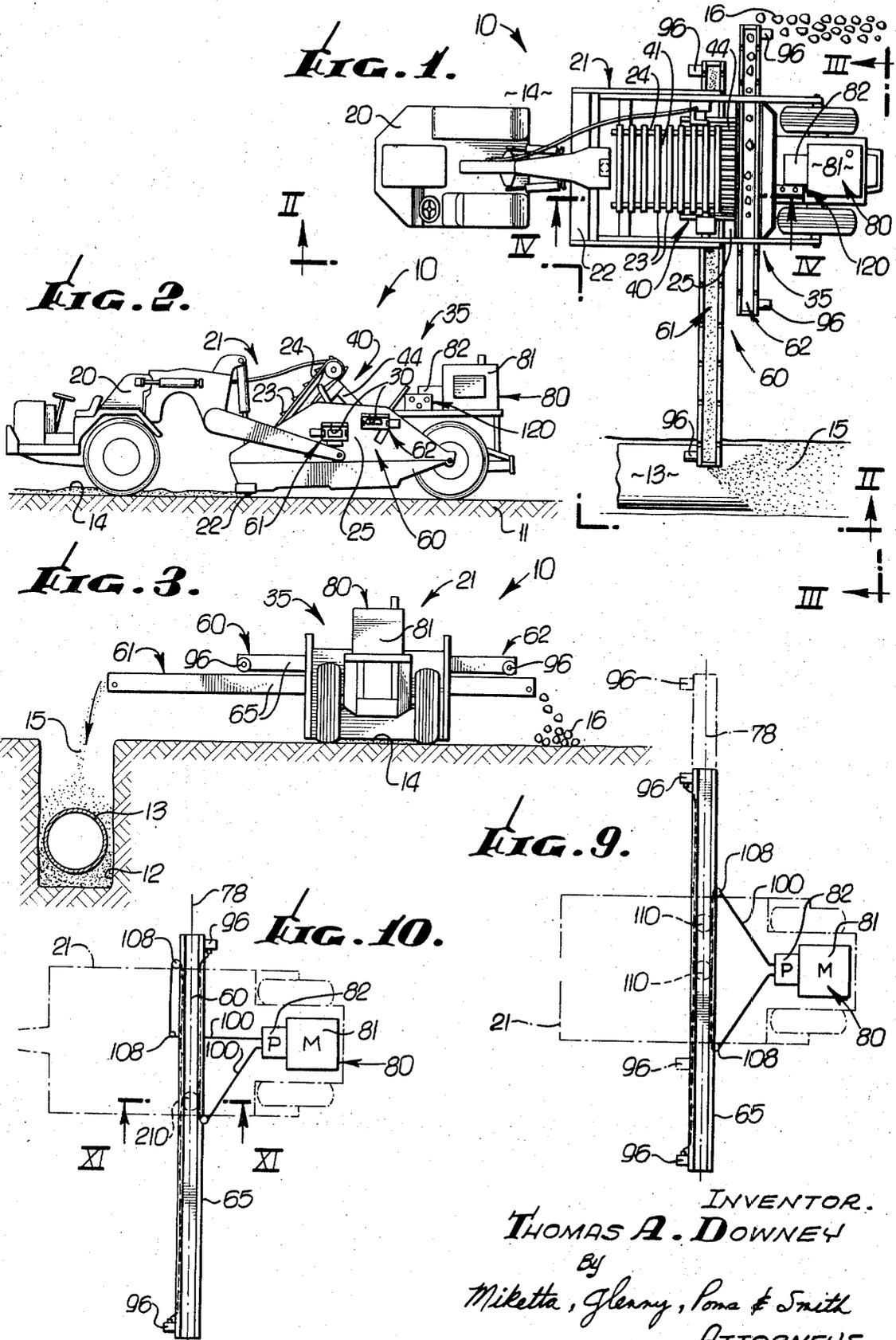
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[57] ABSTRACT

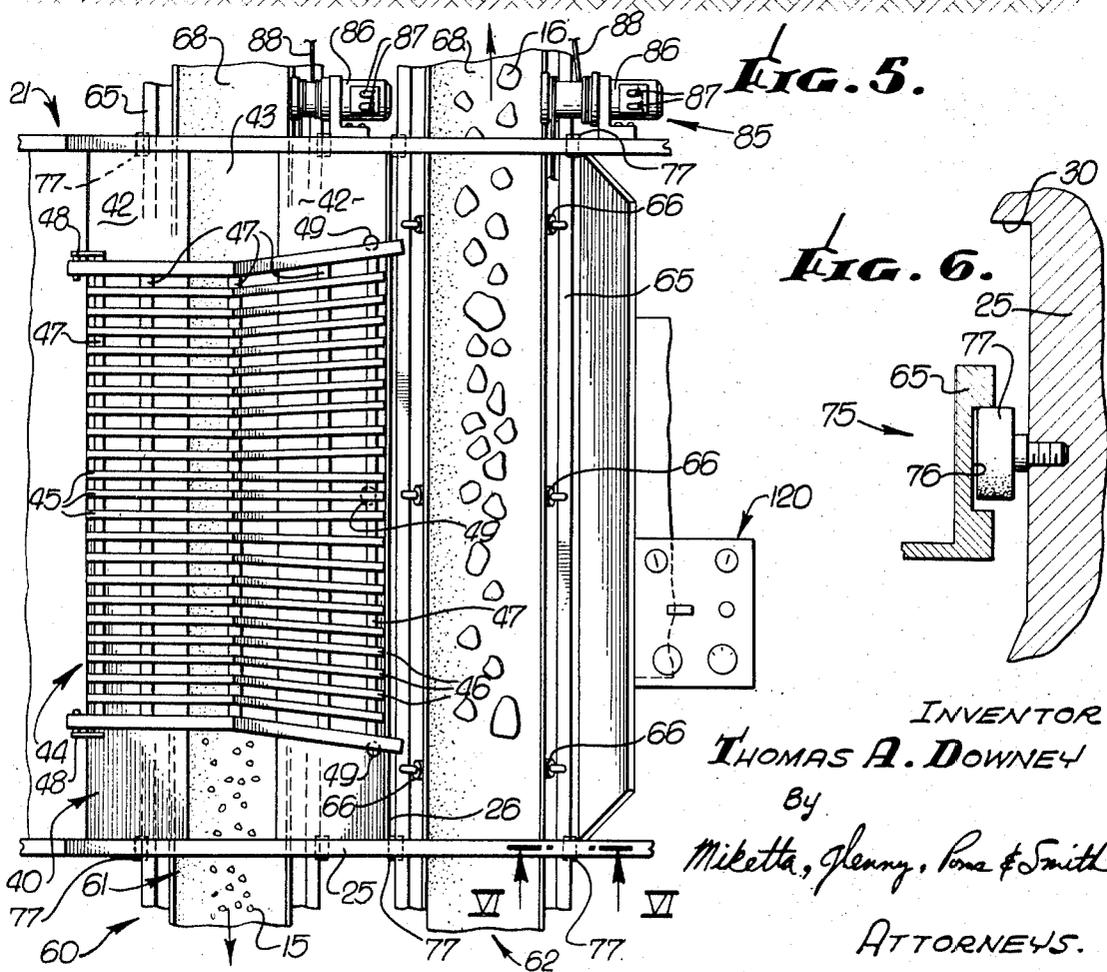
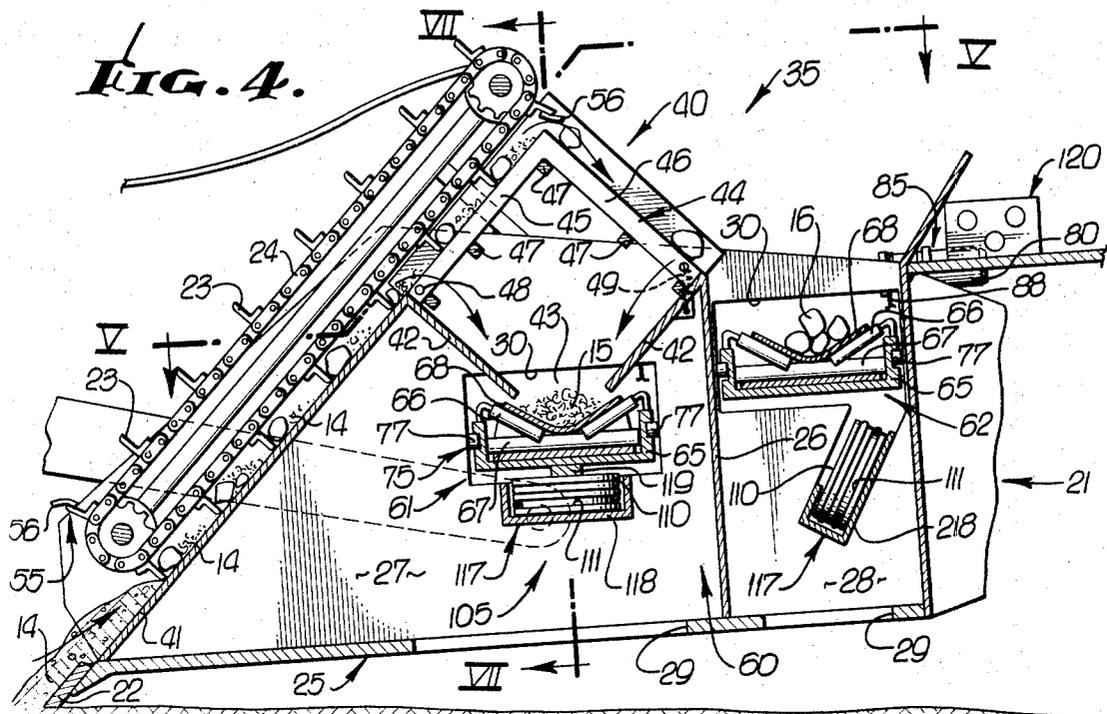
An earth moving vehicle including a scraper for collecting rocky earth and other native material to be carried upwardly by an endless paddle elevator across a grizzly for separating the material into fines and larger aggregates or tailings. The fines drop through the separator onto a continuously moving transverse conveyor adapted to discharge the fines along a line parallel to the line of vehicle movement and spaced laterally therefrom, for example in a partially filled trench for a pipeline or the like. The tailings are simultaneously discharged onto a second transversely extending continuously moving conveyor to be discharged along a longitudinal ridge, preferably on the opposite side of the vehicle from the trench being filled, and extending parallel to movement of the vehicle. The conveyors are driven by suitable motor means, preferably hydraulically actuated by pressurized fluid from a pump on the vehicle, the fluid being conducted to and from the hydraulic motors by flexible conduits wound around a sheave to maintain proper tension in the fluid lines and to avoid slack or fouling thereof, while permitting the operator to selectively adjust the discharge ends of the conveyors at desired distances laterally of the vehicle.

1 Claim, 11 Drawing Figures

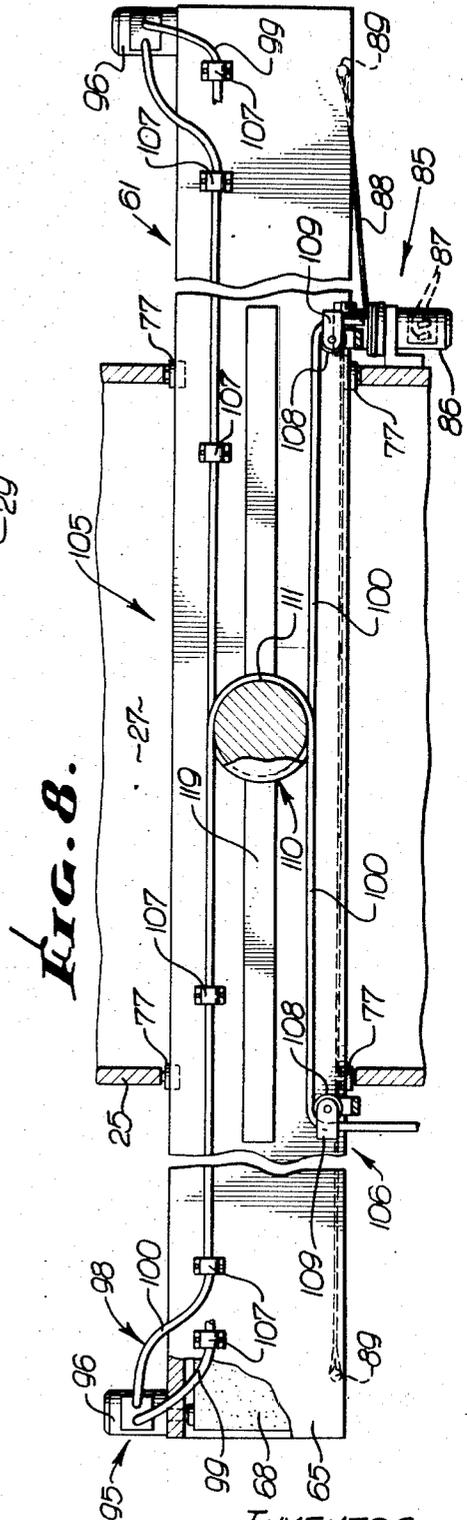
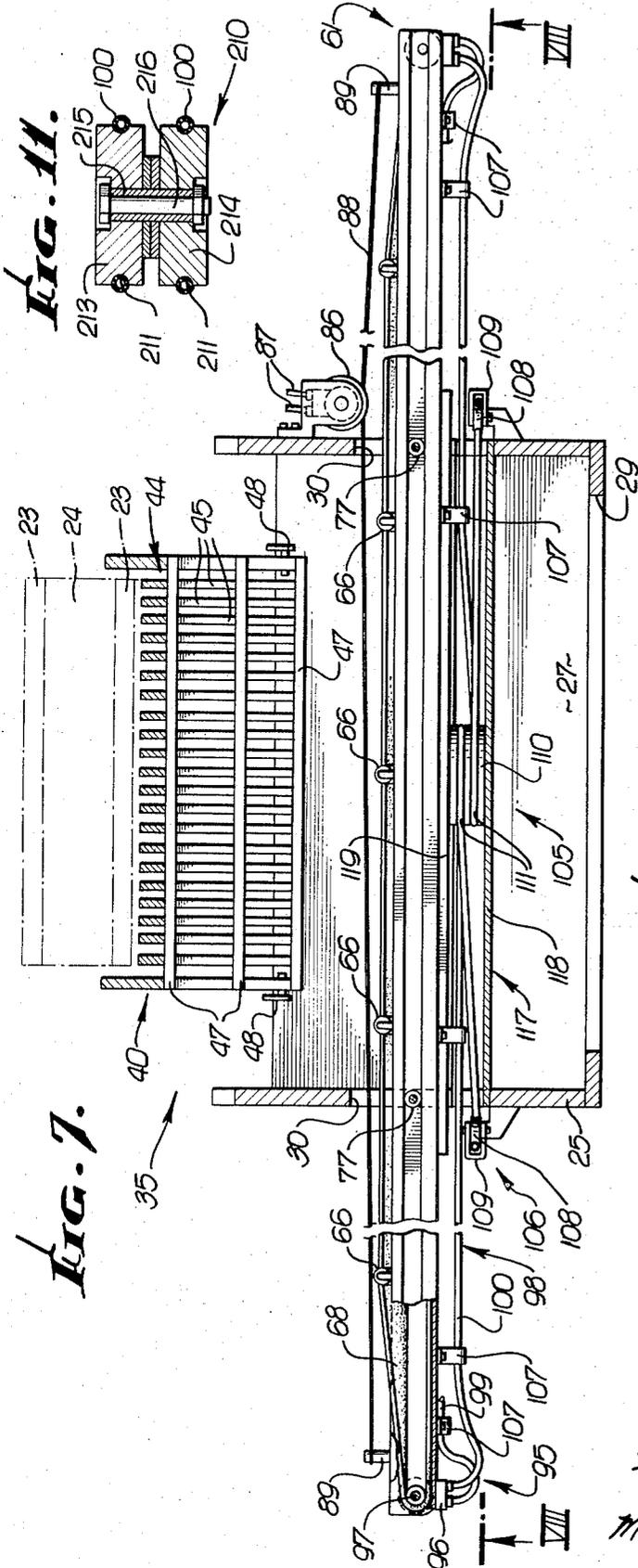




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VEHICLE MOUNTED EARTH SEPARATING AND CONVEYING SYSTEM

BACKGROUND OF THE INVENTION

This invention relates to earth moving equipment, and more particularly, to the construction of a separating and conveying system for an earth moving vehicle which separates material including rocks and dirt collected by the vehicle into fines and tailings and deposits them along separate lines parallel to and spaced laterally from vehicle movement.

In conventional operations involving the burying of conduits, pipelines and similar longitudinal underground apparatus, a trench is first dug by well known equipment, which deposits the native material from the trench along a line extending generally parallel to the trench. Later, during actual filling of the trench, the native material, or at least much of it, is used for refilling the trench, or backfilling. During the backfilling operation, engineering specifications for the fineness of the dirt and similar material used are frequently imposed, requiring, for example, the relatively fine material be applied immediately around the pipeline, with the larger pieces of material or aggregate used only after the pipeline itself has been adequately covered with fine material. Additionally, it is frequently required that the material be compacted during filling of the trench, either by being sprayed with water or by mechanical compacting means. It is thus frequently necessary to make a number of passes along a trench in order to completely fill it in accordance with specifications laid down, with material of a prescribed fineness used during each one of the successive passes. The present invention, as will be understood as the description progresses, admirably fills this need by providing an efficient means for continuously picking up from the ground material, which may be the native material originally extracted from the trench, separating that material into fines and aggregates or tailings, and depositing the fines along a selected line laterally spaced from the vehicle as it moves along adjacent the trench; and for simultaneously depositing the aggregates or tailings along another line parallel to the vehicle movement and spaced therefrom, preferably but not necessarily on the opposite side of the vehicle from the trench into which the fines are deposited.

Alternatively, for certain applications it may be unnecessary to deposit the aggregates or tailings along a line spaced away from the vehicle, and such tailings may accordingly be merely dropped under the vehicle as it moves along, the tailings to be subsequently used in a later trench-filled operation, or merely left in place. Thus, the system in accordance with the present invention may include only a single laterally extending conveyor, for the fines separated by the separator; or two separate conveyors, each extending laterally of the axis of the movement of the vehicle, and continuously moving to carry the fines or the tailings, respectively, to desired locations along the path of movement of the vehicle and spaced laterally therefrom.

BRIEF DESCRIPTION OF THE INVENTION

Generally, the vehicle mounted system of the present invention includes a scraper for collecting native material including rocks and dirt, and an endless paddle elevator for moving the material upwardly across a

separating means such as a grizzly, to separate the material into small particles, or fines, and large aggregates or tailings. The system includes conveyor means for transporting the separated material, either fines or tailings, to a desired distance laterally of the travel of the vehicle, thereby forming two separate ridges of the fines and tailings, desirably on opposite side of the vehicle as it moves. The separated ridges are thus available for backfill operations in a trench or similar excavation being formed. Alternatively, either the fines or the tailings may be directly deposited in a trench, as during backfilling.

The conveyors are driven by suitable motor means, herein illustrated as hydraulic, and means are provided in accordance with the invention for conducting pressurized fluid from an engine driven pump on the vehicle to and from the hydraulic motors actuating the conveyors. Such means provides for maintaining the hydraulic lines under proper tension, regardless of the position of each of the conveyors laterally of the vehicle. Thus the ridges of fines and tailings may be deposited at any desired distances from the vehicle, within a wide range at the selection of the operator.

Therefore, it is the primary object of this invention to provide a novel vehicle mounted system for continuously separating native earth material and conveying the separated material laterally of the vehicle. Additional objects and purposes are to provide, in such a system, laterally extending continuously moving conveyor means having discharge ends which may be positioned at desired distances from the vehicle proper; to provide, in such a system, an earth moving vehicle with a grizzly over which the collected and elevated native material is passed to continuously separate the material into fines and tailings; to provide such a system including conveyor means for carrying fines laterally of the movement of the vehicle and discharging the fines either into a trench or on the ground to form a parallel ridge spaced laterally from the vehicle; to provide in such a system conveyor means for similarly receiving and depositing the tailings in a second parallel ridge, desirably on the opposite side of the vehicle from the fines; to provide in such a system means permitting the operator to selectively adjust the position of the effective discharge end of each of the laterally disposed conveyors, on either side of the vehicle as desired; to provide, in such a system, lines for conducting pressurized fluid to hydraulic motors mounted on the laterally adjustable conveyors; to provide a sheave for maintaining the pressurized hydraulic lines under proper tension regardless of the lateral position of each of each of the conveyors relative to the vehicle; and for other and allied objects as will be understood from a reading of the following description of a preferred embodiment of the invention, taken in connection with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS:

FIG. 1 is a top plan view of a vehicle having a separating and conveying system according to this invention, said vehicle being shown moving leftwardly as seen in the drawing along a path of travel parallel to a pipeline trench for partially fill the trench with separated fines;

FIG. 2 is a side elevational view of the vehicle taken along the stepped plane II—II of FIG. 1;

FIG. 3 is a rear view of the vehicle looking forwardly along the plane III—III of FIG. 1;

FIG. 4 is a fragmentary sectional view showing the paddle elevator, grizzly and conveyors, taken along the plane IV—IV of FIG. 1;

FIG. 5 is a fragmentary top view taken along the broken line V—V of FIG. 4, and showing the details of the grizzly and conveyors;

FIG. 6 is a fragmentary sectional view on an enlarged scale taken along the plane VI—VI of FIG. 5;

FIG. 7 is a vertical sectional view looking forwardly on the plane VII—VII of FIG. 4, showing the details of construction of one of the conveyors.

FIG. 8 is a view looking upwardly along the plane VII—VIII of FIG. 7, showing the details of the preferred arrangement of the hydraulic lines and the sheave therefor;

FIG. 9 is a schematic view, looking downwardly, of part of the preferred arrangement of the hydraulic system, with one conveyor shown in solid lines in its central position and in phantom lines in its position extended fully rightwardly.

FIG. 10 is a view similar to FIG. 9, but showing an alternative arrangement of the hydraulic system, with the conveyor shown in its left extended position.

FIG. 11 is a sectional view taken along the line XI—XI of FIG. 10 showing the details of the construction of the sheave used in an alternative arrangement of the hydraulic system.

DETAILED DESCRIPTION

Referring now to the drawings, and particularly to FIGS. 1, 2 and 3, an improved earth moving vehicle 10 is shown moving along the ground 11 containing a trench 12 in which a pipeline 13 has been laid. The vehicle 10 is shown collecting native material 14 previously excavated from the trench 12 and piled in a ridge parallel to the trench 12, separating the material into small fines 15 to be deposited in the trench 12 over or adjacent the pipeline 13 and into large tailings 16 to be deposited on the ground 11.

Basically, the earth moving vehicle 10 includes a conventional motor driven tractor 20 pulling a modified scraper body 21 (base platform) having a scraper blade 22 for collecting native material 14 from the ground 11 to be moved by the paddles 23 of a motor driven endless elevator 24 into a container 25. As best seen in FIG. 4, the container has a transverse dividing plate 26 dividing the container into a fore section 27 and an aft section 28. Each of the sections 27 and 28 is provided with a bottom opening 29 as well as being provided with horizontally aligned side openings 30 for a purpose which will appear later.

Generally, the separating and conveying system 35 receives native material 14 from scraper blade 22 and elevator 24. The system 35 includes the following major structural components, each indicated generally by its respective reference character, namely, separating means 40, transverse carrying means 60, mounting means 75, drive means 80 and control means 120. The drive means 80 includes a transverse moving means 85 and a conveyor drive means 95 including compensating means 105 for tensioning the flexible hydraulic lines 98 running from the pump 82 to the conveyor motors 96.

As best seen in FIGS. 4 and 5, the separating means 40 serves to receive the native material 14 from the

endless elevator 24 and separate the native material 14 into fines 15, being smaller than a predetermined size and into tailings 16, being larger than the predetermined size. A plate 41 is mounted in the container 25 and extends upwardly and rearwardly from the scraper blade 22 parallel to elevator 24 and spaced therefrom by the height of a paddle. Plate 41 terminates rearwardly at the forward one of a pair of funnel plate 42 located in the fore section 27 of the container 25. The funnel plates 42 are inclined downwardly and toward one another, terminating at a lower opening 43.

Rearwardly and above the juncture of plates 41 and 42 there is provided a classifying separator which may take any of many forms well known in the art. Particularly well suited for the purposes of this invention is a grizzly indicated generally at 44, located above funnel plates 42. Grizzly 44 includes a series of spaced parallel front bars 45 rising to an apex from which spaced fanned rear bars 46 extend downwardly and rearwardly. The front and rear bars 45 and 46 are braced by interconnecting bars 47.

The forward end of the grizzly is pivotally attached at 48 to container 25, and its rear end is resiliently supported by a set of laterally spaced springs 49 on the container. This mounting permits a shaking motion to be imparted to the grizzly. The spacing between the bars 45 and 46 determines the maximum size of fines 15. The mounting is such as to facilitate removal of the grizzly for periodic replacement or change of gouge.

Normally the motion of the vehicle 10 will be sufficiently rough to impart a shaking motion to the grizzly 14 on the springs 49. However, if additional motion is required, jarring means 55 may be provided. In the preferred embodiment the jarring means 55 are nubs 56 located on the edges of some of the paddles 23 of the endless elevator 24. As the paddles 23 with the nubs 56 pass over the grizzly 44, the nubs 56 strike the grizzly 44 to pivot it at 48 and the springs 49 in returning the grizzly 44 to the neutral position impart a shaking motion thereto to aid in the separation of the material 14.

The system 35 in the preferred embodiment is also provided with transverse carrying means 60 for receiving the native material 14 from the separating means 40 and for transporting the material to a desired location alongside the vehicle for discharge thereof. Actually, the transverse carrying means, conveyor, or movable platform 60 in the preferred embodiment includes a first transverse carrying means 61 for receiving the fines 15 and a second transverse carrying means 62 for receiving the tailings 16. As both the first and second transverse carrying means or conveyors 61 and 62 of the preferred embodiment are of substantially similar construction, only a general description will be given which applies equally to both.

Generally the preferred embodiment of the transverse carrying means or conveyor 60 includes an elongated frame 65 having a U-shaped cross section. The frame is provided with sets of upper rollers 66 in a flattened V relationship, and with lower rollers 67. A conveyor belt 68 extends along the upper rollers 66 where it is formed by the rollers 66 into a generally U-cross section, and along the lower rollers 67 to form a continuous loop.

The frame 65, and the belt 68 carried thereby, is mounted across the scraper body 21 through the side openings 30 of the container 25 by mounting means indicated generally at 75. In the preferred embodiment, the mounting means 75 includes indented horizontal tracks 76 in the sides of the frame 65. As best seen in FIG. 6, the mounting means 75 also includes rollers 77 rotatably mounted to the scraper body 21 and extending into the tracks 76 to movably mount the frame 65 to the scraper body 21 for transverse movement relative thereto, along a path of reciprocating 78.

The system 35 also includes drive means 80 to provide auxiliary power for the vehicle 10. In the preferred embodiment, the drive means 80 includes a conventional diesel engine 81 drivingly connected to a pump 82 with a built-in hydraulic fluid reservoir. Both the pump 82 and the engine 81 are mounted on the scraper body 21 behind the container 25 and over the rear wheels. Of course other methods of providing the auxiliary power and of transferring the power could be used, if desired.

The drive means 80 also includes transverse moving means 85 for moving the transverse carrying means or conveyor 60 transversely of the scraper body 21 along the path of reciprocation 78 relative the body 21. In the preferred embodiment, the transverse moving means 80 includes a hydraulically driven drum winch 86 for each transverse carrying means 61 and 62 mounted to the scraper body 21 adjacent the respective side opening 30 in the container 25. Each winch 86 is connected by hydraulic lines 87 to the pump 82. A cable 88 has one end thereof anchored at each end of the frame 65 by suitable cable anchors 89. The cable 88 extends from one end of the frame 65, around the drum of winch 86 several times before extending to the opposite end of the frame 65. As hydraulic fluid is supplied to the winch 76 through the lines 87, the drum thereof rotates to pull on the cable 88 and to move the frame 65 transversely relative to the modified scraper body 21, as directed by the control means 120.

When the drum is stationary, the cable 88 maintains the frame 65 in a stationary position relative the body 21. Again there are other suitable systems of accomplishing the transverse movement such as a rack and pinion gears, etc., but the cable winch system is simple, rugged and therefore well suited for this application.

The drive means 80 also includes conveyor drive means 95 for rotating the belt 68 on the rollers 66 and 67. In the preferred embodiment, the conveyor drive means 95 includes a reversible hydraulic conveyor motor 96 at each end of the frame 65. Each motor 96 is drivingly connected to a drive roller 97 over which the belt 68 passes to be driven thereby. A series of hydraulic lines 98 are provided to supply hydraulic fluid under pressure from the pump 82 to the motor 96. The lines 98 include a cross line 99 extending from one conveyor motor 96 to the other conveyor motor 96 along the frame 65. The lines 98 also include a pair of flexible lines 100, each with one end connected to one of the conveyor motors 96, and the other end connected to the pump 82.

As the frame 65 and therefore the conveyor motors 96 thereon move transversely along the path of reciprocation 78 relative to the scraper body 21, and therefore the pump 82 mounted thereon, compensating means

105 must be provided to pay out and take in the flexible lines 100, during transverse movement of the frame 65.

As best seen in FIG. 8, generally the compensating means 105 includes guide means 106 having line guides 107 located along the lower surface of the frame 65, pulleys 108 located on the sides of the scraper body 21 adjacent the side openings 30, and line anchors 109 next to the pulleys 108. Most importantly the compensating means 105 also includes a sheave 110, 210 located under the frame 65, and containing circumferential grooves 111 for receiving the flexible lines 100 to be payed out or taken up as required.

There are many arrangements of the line guides 107, pulleys 108, line 100 and sheaves 110, 210 which will operate satisfactorily as compensating means 105. A preferred arrangement is shown in FIGS. 1 through 9 and one alternative arrangement is shown in FIGS. 10 and 11. In the two arrangements, many parts are the same and so will keep the same number while other parts are similar and will have numbers separated by 100.

In the preferred arrangement, the pulleys 108 are both located on the scraper body 21 (base platform) on the same side of the path of reciprocation 78. The motors 96 are both located on the same side of the frame 65 (movable platform) and are both on opposite sides of the path of reciprocation 78 from the pulleys 108. The line guides 107 form a line towards the center line of the body 21 (base platform). The sheave 110 of the preferred arrangement is a single wheel 112 preferably made out of rubber or rubber-coated metal. The single wheel 112 of course will have both grooves 111 in the circumference thereof.

As best seen in FIGS. 8 and 9, each flexible line 100 extends from its respective motor 96 inwardly along the bottom of the frame 65 (movable platform) through the line guides 107 to pass oppositely around the wheel 112 in a respective groove 111. From the wheel 112, the lines 100 pass outwardly on the opposite side of the path of reciprocation 78 from which the lines were previously located, around the pulleys 108 where the lines 100 are anchored by anchors 109 before extending to the pump 82. As best seen in FIG. 8, when the midway line of the frame 65 (movable platform) is at the center line of the scraper body 21 (base platform), the axis of the wheel 112 is generally at the intersection of the body 21 (base platform) center line with the path of reciprocation 78. As the frame 65 (movable platform) moves transversely along the path of reciprocation 78 as shown by the phantom lines of FIG. 9, the wheel 112 rotates appropriately to pay out one line 100 while taking in the other line 100, and at the same time the wheel 112 moves with the frame 65 (movable platform) along the path of reciprocation 78. The wheel 112 will move exactly one-half of the distance along the path of reciprocation 78 as the distance the frame 65 (movable platform) moves.

In the alternative arrangement of FIGS. 10 and 11, the motors 96 are located on the frame 65 (base platform) on opposite sides of the path of reciprocation 78, with the line guides 107 extending parallel to the path of reciprocation 78 from each motor. The pulleys 108 are located on the scraper body 21 (base platform) on opposite sides of the path of reciprocation 78.

The sheave 210 of the alternative arrangement is slightly more complicated than that of the preferred embodiment for reasons which will appear later, and includes as seen in FIG. 11, a pair of wheels 213 and 214. The wheels 213 and 214 have central bearings 215 through which a shaft 216 passes to rotatably secure the wheels 213 and 214 together. Each wheel 213 and 214 has one of the grooves 111 therein, and when the wheels are rotatably secured together, the grooves 111 have the same spacing as in the single wheel 112. The wheels 213 and 214 are constructed similarly to the wheel 112.

As best seen in FIG. 10, each line 100 extends from its respective motor 96 along the frame 65 (base platform) through the line guides 107 on opposite sides of the path of reciprocation 78 to pass the same direction around the wheels 213 and 214 respectively, in the respective grooves 111. From the wheels 213 and 214, the lines 100 pass outwardly along opposite sides of the path of reciprocation 78 from each other, and from where they were previously located, around the pulleys 108 where the lines 100 are anchored by anchors 109, before extending to the pump 82. Again, the center line of the wheels 213 and 214 will be located on the intersection of the path of reciprocation 78 with the scraper body 21 (base platform) center line when frame 65 (movable platform) extends equally on either side of the scraper body 21. As the frame 65 (movable platform) moves transversely along the path of reciprocation 78, as shown in FIG. 10, the wheels 213 and 214 rotate oppositely but appropriately to take up one line 100 while paying out the other line 100 to maintain the proper tension in the lines. Again the same relationship between the travel distance by the center line of the wheels 213 and 214 and by the frame 65 (movable platform) is true.

One important difference to notice between the preferred arrangement of FIGS. 1 through 9, and the alternative arrangement of FIGS. 10 and 11, is that the lines 100 extend from opposite sides of the path of reciprocation, and therefore a two-wheel sheave 210 is required for the alternative arrangement where a one-wheel sheave 110 will suffice for the preferred arrangement. Of course a two-wheel sheave could be used for the preferred arrangement also but it is not needed.

It will be particularly noted that in both arrangement just described that the sheave 110 is not attached to the frame 65 (movable platform) or the scraper body 21 (base platform) but must be free to move transversely along the path of reciprocation 78 during the positioning of the frame 65 (movable platform) relative to the scraper body 21 (base platform). The tension in the lines 100 produces a force couple on the sheave means 110 tending to cock or cant the sheave 110 from its plane of movement and so restraint means 117 is provided for opposing the action of the force couple and maintaining the sheave means 110 in its plane of movement as the frame 65 (movable platform) is positioned relative to the body 21 (base platform).

For the first transverse carrying means 61, the restraint means 117 includes a channel 118 mounted to the scraper body 21 (base platform) with a bar 119 mounted to the frame 65 (movable platform) which together form an elongated opening slightly larger than the sheave 110 for slidably receiving the sheave means

110. The size of the opening is such that the sheave 110 will slide therein but will engage either the channel 118 or the bar 119 if the sheave 110 begins to cant while sliding.

For the second transverse carrying means 62, the restraint means 117 includes a channel 218 of substantially vertical tilt to provide a substantially vertical tilt to the sheave means 110 thereof. The difference in tilt of the sheave means 110 of the first and second carrying means 61 and 62 is due to clearance requirements of the preferred embodiment and has no significance to the general operation of the sheave means 110. However it must be noted that the alternative arrangement of the lines 100 requires that the plane of movement of the sheave 110 be parallel to the frame 65 (movable platform) while the plane of movement of the sheave 110 of the preferred arrangement of the lines 100 is not so restricted. Practically then, the second transverse carrying means 62 must have the preferred arrangement of the lines 100 while the first transverse carrying means 61 may use either arrangement.

The preferred embodiment of the system 35 is provided with a control means 120 for controlling the position of the transverse carrying means 60 and the speed and direction of the conveyor drive means 95. In the preferred embodiment the control means 120 involves suitable electronic and hydraulic controls, manually operable from a control panel 121 located adjacent the pump 82 on the scraper body 21.

Ideally, in operation, the vehicle 10 is driven alongside the trench 12 as shown in FIG. 3 with first transverse carrying means 61 extending out to the left with the end thereof suitably located over the trench 12 and the second transverse carrier means 62 more centrally located. As seen in FIG. 2, the scraper blade 22 is lowered to contact the ground 11 alongside the trench 12 where the native material 14 from the trench digging operation has been thrown. As seen in FIG. 4, the scraper blade 22 collects the native material 14 to be carried by the paddles 23 of the endless elevator 44 upwardly along plate 41 and along the grizzly 44 where the fines 15 drop through the spaced parallel bars 35 and the tailings 16 continue up over the grizzly apex to roll down to the fanned rear bars 36. Periodically during the time the native material 14 is passing over the grizzly 44, the nubs 56 jar the grizzly 44 enabling the springs 49 to provide a shaking action.

The fines 15, upon dropping through the grizzly 44, engage the funnel plates 42 to pass through the opening 43 and onto the belt 68 of the first transverse conveyor means 61. The movement of the belt 68 driven by the conveyor motors 86 carries the fines 15 to the left through the respective side opening 30. As the fines 15 reach the end of the frame 65, the fines 15 drop from the belt 68 into the trench 12, to cover the pipe line 13. Remember the belt 68 is concave to catch the fines 15 but should any of the fines 15 miss the belt 68, they will fall into the fore section 27 of the container 25 and out the bottom opening 29 thereof onto the ground 11 to be scraped up again on a later pass of the vehicle 10.

In the meantime, the tailings 16 from the grizzly 44 fall from the rear end of the grizzly 44 into the aft section 28 of the container 25 and onto the belt 68 of the second transverse carrying means 62. The movement of the conveyor belt 68 to the right, carries the tailings

16 to the right end thereof to be deposited on the ground on the opposite side of the vehicle 10 from the trench 12. The earth moving vehicle 10 continues along the trench 12 for a suitable distance covering part of the pipeline 13 with fines 14.

When the end of a particular run is reached, the earth moving vehicle 10 is turned around and the positions of the first and second transverse carrying means 61 and 62 are reversed from the control panel 121 by actuating the winch 86 to rotate the drums thereof and pull on cables 88, moving the frame 65 and the sheaves 110, 210 as needed to keep the slack out of the lines 100. Once the first and second transverse carrying means 61 and 62 are properly located, the directions of travel of the belts 68 are reversed from the control panel 120, to again move the fines 15 into the trench 12 while depositing the tailings 16 on the ground 11. The vehicle 10 then moves back along the trench 12 adding more fines 15 to cover the pipeline 13. Once the pipeline 13 in the trench 12 is completely covered with the fines 15, the balance of the trench 12 may be conventionally filled by bulldozing the remaining supply of tailings 14 into the trench 12.

It should be understood that the second transverse conveyor means 62 may be omitted from the earth moving vehicle 10 if only one pass along the trench is contemplated and the tailings 16 will drop through bottom opening 24 in the aft section 28 of the container 25, onto the ground 11 or collected in the aft section 28 if desired merely by plugging the aft bottom opening 28. However, if more than one pass along the trench is contemplated, the omission of the second transverse carrying means 62 without plugging aft opening 28

causes the tailings 16 to be repeatedly picked up by the scraper blade 22 only to be dropped again from the vehicle 10.

It should also be understood that the conveyor drive means 85 can be used with any movable platform containing motors which are driven from a source of energy stationary platform wherein the energy is transported by a plurality of lines by using the compensating means 95.

I claim:

1. In an earth moving vehicle including a movable open front container with an earth scraper carried thereby and an endless elevator for moving native material rearwardly and upwardly from the scraper into said container, the improvement comprising:

separating means for receiving material from the elevator and separating it into fines and tailings;

carrying means receiving the fines from the separating means, and transporting and depositing the fines transversely of the direction of vehicle movement to a desired location laterally spaced from the vehicle;

resilient support means for mounting the separating means on the container, the separating means having a resiliently neutral position relative to the container;

and jarring means for periodically engaging the separating means by moving it from its neutral position and thereafter releasing it, the jarring means being mounted on the endless elevator and cyclically engaging the separating means during elevator movement.

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