A trench compactor assembly for use with a piece of equipment, the trench compactor assembly comprises: a compactor wheel, a frame assembly, a compactor mount, and an exciter. The frame assembly comprises one or more primary frame members and one or more extension members. The one or more primary frame members have a first end disposed adjacent the rotational axis of the compactor wheel, a second end spaced apart from the peripheral compaction surface of the compactor wheel, and a length greater than the radius of the compactor wheel extending between the first end and the second end. The exciter is disposed adjacent the second end of the one or more primary frame members such that the exciter is substantially aligned with the first and second ends of the primary frame members and the rotational axis of the compactor wheel. The exciter is selectively connected to a hydraulic system of the piece of equipment such that the exciter is further selectively actuated to generate vibrations.
BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates generally to apparatus and methods for compacting or tamping soil, sand, and the like. More specifically, but not by way of limitation, the present invention relates to apparatus and methods for compacting soil, and the like with a rolling compactor member having vibration enhanced capabilities.

2. Brief Description of Related Art

Compaction of soil, sand, or the like is desirable in a number of circumstances and situations. For example, when installing underground utilities such as electric, telephone, or cable lines, a trench is generally formed in the ground by removing soil and the like. Once the utility line is installed in the trench, it is desirable to fully compact the removed soil back into the trench so as to fully fill the trench and prevent unsightly settling. Due to expansion or de-compaction of the soil as it is removed to form a trench, it is extremely difficult to fully compact the soil when filling the trench. As a result, soil must be mound over the top of the trench and often overlaps the sides of the filled trench. As traffic, rainwater, runoff, and the like pass over the trench, the soil eventually settles and re-compacts within the trench. Often this settling takes place unevenly, causing an unsightly and sometimes dangerous condition in which the trench is unevenly filled and may include mounds and divots or holes within the trench that may make it easier for an individual to trip or fall in or about the trench. These conditions often require further trips and further manpower to re-warrant the soil in the trench as settling occurs to ensure even compaction and filling of the trench over time. Such additional trips and manpower are time consuming and may not generate independent revenue, thereby detracting from separate revenue generating activities and making such trips and manpower even less desirable. As such, a need exists for devices and methods of filling and compacting trenches to improve effectiveness of such backfilling and reduce return trips needed to properly backfill.

A number of attempts have been made at creating devices to improve compaction of soil during backfill of a trench. For example, U.S. Pat. No. 3,737,244 discloses a rolling soil compactor attached to a vehicle by way of a three-point hitch and towed behind a drawing vehicle. The soil compactor has an adjustable eccentric within a hollow circular member. The eccentric is coupled to a hydraulic motor that drives the eccentric to create vibrations.

By way of another example, U.S. Pat. No. 4,913,581 discloses a self-propelled trench soil compactor including a vibratory frame pivotally connected to a mobile frame such that the vibratory frame can be moved up or down relative thereto. A soil compaction wheel is rotatably supported at an end of the vibratory frame. The soil compaction wheel is power driven to function as the propulsion means for the machine.

By way of yet another example, U.S. Pat. No. 5,479,728 discloses a self-contained backfill and tamper unit. The unit includes a tractor having a mast secured thereto. A vibrating and tamping wheel assembly is mounted on the mast which is pivotally secured to the tractor for limited arcuate motion from vertical. The vibrator and tamping wheel assembly is free-floating on the mast to isolate the tractor from vibration.

By way of yet another example, U.S. Pat. No. 5,526,590 discloses a vibratory compactor that mounts onto the loader arms of a skid steer. The compactor includes a freely turning compactor wheel that is vibrated at a desired frequency and intensity. The vibrator and the packing wheel are mounted onto a subframe which in turn is mounted through isolation mounts back to a main frame that is attached to the skid steer loader so that vibrations generated are not transferred to substantial levels back to the skid steer loader. The compactor includes a blade member that will move loose dirt into a trench that is being compacted by the packing wheel. The mounting for the packing wheel also can be adjusted to tilt the plane of the wheel, and the wheel can be moved laterally as well, to position the packing wheel close to fences or walls.

Each of the foregoing examples suffers certain shortcomings. With respect to the self-contained devices, the size of the devices makes their cost and transportation impractical. With respect to the last example designed to be mounted to a skid steer, the complexity of the frames may increase the weight of the device, and the inclusion of isolation members may provide a weaker point that may be relatively more susceptible to wear, tear, and breakage and may increase maintenance costs. As such, a continuing need exists for improved devices and methods for compacting soil, for example within a trench as or after the trench is backfilled.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a rear perspective view of a compactor assembly constructed in accordance with the present invention.

FIG. 2 is a front perspective view of the compactor assembly of FIG. 1.

FIG. 3 is a front perspective view of the compactor assembly of FIGS. 1 and 2.

FIG. 4 is a front view of the compactor assembly of FIGS. 1-3.

FIG. 5 is a rear view of a mount plate for use with the compactor assembly of FIGS. 1-4.

FIG. 6A and 6B are side and front views, respectively, of a compactor wheel for use with the compactor assemblies of FIGS. 14 and 5A-5C.

FIGS. 7A, 7B, and 5C are front, side, and top schematic views, respectively, of the compactor assembly of FIGS. 1-4.

FIGS. 8A and 8B are front and side views, respectively, of a wheel scraper assembly for use with the compactor assemblies of FIGS. 1-4 and 7A-7C.

FIG. 9 is a side elevational view of the compactor assembly in conjunction with a skid steer in accordance with the present invention.

DETAILED DESCRIPTION OF EXEMPLARY EMBODIMENTS

Referring now to the drawings, and more particularly to FIG. 1, shown therein and designated by the reference numeral 10 is one embodiment of a compactor assembly constructed in accordance with the present invention. The assembly 10 preferably includes a frame 14, a compactor wheel 18, and an exciter 20. The frame 14 preferably includes a pair of primary frame members 22, an exciter base 24, a pair of extension members 30, a mount plate 32, and a compactor mount 34. The primary frame members 22 are preferably substantially vertical, but in other embodiments may be any
suitable shape or configuration that permits the compactor assembly 10 to function as described herein.

Each primary frame member 22 is provided with an upper end 38, a lower end 42, and an offset portion 46 (FIG. 2). The primary frame members 22 are also preferably disposed as mirror images of one another with their offset portions 46 offsetting their respective upper ends 38 from their respective lower ends 42. In this way, the lower ends 42 of the primary frame members 22 are relatively closer together than the upper ends 38 such that the lower ends 42 are spaced apart from one another a distance about equal to, slightly larger than, or larger than the width of the center of the wheel 18. The primary frame members 22 are preferably disposed such that when the compactor wheel 18 is supported at the lower ends 42 of the primary frame members 22, the upper ends 38 of the primary frame members 22 are disposed above the top of the compactor wheel 18, as shown. Stated otherwise, the primary frame members 22 are sized such that the distance between the upper end 38 and the lower end 42 is greater than the radius of the compactor wheel 18 such that there is sufficient space within the assembled frame 14 to permit compactor wheel 18 to rotate therein.

Each extension member 30 preferably extends between a first end 46 and a second end 50. The first end 50 of each extension member 30 preferably engages or is otherwise connected or cooperatively associated with the upper end 38 of the corresponding primary frame member 22, such that the extension members 30 and primary frame members 22 are angularly disposed from one another, and preferably substantially perpendicular to one another. In other embodiments, the extension members 30 and the primary frame members 22 may alternatively be disposed at a relative angle of between about 45 degrees and about 135 degrees, between about 30 degrees and about 120 degrees, or between about 15 degrees and about 105 degrees. The second end 54 of each extension member 30 preferably engages or is otherwise connected or cooperatively associated with the mount plate 32 such that the mount plate 32 is spaced apart from the primary frame members 22 as shown. More specifically, the extension members 30 are preferably provided with a length that is greater than the radius of the compactor wheel 18, or a length such that the mount plate 32 is mounted far enough forward of the primary frame members 22 that the compactor wheel 18 is permitted to rotate within the assembled frame 14. The compactor mount 34 preferably engages a forward portion of the mount plate 32 such that the compactor mount 34 is the foremost portion of the assembled frame 14, as will be described in more detail below.

As best shown in FIG. 2, the primary frame members 22 are also preferably reinforced as necessary to permit the compactor assembly 10 to function as described herein. Specifically, in the embodiment shown, the primary frame members 22 are reinforced with angle members 58 and stiffener plates 62. The angle members preferably form a right angle sized and shaped to correspond to the offset portion 46 of each primary frame member 22. Similarly, the stiffener plates 62 are preferably sized to span a portion of each primary frame member 22 (adjacent to the upper end 38) and at least a portion of the respective angle member 58.

The primary frame members 22 preferably support the exciter base 26 at or near the upper ends 38 of the primary frame members 22. More specifically, the exciter base 26 is preferably disposed relative to the primary frame members 22 such that the exciter 20 may be mounted on the exciter base 26 in substantial alignment with the upper and lower ends 38 and 42 of the primary frame members 22 and the central or rotational axis of the compactor wheel 18. In other embodiments in which the primary frame members 22 are given a different shape, the exciter base 26 is preferably such that the exciter 20 may be mounted so as to be substantially vertically aligned over the central or rotational axis of the compactor wheel 18.

For example, the exciter 20 may be mounted such that its center of mass, center of gravity, center of volume, or the like is substantially aligned as described above. In this way, the vibration created by the exciter 20 is preferably transferred to the wheel 18, and the vibration created by the exciter 20 is preferably transferred less-effectively to a skid steer or other piece of equipment with which the compactor assembly 10 is used. As such, wear and fatigue caused to the skid steer or other piece of equipment is preferably minimized, without elastomeric, hydraulic, or other shock- and vibration-reducing members or systems which are susceptible to failure.

The exciter base 26 is preferably durable enough to support the exciter 20 that provides vibration to assist in the compaction of soil or the like, as will be described in more detail below. Additionally, the exciter 20 may be of considerable weight. To support the weight of the exciter 20 and to resist deformations or wear induced by the vibrations of the exciter 20, the exciter base 26 is preferably disposed above the upper ends 38 of the primary frame members 22, and formed of a durable material that, in some embodiments, may be harder, more rigid, thicker, or the like, than one or more other portions of the frame 14. The frame 14 also preferably includes exciter supports 66 at the intersection of the primary frame members 22 and the exciter support 26. The exciter supports 66 are preferably affixed to both the primary frame members 22 and the exciter base 26 so as to provide additional support to help both the primary frame members 22 and the exciter support 26 resist deformation and wear.

The primary frame members 22, exciter base 26, angle members 58, stiffener plates 62, and exciter supports 66 are preferably connected, interlocked, or engaged by any suitable means, such as, for example, with welds, bolts, screws, rivets, mechanical interlock such as tabs and/or slots, or any other suitable means for cooperatively associating the primary frame members 22, exciter base 26, angle members 58, stiffener plates 62, and exciter supports 66. In other embodiments, the primary frame members 22, exciter base 26, angle members 58, stiffener plates 62, and exciter supports 66 may be formed in any suitable shape, size, or the like, and may be modified, supplemented, or omitted in any suitable fashion to permit the compactor assembly 10 to function as described herein.

The frame 14 preferably further includes one or more support legs 70. As shown, the frame includes two support legs 70, with one support leg 70 disposed on each side of the compactor wheel 18 to support the compactor assembly 10 in an upright position, as shown, when the compactor assembly 10 is not in use. Each support leg 70 preferably extends between an upper end 74 and a lower end 78, and includes a foot 82 affixed to the lower end 78. Each foot 82 is preferably a flattened plate or the like extending laterally from the support leg 70 and angled relative to the support leg 70 such that at least a portion of the foot 82 engages a support surface, such as the ground, when the compactor assembly 10 is in an upright position, as shown.

As best shown in FIG. 3, each support leg 70 is selectively received within a leg mount 86. Each leg mount 86
is preferably formed of length of hollow tubing or the like formed to correspond in size and shape to the upper ends 74 of the support legs 70. Each leg mount 86 is preferably affixed to a rear surface of the mount plate 32. The leg mounts 86 are preferably angularly disposed relative to the compactor wheel 18 such that the support legs 70 diverge from one another as they extend toward a support surface such as the ground, for example, to improve lateral stability of the compactor assembly 10 when not in use. The leg mounts 86 and support legs 70 are preferably formed such that the support legs 70 can be selectively removed from the leg mounts 86 when the compactor assembly 10 is mounted to a skid steer or other piece of equipment, such as, for example, when the compactor assembly 10 is in use. For example, in the embodiment shown, the upper end 74 of each support leg 70 is preferably slidingly received within its respective leg mount 86 and secured at a predetermined position therein by a pin 90. Specifically, each leg mount 86 and each support leg 70 is preferably provided with a hole or aperture therethrough such that the pin 90 selectively extends between at least a portion of each of the leg mount 86 and the support leg 70. In some embodiments, the support legs 70 may each be provided with a plurality of holes or apertures such that the support leg may be secured at a plurality of positions relative to the leg mount 86, for example, to permit adjustment for uneven terrain. In other embodiments, an upper end 94 of the leg mounts 86 may be closed, such that the upper end 74 of the support leg 70 is received within the leg mount 86 to engage the upper end 90 of the leg mount 86, and thereby making the pin 90 unnecessary. In yet further embodiments, the support legs 70 and leg mounts 86 may be omitted, supplemented, or modified as necessary, to permit the compactor assembly 10 to function as described herein.

[0028] Referring now to FIGS. 4 and 5, depicted in FIG. 4 is a rear perspective view of the compactor assembly 10, and depicted in FIG. 5 is a front view of the mount plate 32. The compactor mount 34 preferably includes a central attachment portion 98, a first lateral attachment portion 102a, and a second lateral attachment portion 102b. The first and second lateral attachment portions 102a and 102b are preferably substantially-similar mirror images of one another. Each lateral attachment portion 102 preferably includes an upper hooked portion 106, a lower lip 110, and a lateral reinforcing rib 114. The upper hooked portions 106 preferably protrude rearward and downward from the top of the attachment portion 102 to define a hook space 118 (FIG. 1). The lower lips 110 preferably angle rearward at a lower edge of each lateral attachment portion 102 (FIG. 1), as shown. The lateral reinforcing ribs 104 preferably span the height of the lateral attachment portions 102 to reinforce both the upper hooked portions 106 and the lower lip 110, as well as to reinforce the lateral attachment portions 102. The lower lips 110 also preferably include one or more apertures 122, as shown, to permit selective connection to a skid steer or similar vehicle (not shown) for transporting and operating the compactor assembly 10.

[0029] As best shown in FIG. 5, the mount plate 32 is preferably formed of an elongated plate extending between a left end 126 and a right end 128, and includes a rear side (not shown) and a front side 132. As described above, the mount plate 32 preferably includes a pair of leg mounts 86 affixed to the rear side 132 of the mount plate 32. Additionally, the mount plate 32 also preferably includes a central hole 134. The central hole 134 is preferably disposed at a substantially central point on the mount plate 32. In the embodiment shown, the mount plate 32 also includes a plurality of arcuate slots 138 located about and the central hole 134. The arcuate slots 138 are preferably defined by a radius 142, as shown, on both sides of the central hole 106. When the frame 14 is assembled, the rear side 132 of the mount plate 32 preferably engages the extension members 30, as shown. For example, the extension members 30 and the mount plate 32 may be continuously welded or spot welded together along the dashed weld lines 146. In other examples, the extension members 30 and mount plate 32 may be connected, engaged, or operatively associated in any suitable fashion, such as, for example, by way of screws, bolts, rivets, or the like, and may also be of unitary construction.

[0030] As best shown in FIG. 4, the compactor mount 34 is preferably connected to the front surface (not shown) of the mount plate 32 (FIG. 5). More specifically, the central connection portion 98 of the compactor mount 34 is preferably connected to the mount plate 32 (FIG. 5) by way of a central bolt 150 and a plurality of radial bolts 154. The central bolt 150 preferably passes through the central attachment portion 98 of the compactor mount 34 and through the central hole 134 (FIG. 4) of the mount plate 32 (FIG. 4) to pivotally connect the compactor mount 34 to the mount plate 32. The radial bolts 154 preferably pass through the central attachment portion 98 of the compactor mount 34 and through the respective arcuate slots 138 (FIG. 4) in the mount plate 32 (FIG. 4). The radial bolts 154 are preferably disposed a radial distance 158 away from the central axis of the central bolt 150. The radius 158 is preferably substantially equal to the radius 142 (FIG. 5) such that the radial bolts 154 correspond in position to the arcuate slots 138 in the mount plate 32 (FIG. 5).

[0031] In the embodiment shown, the central and radial bolts 150 and 154 are preferably held in substantially fixed positions relative to the compactor mount 34, such that the compactor mount 34 is permitted to rotate about the central bolt 150 relative to the mount plate 32 (FIG. 4). Likewise, the radial bolts 154 are preferably permitted to move with the compactor mount 34 relative to the mount plate 32 (FIG. 4) even as the central bolts 150 extend through the arcuate slots 138 (FIG. 4). In this way, the compactor mount 34 may be adjusted angularly relative to the mount plate 32 (FIG. 5) and relative to the rest of the compactor assembly 10 to permit a desirable angle to be achieved between the rest of the compactor assembly 10 and the skid steer or similar equipment (not shown) to which the compactor assembly is mounted or used in conjunction with. When the compactor mount 34 is in the desired angular relation to the compactor plate 32 (FIG. 5), nuts (not shown), may be threaded onto and/or tightened onto the bolts 150 and/or 154 so as to hold the compactor mount 34 and the mount plate 32 (FIG. 5) in fixed relation to one another. In other embodiments, the central and radial bolts 150 and 154 may be held in substantially fixed relation to the mount plate 32 (FIG. 5) and the compactor mount 34 provided with arcuate slots (not shown), both the mount plate 32 (FIG. 5) and compactor mount 34 may be provided with arcuate slots (not shown), or the bolts 150 and 154 may be held in fixed relation to both the mount plate 32 (FIG. 5) and the compactor mount 34, such that the two held in fixed relation and are not adjustable relative to one another.

[0032] Referring now to FIGS. 6A and 6B, shown therein is more detail is one embodiment of a compactor wheel 18 for use in the compactor assembly 10. The compactor wheel 18 preferably includes a wheel body 158, a central hub 162, a
The wheel body 158 is preferably circular and defined by a diameter 174. The wheel body 158 also preferably includes a plurality of pads 178 disposed at substantially-equal intervals about the circumference of the wheel body 158. In this way, the wheel body 158 and the pads 178 preferably cooperate to define a compacting surface 182. The pads 178 have a length 186 and are preferably offset from one another both laterally and about the circumference of the wheel body 158, as shown. Specifically, a plurality of the pads 178a are disposed adjacent to a first side 190 of the wheel body 158, and a plurality of the pads 178b are disposed adjacent to a second side 194 of the wheel body 158. Additionally, each pad 178a is preferably spaced a distance 198 from the next adjacent pad 178a, and each pad 178b is preferably spaced a distance 198 from the next adjacent pad 178b, as shown. In operation of the compactor assembly 10, the pads 178 preferably increase the pressure exerted on individual portions of soil or the like as the soil is being compacted. In other embodiments, the pads 178 may be omitted, modified, or the like, as desired.

The central hub 162 preferably includes a plurality of equally-spaced holes 202 to permit attachment of the central hub 162 to the primary frame members 22 by way of bolts 206 or the like (FIG. 1). In this way, the central hub 162 is preferably held in fixed relation to the primary frame members 22, and the wheel body 158 preferably rotates about the central hub 162. Additionally, at least one of the peripheral surface (not shown) of the central hub 162 and the bearing race 166 is preferably adapted to engage and/or receive one or more bearings (not shown) between the central hub 162 and the bearing race 166. For example, ball bearings, needle bearings, or any other suitable type of bearings may be received between and/or engage the central hub 162 and the bearing race 166. The wear rings 170 are preferably a flattened washer-type ring disposed between either side of the wheel body 158 and the primary frame members 22 such that the wear rings 170 bear the brunt of the vibrational and frictional wear so as to protect the wheel body 158 and the primary frame members 22 from wear and fatigue. The wear rings 170 are preferably formed of a material that is somewhat softer, less durable, or the like than the wheel body 158 and the primary frame members 22, such that the wear rings 170 are more susceptible to abrasion, wear, and the like than the wheel body 158 and the primary frame members 22. In this way, the wear rings 170 can preferably be replaced periodically to substantially prevent or delay wear or fatigue of the wheel body 158 and primary frame members 22.

Additionally, the compactor assembly 10 depicted in FIGS. 7A-7C includes an optional wheel scraper 214. The wheel scraper is preferably mounted near the front of the upper end 38 of the primary frame members 22 to permit the wheel scraper 214 to be adjacent to, but spaced a distance away from, the compacting surface 182 of the wheel 18, such that during operation of the compactor assembly 10, the wheel 18 rotates in close proximity to the wheel scraper 214 such that dirt, soil, and the like are scraped from the compacting surface 182 by the wheel scraper 214. More specifically, the wheel scraper 214 is shown attached to a forward portion of the exciter base 26, and in other embodiments, the wheel scraper 214 may be mounted in any suitable fashion or position to permit the wheel scraper 214 to function as described herein.

Referring now to FIGS. 8A and 8B, one embodiment of a wheel scraper 214 is depicted. The wheel scraper 214 preferably includes a scraping edge 218 that includes a plurality of protrusions 222. The protrusions 222 are sized to fit between the pads 178 on the wheel 18, and are preferably spaced a distance 226 apart that corresponds to the width of the pads 178 on the wheel 18. In this way, the protrusions 222 preferably correspond in size and position to the spaces immediately adjacent the pads 178 on the wheel 18 such that as the wheel 18 rotates in the frame 14, the scraping edge 218 preferably corresponds to the compacting surface 182 of the wheel 18 so as to remove at least a portion of any dirt, soil, or the like that may stick to the compacting surface 182 of the wheel 18. In the embodiment shown, the wheel scraper 214 preferably includes a connection member 230 that permits the wheel scraper 214 to be supported by the frame 14 in fixed relation to the rotational axis of the wheel 18, so as to permit the wheel 18 to rotate while maintaining a substantially-constant relationship between the wheel scraper 214 and the compacting surface 182 of the wheel 18. In the embodiment shown, the connection member 230 is shaped as an angled member that includes a scraper portion 234 and an attachment portion 238. The scraper portion 234 is connected to the wheel scraper 218, and the attachment portion 238 is preferably connected to the exciter base 26. The wheel scraper 214 may be connected or supported by the frame 14 in any suitable configuration, and by any suitable means, such as, for example, by welds, bolts, rivets, or the like.

Referring now to FIG. 9, a compactor assembly 10 is shown in conjunction with a skid steer 250 in accordance with the present invention. The skid steer 250 is of typical construction and is merely one example of a piece of equipment with which the compactor assembly 10 may be used. By way of example, the compactor assembly 10 may also be used with tractors, trenchers, and like. The skid steer 250 includes a pair of lift arms 254 that pivot about an axis 258. The skid steer 250 further includes a pair of hydraulic lift cylinders 262 that are selectively expanded and contracted to lift and lower, respectively, the lift arms 254. The lift arms 254 preferably include a main plate 266 pivotally connected to the lift arms 254 about axis 270, and actuated by one or more secondary hydraulic cylinders 274. The main plate 256 is preferably adapted to receive, engage, support, or otherwise operatively connect to the compactor mount 34 of the compactor assembly 10, such that the compactor assembly 10 is supported and/or actuated by the lift arms 254. Additionally, as described above, the exciter 20 is preferably in fluid communication, for example via two or more hydraulic lines (not shown), to the hydraulic system (not shown) of the skid steer 250 such that the hydraulic system (not shown) of the skid steer 250 selectively pumps hydraulic fluid through the exciter 20 to cause the exciter 20 to generate vibration.
In one exemplary method of use, a compactor assembly 10 and skid steer 250 are provided, either separately or together. When they are provided separately, the compactor assembly 10 is attached or connected to the skid steer 250. As necessary or desirable, the support legs 70 (FIG. 2) may then be removed from the compactor assembly 10 such that the compactor assembly 10 is wholly supported by the skid steer 250. The skid steer 250 is then preferably positioned relative to a trench 300 such that the compactor wheel 18 is at least partially disposed within the trench 300, as shown. Backfill material 304 is also placed in at least a portion of the trench 300, either before or after the compactor wheel 18 is placed. By way of example, the trench 300 is also shown with a utility line 308, such as a water line, and a bedding material 312, such as sand or gravel. The exciter 20 is then actuated to generate vibration and cause the compactor wheel 18 to vibrate. The trench compactor assembly 10 is then propelled along the trench, for example, by the skid steer 250, such that the compactor wheel 18 travels along at least a portion of the trench 300 to compact at least a portion of the backfill 304 within the trench. The compactor assembly 10 may be propelled either in a forward direction 316 or in a rearward direction 320. In some embodiments, backfill 304 may be placed in the trench 300 at the same time the compactor assembly 10 is propelled along the trench, for example, where the skid steer 250 or the compactor assembly 10 is provided with one or more blades (not shown) that are angled to push backfill 304 into the trench 300.

Changes may be made in the construction and the operation of the various components, elements and assemblies described herein or in the steps or the sequence of steps of the methods described herein without departing from the spirit and scope of the invention as defined in the following claims.

What is claimed is:

1. A trench compactor assembly for use with a piece of equipment, comprising:
   a compactor wheel having a rotational axis, a radius, and a peripheral compaction surface;
   a frame assembly comprising:
   one or more primary frame members having a first end disposed adjacent the rotational axis of the compactor wheel, a second end spaced apart from the peripheral compaction surface of the compactor wheel, and a length greater than the radius of the compactor wheel extending between the first end and the second end;
   one or more extension members having a first end, a second end, and a length extending therebetween, the first end engaging at least one of the one or more primary frame members, the second end extending from the at least one primary frame member in substantially fixed angular relation;
   a compactor mount engaging the second end of at least one of the one or more extension members, the compactor mount adapted to be selectively mounted to a piece of equipment, and
   an exciter disposed adjacent the second end of the one or more primary frame members such that the exciter is substantially aligned with the first and second ends of the primary frame members and the rotational axis of the compactor wheel, the exciter selectively actuated to generate vibrations;
2. The trench compactor assembly of claim 1, wherein the center of mass of the exciter is substantially aligned with the first and second ends of the primary frame members and the rotational axis of the compactor wheel.
3. The trench compactor assembly of claim 1, wherein the one or more primary frame members comprise two primary frame members, and wherein the one or more extension members comprise two extension members.
4. The trench compactor assembly of claim 1, wherein the angle between the one or more primary frame members and the one or more extension members is between about 45 degrees and about 135 degrees.
5. The trench compactor assembly of claim 4, wherein the angle between the one or more primary frame members and the one or more extension members is between about 30 degrees and about 120 degrees.
6. The trench compactor assembly of claim 5, wherein the angle between the one or more primary frame members and the one or more extension members is between about 15 degrees and about 105 degrees.
7. The trench compactor assembly of claim 6, wherein the angle between the one or more primary frame members and the one or more extension members is about 90 degrees.
8. The trench compactor assembly of claim 1, wherein the exciter is selectively connected to a hydraulic system of the piece of equipment such that hydraulic fluid from the hydraulic system causes the exciter to generate vibrations.
9. The trench compactor assembly of claim 1, wherein the compactor mount is pivotally connected to the frame assembly such that the angle between the frame assembly and the compactor mount is selectively adjusted.
10. The trench compactor assembly of claim 9, wherein the frame assembly further comprises:
   one or more support arms extending downward from the frame assembly such that the one or more support arms cooperate with the compactor wheel to selectively support the trench compactor assembly in an upright position.
11. The trench compactor assembly of claim 10, wherein the one or more support arms are selectively removed from the frame assembly.
12. The trench compactor assembly of claim 10, wherein the one or more support arms comprise two support arms that angle away from the compactor wheel as they extend downward from the frame assembly.
13. The trench compactor assembly of claim 11, wherein the two support arms are selectively removed from the frame assembly.
14. A method of compacting backfill in a trench, comprising the steps of: providing a skid steer;
   providing a trench compactor assembly selectively supported by the skid steer, the trench compactor assembly comprising:
   a compactor wheel having a rotational axis, a radius, and a peripheral compaction surface;
   a frame assembly comprising:
   one or more primary frame members having a first end disposed adjacent the rotational axis of the compactor wheel, a second end spaced apart from the peripheral compaction surface of the compactor wheel, and a length greater than the radius of the compactor wheel extending between the first end and the second end;
   one or more extension members having a first end, a second end, and a length extending therebetween, the first end engaging at least one of the one or more primary frame members, the second end extending from the at least one primary frame member in substantially fixed angular relation;
from the at least one primary frame member in substantially-fixed angular relation;
a compactor mount engaging the second end of at least one of the one or more extension members, the compactor mount selectively engaging the skid steer; and an exciter disposed adjacent the second end of the one or more primary frame members such that the exciter is substantially aligned with the first and second ends of the primary frame members and the rotational axis of the compactor wheel, the exciter selectively connected to a hydraulic system of the skid steer and further selectively actuated to cause the compactor wheel to vibrate;
positioning the skid steer relative to a trench such that the compactor wheel of the trench compactor assembly is at least partially disposed within the trench;
placing backfill within the trench;
actuating the exciter of the trench compactor assembly to cause the compactor wheel to vibrate;
propelling the trench compactor assembly with the skid steer such that the compactor wheel travels along at least a portion of the trench to compact at least a portion of the backfill within the trench.

15. The method of claim 14, wherein the steps of providing a skid steer and providing a trench compactor assembly are performed together.

16. The method of claim 14, further comprising the step of: connecting the trench compactor assembly to the skid steer.

17. The method of claim 14, wherein the step of placing backfill is performed before the step of positioning the skid steer.

18. The method of claim 14, wherein the steps of placing backfill and propelling the compactor assembly are performed simultaneously.

19. The method of claim 18, wherein the trench compactor assembly further comprises two support arms extending downward from the frame assembly such that the two support arms cooperate with the compactor wheel to selectively support the trench compactor assembly in an upright position, the method further comprising the step of: removing the support arms from the frame assembly prior to the step of positioning the skid steer.

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