



US 20080138174A1

(19) **United States**

(12) **Patent Application Publication**
Hawkins

(10) **Pub. No.: US 2008/0138174 A1**

(43) **Pub. Date: Jun. 12, 2008**

(54) **PICK-UP AND LAY-DOWN SYSTEM AND METHOD**

Publication Classification

(76) Inventor: **Samuel P. Hawkins**, Lafayette, LA (US)

(51) **Int. Cl.**
E21B 19/00 (2006.01)
(52) **U.S. Cl.** **414/22.54**

(57) **ABSTRACT**

Correspondence Address:
THE MATTHEWS FIRM
2000 BERING DRIVE, SUITE 700
HOUSTON, TX 77057

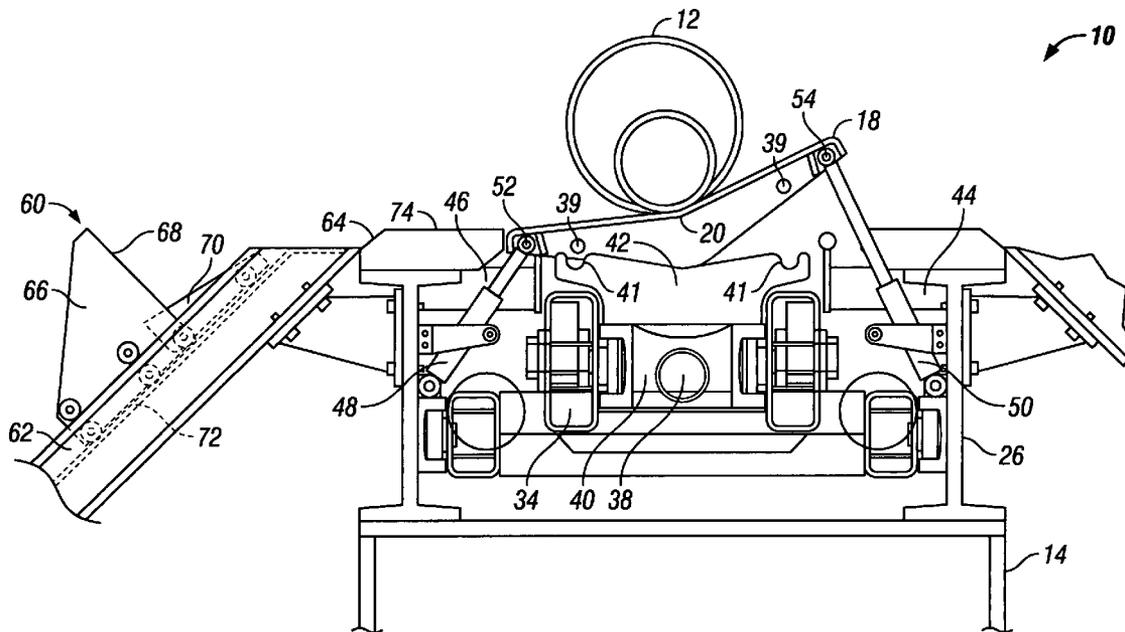
A self supporting pick-up and lay-down pipe handling system and method provides apparatuses and methods including a telescopingly extendable pipe trough which is telescopingly extendable from a lift frame, a lift frame movable by extendable lifts, and a movable lift frame with a conveyor system. The lift frame is preferably pivotally moveable with respect to a support. A rotating mechanism may be utilized which is operable for rotating the pipe trough to either lateral side for unloading and/or loading purposes. A lift frame with slidable powered lift heads is provided to raise and lower pipes from a pipe rack to the pipe trough. A pivotal guide member on the slidable powered lift head to pivot into a guiding position for guiding pipe from the lift frame onto the pipe trough.

(21) Appl. No.: **11/349,806**

(22) Filed: **Feb. 7, 2006**

Related U.S. Application Data

(63) Continuation-in-part of application No. 10/754,160, filed on Jan. 9, 2004, now Pat. No. 6,994,505.



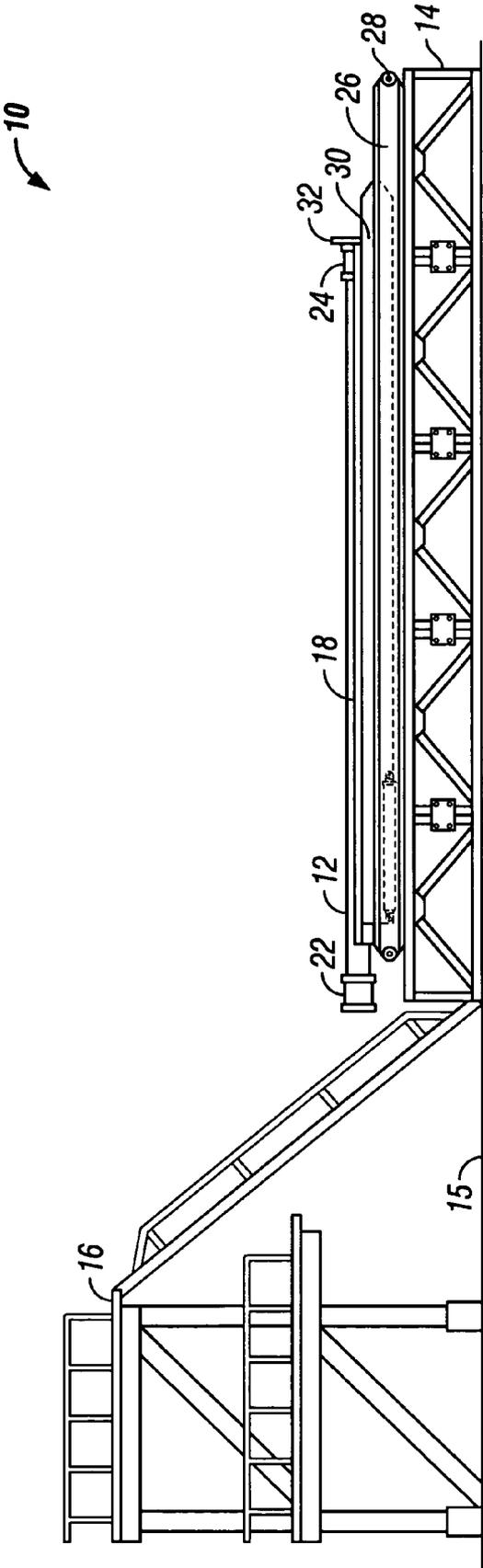


FIG. 1

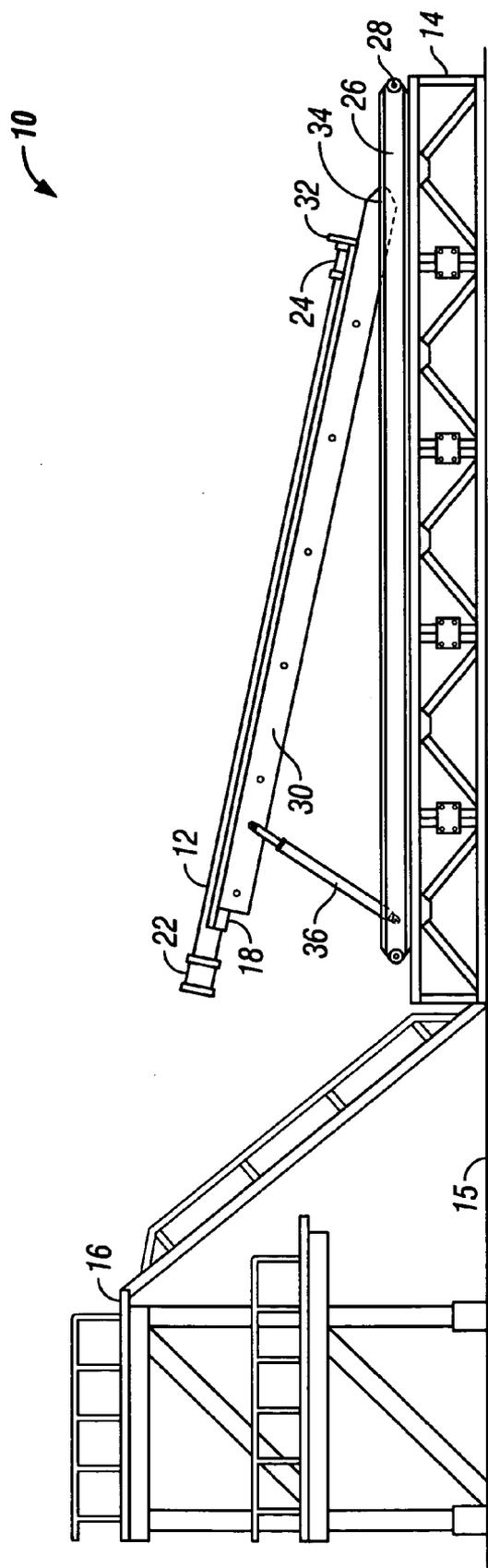


FIG. 2

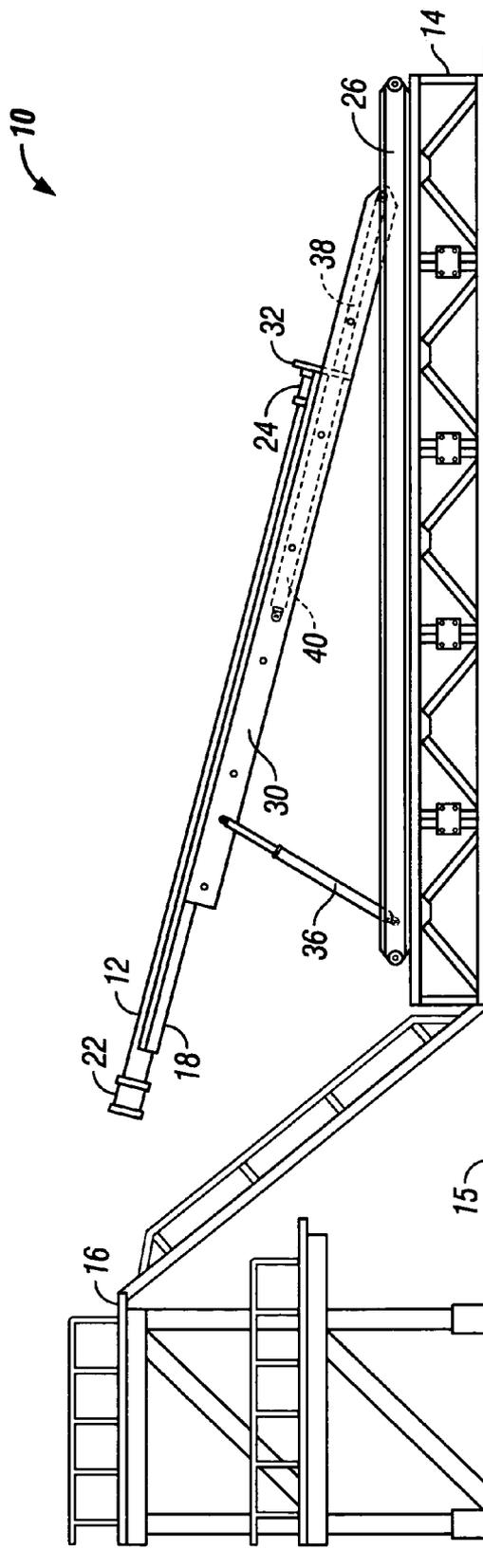


FIG. 3

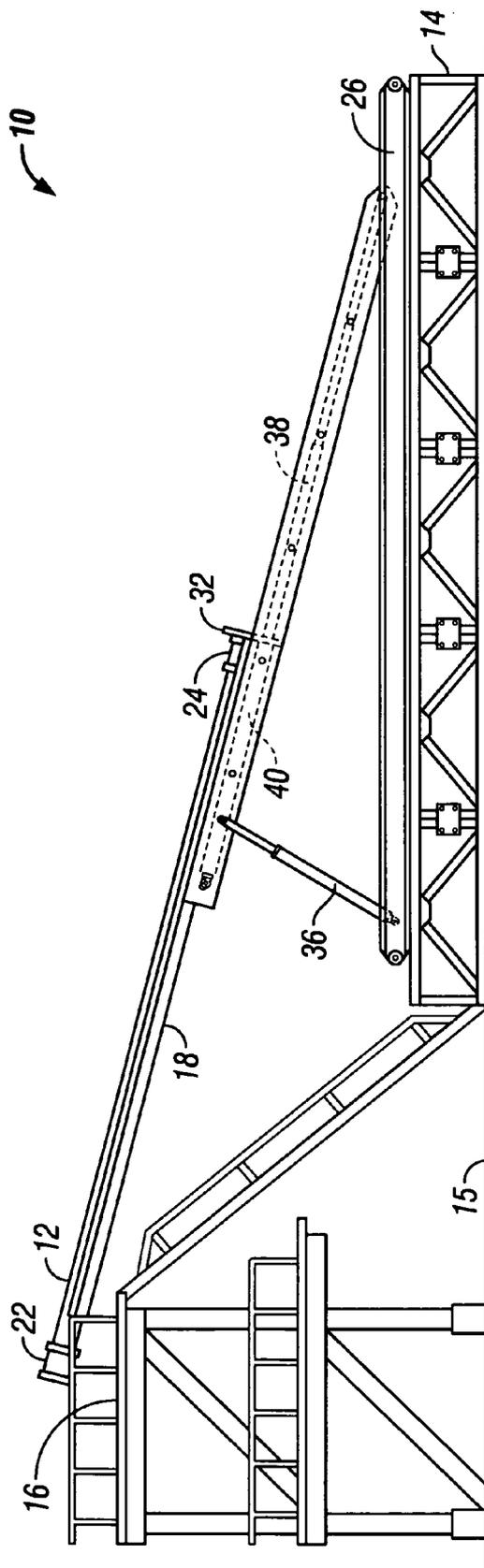


FIG. 4

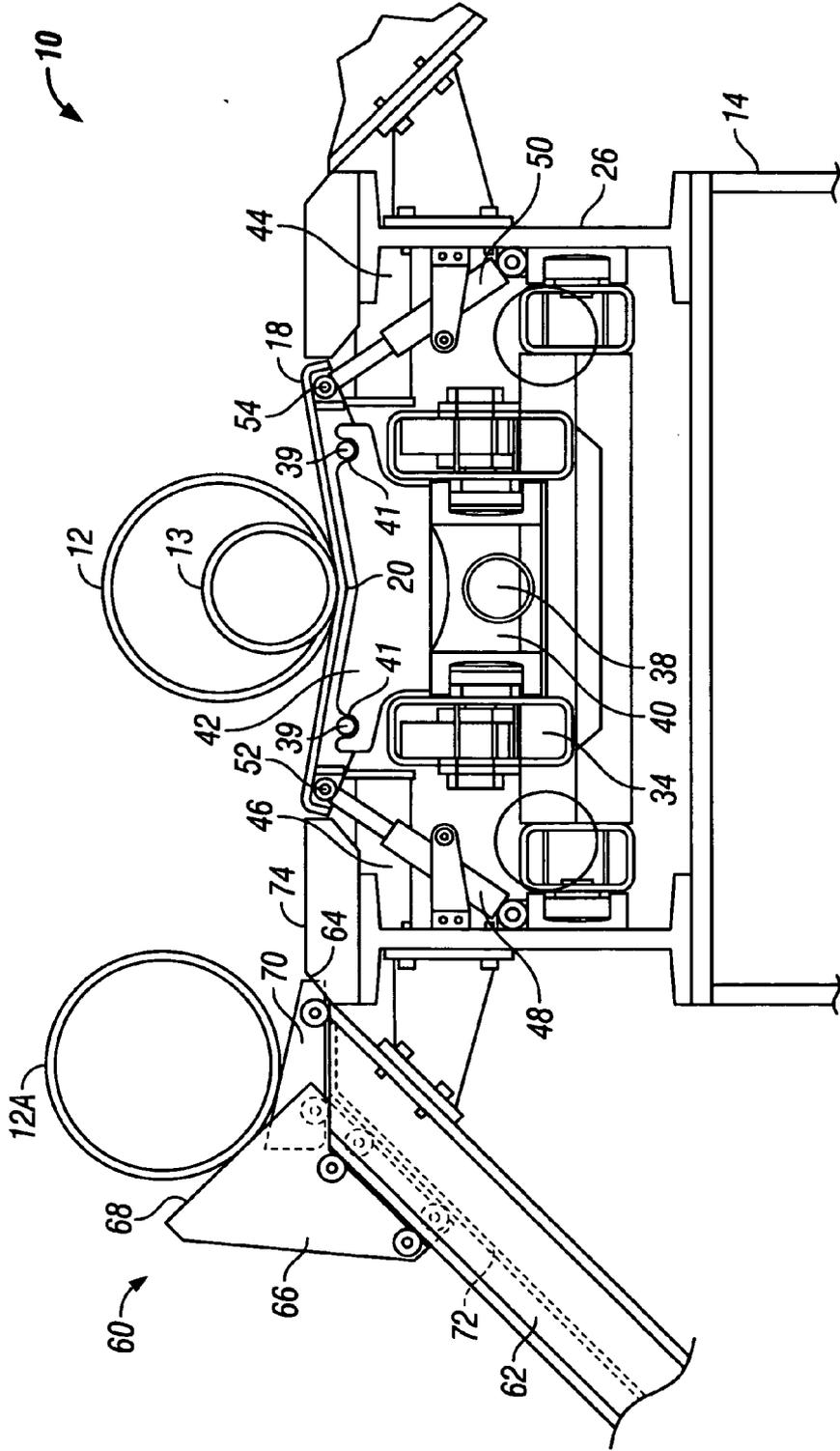


FIG. 5

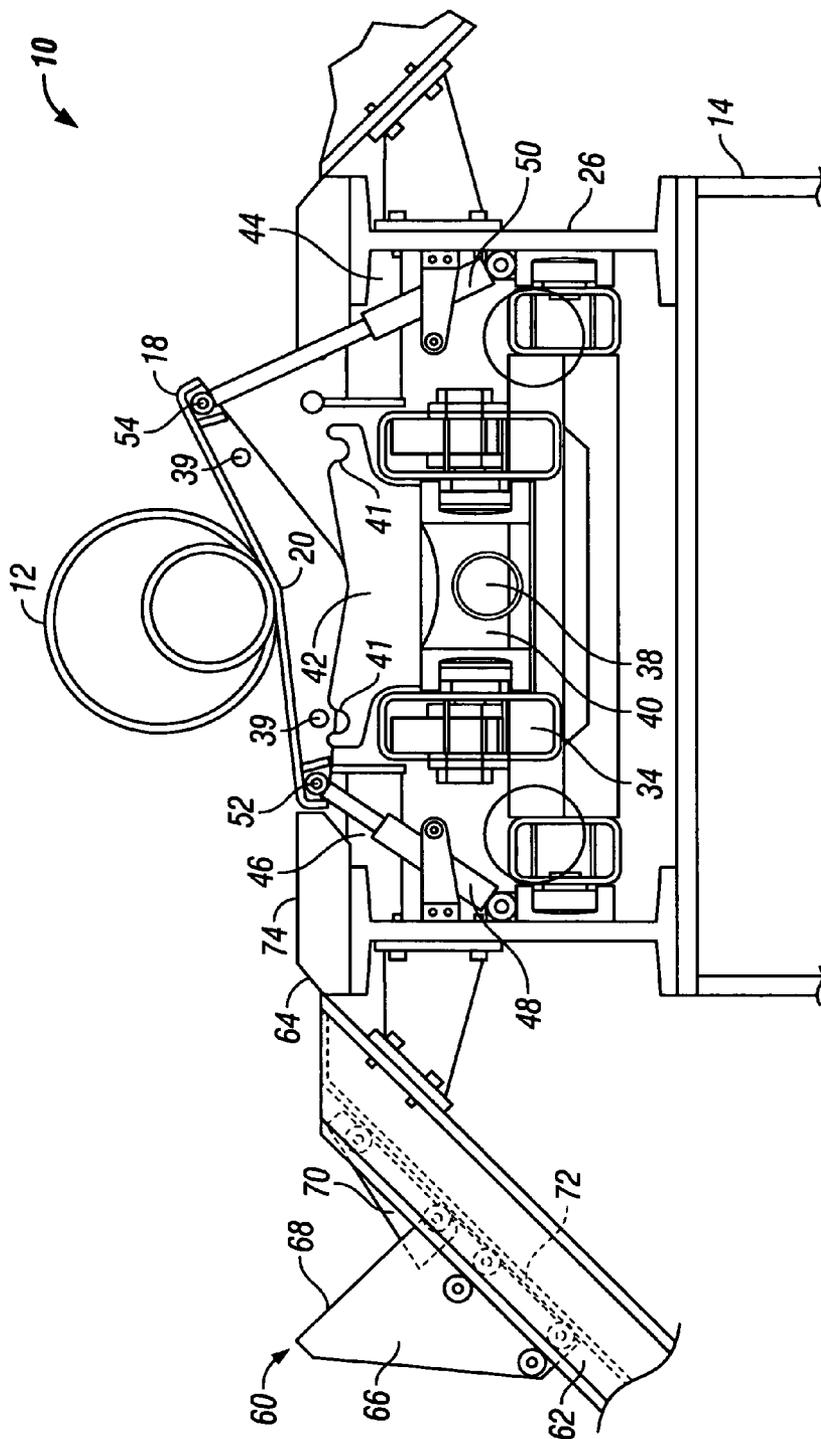
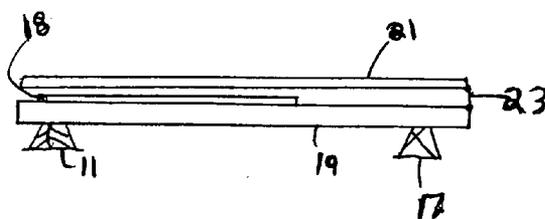
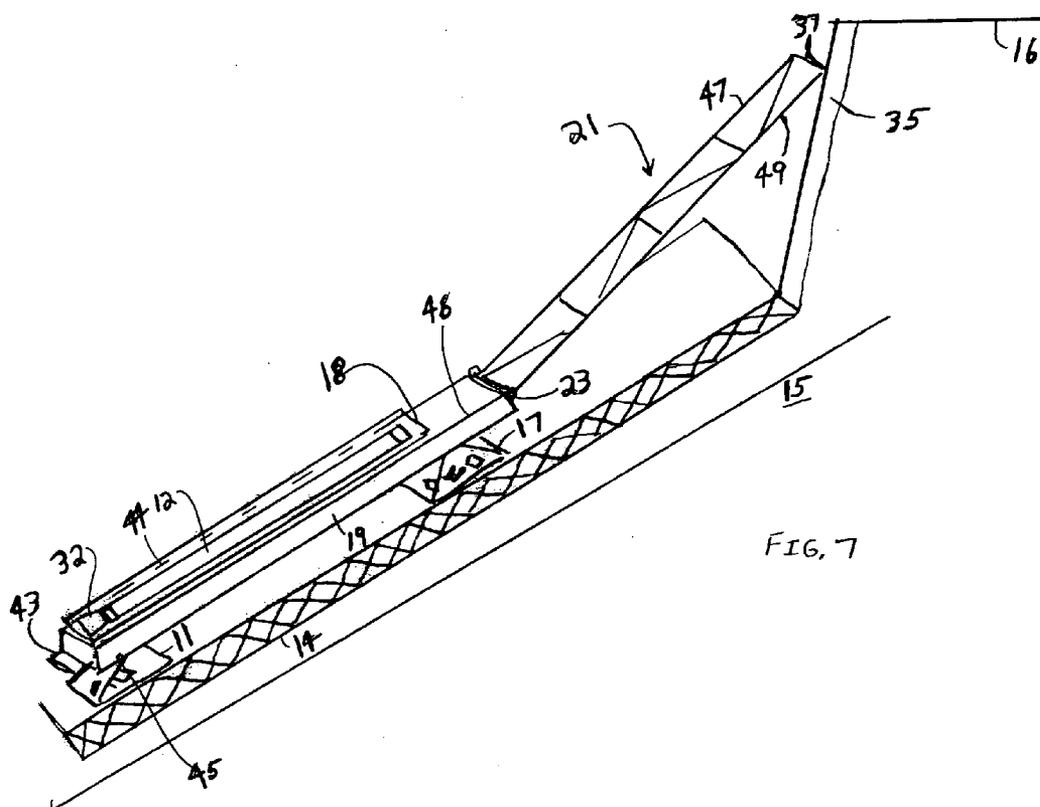


FIG. 6



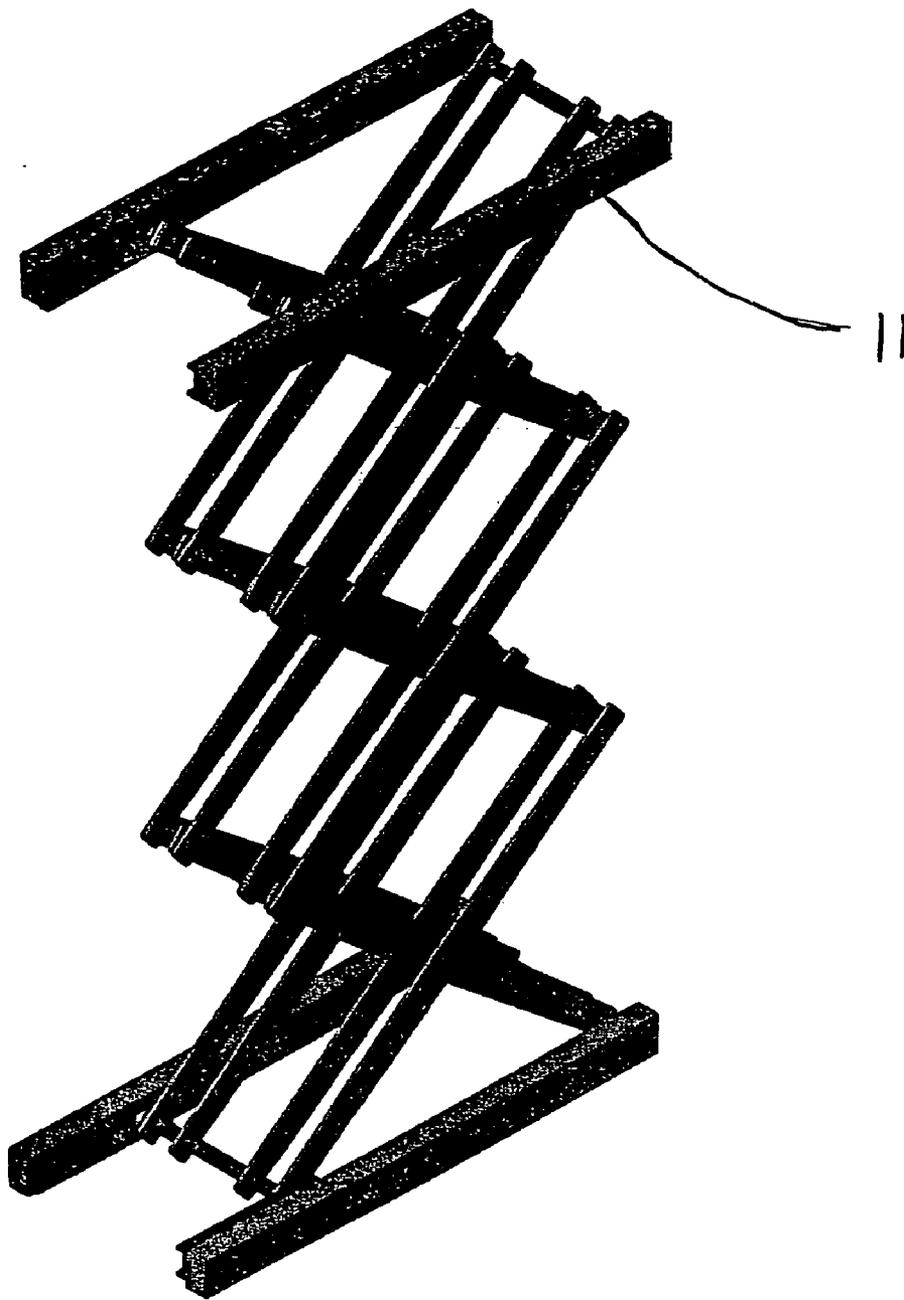


FIG. 8

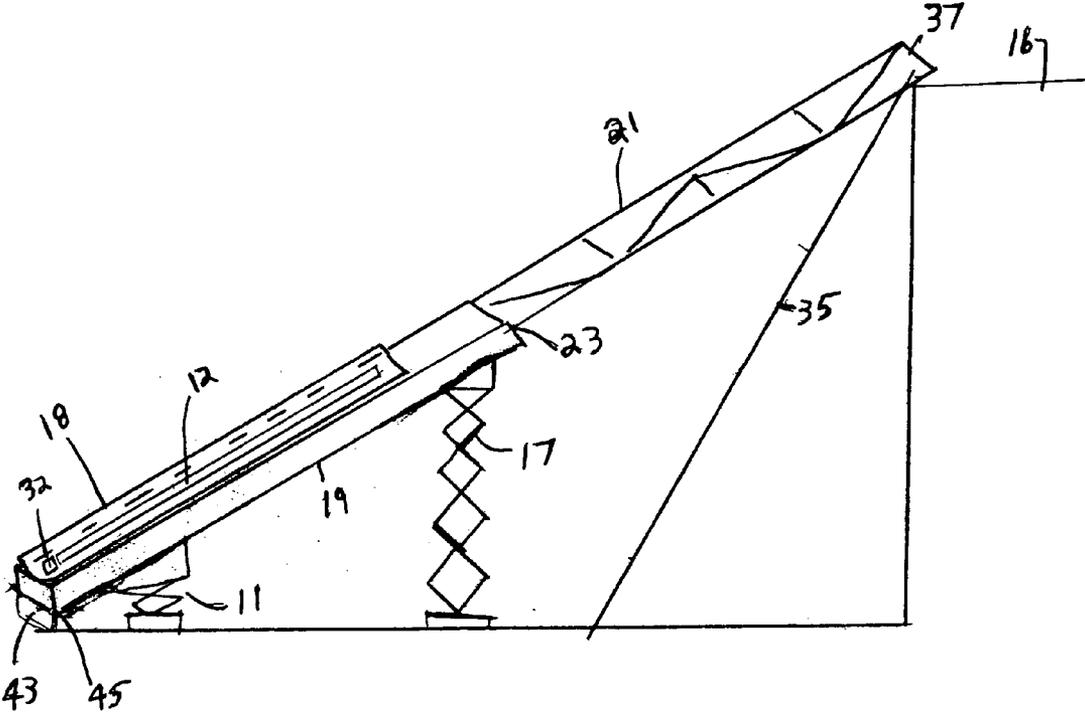


FIG. 9

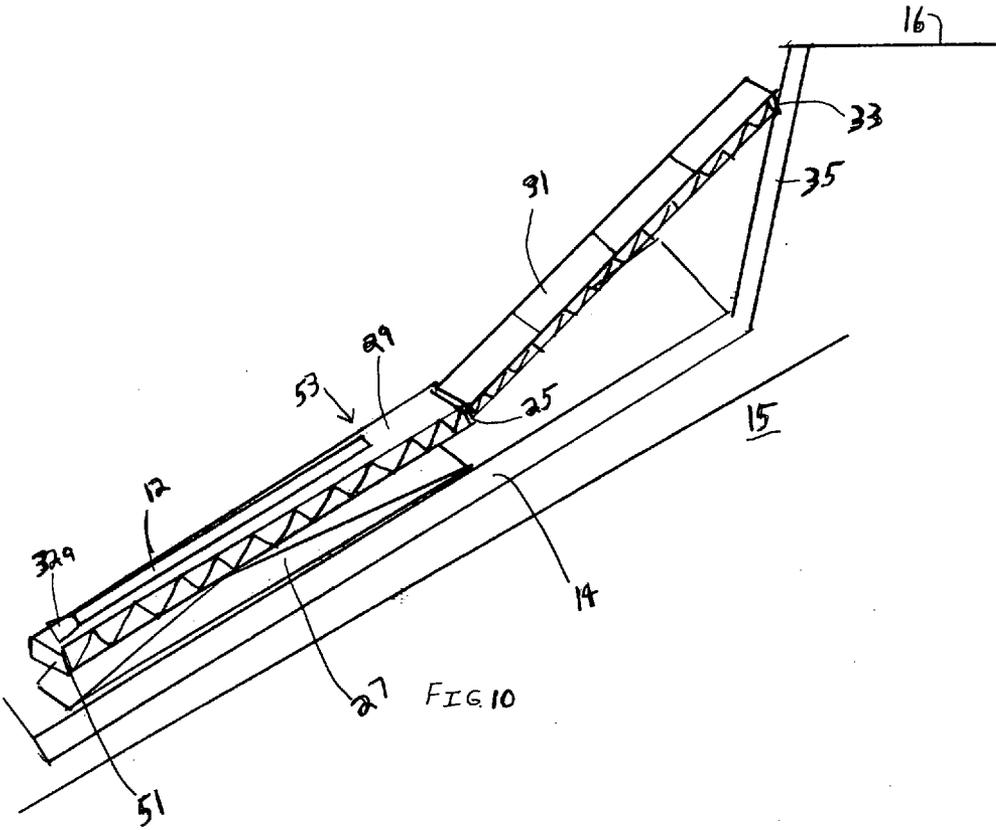


FIG 10

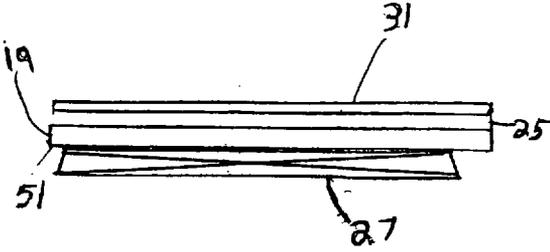


FIG 10A

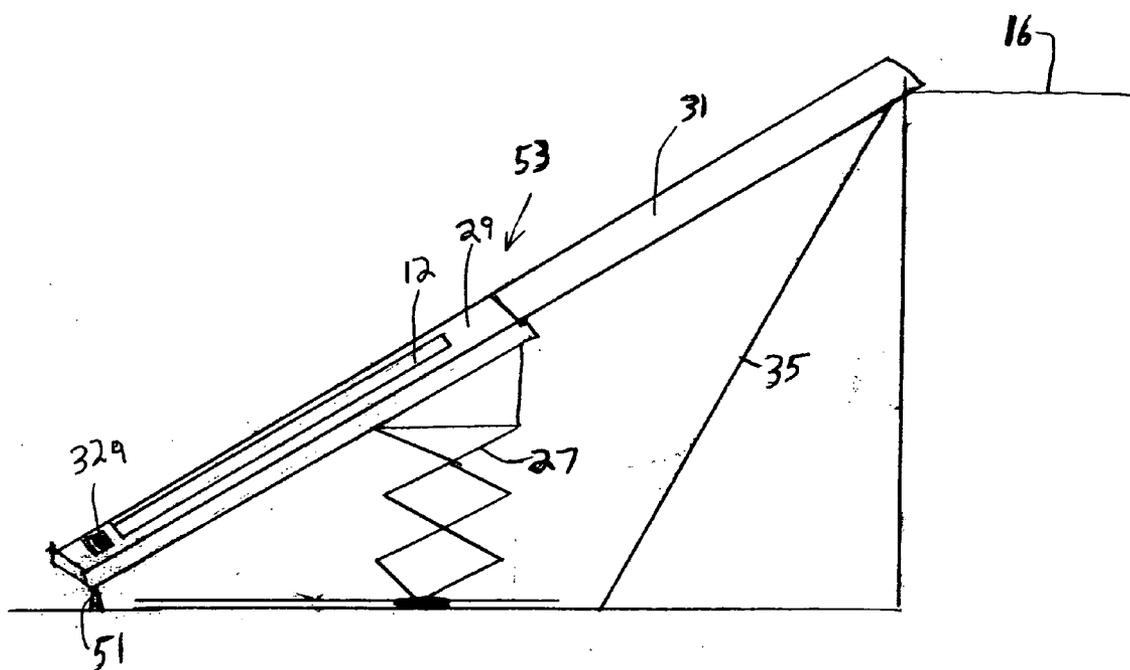


FIG 11

PICK-UP AND LAY-DOWN SYSTEM AND METHOD

RELATED APPLICATIONS

[0001] This application is a continuation-in-part of U.S. patent application Ser. No. 10/754,160, filed on Jan. 9, 2004.

TECHNICAL FIELD

[0002] The present invention relates generally to apparatuses and methods operable for automatically lifting and lowering oilfield tubulars and, more particularly, is especially suitable for lifting large diameter tubulars of heavy weight or other tubulars which are especially prone to lateral impact and friction damage during transport due to their significant weight.

BACKGROUND ART

[0003] Prior art oil field pipe handling systems and methods are well known for lifting and lowering drill pipe and casing to and from pipe racks, to and from the catwalk, and then onto the rig floor, and/or for stacking the pipe at other locations adjacent to or separated from the rig floor. However, the prior art systems have problems relating to damage of the tubulars during this process. Moreover, prior art systems are limited in their adaptability to the path of transportation typically to and from each particular rig floor, catwalk, and pipe rack arrangement.

[0004] Numerous U.S. Patents show various attempts to provide suitable devices, methods, and machines for handling drilling tubulars of various types and under various work situations and for various work environments. However, the prior art does not provide a suitable means for moving pipes whereby they arrive at the rig floor virtually without experiencing sharp lateral impacts and/or friction damage to sensitive areas such as threads. For instance, heavy tubulars such as casing, due to their very great weight and large diameter may be easily damaged by lateral impacts and/or even by impacts to thread protectors during movement from the pipe rack, to the cat walk, and then to the drill floor. The transportation from a pipe rack to the rig floor often involves an irregular and difficult path for moving heavy items. Moreover, this pathway will often vary depending on the particulars of construction for each drilling, workover, offshore, and/or onshore rig.

[0005] It would be desirable to provide a machine which will handle all types of pipes and which adapt to the many different transportation pathways, for transporting tubulars from pipe racks to the rig floor without damage even to extremely heavy, large, tubulars and/or to other tubulars prone to damage due to sharp lateral impacts or impacts to the sensitive threaded ends thereof.

[0006] Consequently, those of skill in the art will appreciate the present invention which addresses the above and other problems.

BRIEF DESCRIPTION OF DRAWINGS

[0007] For a further understanding of the nature and objects of the present invention, reference should be had to the following detailed description, taken in conjunction with the accompanying drawings, in which like elements are given the same or analogous reference numbers and wherein:

[0008] FIG. 1 is an elevational view, partially in phantom lines, of one possible embodiment of a system and method

with a pipe just mounted thereon for movement to the rig floor from the catwalk in accord with the present invention;

[0009] FIG. 2 is an elevational view, partially in phantom lines, of the embodiment shown in FIG. 1 as it initially lifts and adjusts in height for a particular rig floor;

[0010] FIG. 3 is an elevational view, partially in phantom lines, of the embodiment shown in FIG. 1 wherein an entire trough for laterally supporting and carrying the pipe extends outwardly from a carrier the pipe so as to prevent any friction and/or lateral impacts acting on the pipe as the pipe moves in the direction of the rig floor;

[0011] FIG. 4 is an elevational view, partially in phantom lines, of the embodiment shown in FIG. 1 wherein the trough is now at the rig floor;

[0012] FIG. 5 is a cross-sectional view, partially in phantom lines, of the embodiment of FIG. 1 wherein a pipe is shown in various stages of movement from a pipe rack or other pipe support to a slidable trough in accord with the present invention;

[0013] FIG. 6 is a cross-sectional view, partially in phantom lines, of the system in FIG. 5 illustrating that the trough can be tilted or rotated in either direction as desired for loading and unloading;

[0014] FIG. 7 is a perspective view of an alternate embodiment of a system and method for movement of a tubular between the rig floor and a pipe storage location in accord with the present invention;

[0015] FIG. 7A is a side view of the embodiment shown in FIG. 7 in a substantially folded position in accord with the present invention;

[0016] FIG. 8 is an elevated side view of one embodiment of a scissor lift in accord with the present invention;

[0017] FIG. 9 is a perspective view of the embodiment shown in FIG. 7 as it initially lifts and adjusts in height for a particular rig floor in accord with the present invention;

[0018] FIG. 10 is a perspective view of an alternate embodiment of a system and method for movement of a tubular between the rig floor and a pipe storage location in accord with the present invention;

[0019] FIG. 10A is a side view of the embodiment shown in FIG. 10 in a substantially folded position in accord with the present invention; and

[0020] FIG. 11 is a perspective view of the embodiment shown in FIG. 10 as it initially lifts and adjusts in height for a particular rig floor in accord with the present invention.

GENERAL DESCRIPTION AND PREFERRED MODE FOR CARRYING OUT THE INVENTION

[0021] Referring now to the drawings and, more particularly, to FIG. 1, FIG. 2, FIG. 3, and FIG. 4, there is shown a series of elevational views of a presently preferred embodiment of pipe handling system 10 during operation. System 10 gently guides pipe 12, which may be a very large diameter pipe such as surface casing, or drill pipe, or any other type of pipe, from catwalk 14. Catwalk 14, as used herein may refer to any other platform or lower location which leads up to rig floor 16. Rig floor 16, as used herein, may be a drilling rig floor, workover rig floor, derrick floor, pipe storage location, or any other location which is generally elevated with respect to a lower position, such as 14 catwalk, the pipe rack, or other pipe storage locations. A rig may be an offshore rig, workover rig, drilling rig, and the like, for working with well bores. Special apparatus for placing pipe 12 onto moveable trough 18 or removing pipe 12 from moveable trough 18 to/from

another location such as a pipe rack or lower location or possibly an upper location, are not shown in this series of figures but presently preferred and innovative features are shown in FIG. 5 and FIG. 6, as discussed hereinafter.

[0022] As seen in FIG. 5 and FIG. 6, trough 18 preferably has a cross-section that is generally smooth with a relatively wide sloping surface with a generally lower center 20 into which the pipe is guided by gravity. Note that trough 18 is preferably relatively wide and therefore can handle very large pipe. The entire trough or substantially the entire lateral width is preferably slightly V-shaped, curved as desired, or configured to thereby gently direct pipe 12 to center 20. In a presently preferred embodiment, trough 18 is not planar or flat but gradually sloping along its entire lateral width for guiding purposes. Because of this gradual sloping, if desired, multiple drill pipes (which are generally much smaller in diameter than some types of casing, e.g., surface casing) could be placed on trough 18 for simultaneous movement, if desired.

[0023] Moreover, trough 18 is preferably smooth along its axial length without bumps, rivets, bolts, ridges or the like which could cause impacts when pipe 12 is placed on or removed from trough 18. Thus, mechanical connections to trough 18 may be made below trough 18 to avoid a rough surface, if desired.

[0024] In the operating position of system 10 shown in FIG. 1, pipe 12 is substantially parallel to trough 18. Pipe 12 is also substantially parallel to platform 26. Pipe 12 is also substantially parallel to the surface of catwalk 14 or other surface from which pipe 12 is to be moved. Before being picked-up, or after being layed-down, pipe 12 is also typically in the same plane as the pipe rack and/or ground 15 which may be located below or adjacent to catwalk 14. Trough 18 is slidably extendable and may not actually be connected directly to platform 26. Trough 18 is supported by lift frame 30 which may be pivotally and/or slidably pivotally mounted with respect to platform 26. As a rough comparison, trough 18 extends from lift frame 30 like a fireman's ladder extends outwardly. Accordingly, trough 18 is preferably not rigidly mounted and has no rearward fixed connection to platform 26. The length of trough 18 may or may not reach to or past platform end 28, as desired. Platform 26 rests on catwalk 14 or any other desired surface which will typically be below rig floor 16 although theoretically slidable trough 18 could move pipe 12 horizontally to rig floor 16 if rig floor 16 were substantially parallel or just below the plane of movement of pipe 12. Trough 18 preferably has foot member 32 positioned thereon to prevent movement of pipe 12 away from rig floor 16. Foot member 32 preferably engages thread protector 24 of pipe 12. If desired, foot member 32 may be moveable and/or adjustable.

[0025] In FIG. 2, it can be seen that lift frame 30 begins to angle upwardly towards the direction of rig floor 16. Connection 34 between lift frame 30 and platform 26 is preferably pivotally mounted but may be of many different types as desired. As an example, pivot members 34 shown in FIG. 5 and FIG. 6 may be utilized. If desired, for instance, the rear of lift frame 30 could also be raised upwardly from platform 26. However, in one presently preferred embodiment, a pair of hydraulic parallel jacks with hydraulic jack 36 shown in the foreground is utilized to move the end of lift frame 30 closest to rig floor 16 upwardly. Hydraulic jack 36 is preferably pivotally mounted with respect to both lift frame 30 and platform 26 and may be mechanically interconnected therebetween in a variety of ways, as desired. Moreover, various

types of mechanical connections and other types or placements of lift devices such as hydraulic jack 36 may be utilized as desired with the net effect being to repeatedly raise and/or lower lift frame 30, trough 18, and, of course, pipe 12 during operation of system 10. Pipe 12 is prevented from sliding downwardly in trough 18 as lift frame 30 becomes more inclined by foot 32.

[0026] In FIG. 3, trough 18 begins to extend outwardly from lift frame 30. While many possible mechanical arrangements may be utilized to perform the extension function, in a presently preferred embodiment, hydraulic jack with piston 38 and cylinder 40 may be mounted in lift frame 30 for this purpose. Cylinder 40 may be secured to foot 32 and/or other portions of trough 18 such that as cylinder 40 is hydraulically extended from piston 38 trough 18 extends outwardly from lift frame 30. Cylinder 40 and piston 38 may be provided with support elements and/or guide members that support and/or guide operational movement of cylinder 40 and piston 38. Interlocking connections may be utilized as desired and positioned as desired to provide support between cylinder 40, piston 38, lift frame 30 and trough 18.

[0027] FIG. 4 shows trough 18 extended to the desired position. It will be noted that pipe 12 has never moved, relative to trough 18, and has simply sat within trough 18 as trough 18 extends from lift frame 30. Thus, there have been virtually no lateral impacts or friction damage to pipe 12 during the extension/retraction movement of trough 18 with respect to lift frame 30. The rig crew will now typically engage end 22 of pipe 12 with the rig blocks or other lifting means so that thread protector 24 of pipe 12 slides along the smooth surface of trough 18 until suspended in air for assembly to a tubular string.

[0028] Preferably system 10 is sized so as to be easily trucked to a location. In other words, system 10 is preferably transportable from rig to rig rather than requiring system 10 to be incorporated into the rig. However, it should be appreciated that, if so desired, system 10 can be more permanently attached or otherwise located at the rig site. System 10 can be remotely controlled from either rig floor 16 or the ground, or other locations, as desired. Adjustable stops may be utilized for different size pipe joints and to start and stop operation at desired locations automatically. For reference of one possible embodiment and shown only for comparison purposes, trough 18 can accommodate various size tubulars and pipe. Here, as illustrated in FIG. 5 pipe 12 is a large diameter casing while pipe 13 relatively smaller diameter casing.

[0029] As discussed in FIG. 5 and FIG. 6, trough 18 is also pivotal along its axial length axis by hydraulic members for loading and unloading to either lateral side of trough 18. When in the lowered, contracted, position wherein trough 18 is fully collapsed or retracted as shown in FIG. 1, then trough 18 is supported by guide rails 39 and corresponding slots 41 on either side of trough 18 and one or more center braces 42 of lift frame 30 (see outer surface of lift frame 30 in FIG. 1-FIG. 4). Lift frame 30 may also preferably comprise outer support rails, such as outer rails 44 and 46. Trough 18 may be mounted to lift frame outer rails 44 and 46 by greased slidable connections, rollers, suitably positioned interlocking telescoping joints and/or other suitably positioned mechanical means whereby relative extension between two members is accomplished during the operation thereof.

[0030] When positioned in the lowered position, as shown from the side in FIG. 1, then trough 18 may be tilted or rotated in either direction by multiple hydraulic lifts on either side of

trough 18 two of which are shown in FIG. 5 and 6, namely hydraulic lifts 48 and 50. Hydraulic lifts, such as lifts 48 and 50 are secured to platform 26 which may rest on catwalk 14 or other suitable support, such as the ground. When trough 18 is in the lowered, retracted position, shown in FIG. 1, then the ends of fixed position hydraulic lifts, such as the ends of lifts 48 and 50, align with receptacles such as receptacles 52 and 54. Thus, preferably when in the lowered, collapsed position, trough 18 can be rotating as shown in FIG. 6, such as for unloading pipe 12, by extending at least one of hydraulic lifts 48 and 50. Each side of trough 18 will preferably have several hydraulic lifts and the lifts on each side act in concert to rotate trough 18. It will be best understood from viewing FIG. 5 and FIG. 6 that trough 18 can be rotated in either direction to permit unloading and/or loading of pipe from either side of trough 18 by controlling the relative amounts of extension of hydraulic lifts 48 and 50. It should be appreciated that other rotating mechanisms can be utilized to rotate or tilt the trough 18 for loading and unloading tubulars. Such mechanisms could include, but are not limited to, rack and pinions, gears, motors, belts/pulleys, chains, cables, manual rotation, or any combination thereof.

[0031] In one embodiment, pipe lift frame 62 preferably aids in the stabilization of system 10. In this embodiment, pipe lift frame 62 is fixedly attached to system 10. It should be understood that the exact attachment point for lift frame 62 can vary depending on the configuration parameters at the rig including, but not limited to, the location of the pipe rack and any space limitations. It should further be understood that pipe lift frame 62 can also be independent of system 10 and serve primarily to lift pipe 12, or pipe 13, to the trough 18. Still further, it should be appreciated that pipe lift frame 62 can help stabilize system 10 whether it is fixedly attached or detachably mounted.

[0032] In another aspect of the invention, hydraulic loader 60 may be utilized for loading and unloading pipe with respect to trough 18. While only hydraulic loader 60, and only one pipe lift frame 62, is shown, it will be understood that multiple hydraulic loaders 60 may be utilized to support the pipe along its length. Preferably, at least two hydraulic loaders 60 may be utilized. Pipe lift frame 62 may extend from edge 64 of platform 26 to the ground or to a lower floor and will preferably extend through a pipe rack (not shown) or the like where the pipe to be loaded/unloaded is provided. The pipe rack may be at the same horizontal level as catwalk 14, or lower, and may even be significantly lower. Conceivably the pipe rack could also be higher but then lifting member 66 would need to be reoriented. In the normal case where the pipe rack is lower, when powered pipe lifter 66 is lowered beneath the horizontal level of pipes on the pipe rack, a pipe can be rolled in position against pipe lift frame 62. When pipe lifter 66 comes upwardly, then the pipe, such as pipe 12A shown in FIG. 5, is trapped between pipe lift frame 62 by lifting surface 68 on powered pipe lifter 66 and is then raised upwardly to trough 18.

[0033] In a preferred embodiment, pipe lifter 66 comprises a pivotal pipe guide 70 which follows track 72, to gently guide pipe 12A onto rail 74 and into trough 18. Pivotal guide 70, rail 74, and trough 18 are aligned to prevent any lateral bumps or shocks to the pipe. In a reverse manner, pipe is unloaded from trough 18.

[0034] Thus, in operation to move pipe from a pipe rack to rig floor 16, powered pipe lifter 66 is lowered, a pipe is rolled against pipe lift frame 62. Powered pipe lifter 66 moves the

pipe upwardly and rolls it gently onto trough 18 where it comes to rest in bottom groove 20. Lift frame 30 is then lifted upwardly, and trough 18 slides outwardly with respect to lift frame 30. To unload pipes, the reverse process takes place, except that the pipe can be rolled off of trough 18 by hydraulic lifts 48 and 50 to either side of trough 18, as desired. For instance, pipe lift frame 62 may be positioned on the opposite side of trough 18 than as shown.

[0035] The particular stopping points for each moveable element such as trough 18, powered pipe lifter 66, lift frame 30, and the like, can be set by controls, software, and suitable sensors and/or by mechanically moveable stop means, as desired, so that it is not necessary to manually adjust the stopping points for each cycle of operation.

[0036] FIG. 7 illustrates another embodiment of the pipe handling system 10. Here, system 10 comprises a rear frame 19, which supports trough 18 and pipe 12 when trough 18 is in a home position. It should be appreciated that trough 18 comprises a foot member 32 or a similar member that can engage the thread protector 24 of pipe 12. It should be further appreciated that the pipe engaging member, such as foot member 32 may also directly engage the pipe 12, such as when no thread protector 24 is utilized. As described hereinabove, trough 18 can be further supported by rails 44, 46 which allow for slidable contact with trough 18. However, as can be seen in Fig. 7, rails 44 46, in this embodiment, extend the length of or at least part of the length, as desired, of the rear frame 19. Rear frame 19 is preferably supported by rear scissor lift 11 and a front scissor lift 12. However, if desired, additional scissor lifts may be used or only one scissor lift may be used. It is foreseen that the positioning of the one or more scissor lifts would be in accordance to designs to allow for the proper support of the rear main frame 19, the trough 18, and any tubulars 12 which may be carried therein. FIG. 8 illustrates a typical scissor lift preferred for this embodiment. However, various designs of scissor lifts or similar vertical type lifts can be used without departing from the scope of the instant invention. The scissor lifts 11, 17 can be attached to the rear frame 19 in a variety of conventional means and can be permanently attached such as by, but not limited to, welding or they can be removably attached.

[0037] Still referring to FIG. 7, the rear frame 19 is connected or joined to a front frame 21 at a pivot point 23 and is connected to subframe 43 at a second pivot point 45. Pivot points 23, 45 may be a variety of connections including, but not limited to, pins, shafts, bolts, and any other connection that allows relative movement between rear frame 19 and subframe 43 (pivot point 45) and between rear frame 19 and front frame 21 (pivot point 23). Preferably, front frame 21 also comprises a rail 47 or rails 47, 49 to slidably support trough 18 as it moves from its home position to the rig floor 16. It should be appreciated that if the rails are only on rear frame 19, the carried tubular 12 should reach sufficiently onto the rig floor 16 to be handled by the rig personnel or equipment. Further if only rails 44, 46, on rear frame 19 are utilized, the trough 18 must be sufficiently supported, by rear frame 19 and rails 44, 46 so as to reach the rig floor 16 without being obstructed by the surface of front frame 21. Thus, it is foreseeable that front frame 21 may comprise a complete or partial support or guide surface for the trough 18 as opposed to rails 47, 49.

[0038] FIG. 7A illustrates an embodiment wherein front frame 21 can be folded so as to rest above rear frame 19. Those skilled in the art would recognize that such an embodiment would allow for a more compact system 10 particularly

from a portability perspective wherein transportation between rigs can be by truck, trailer, barge, or other method.

[0039] FIG. 9 illustrates the system 10 with the scissor lifts 11, 17 extended. As can be seen, the scissor lifts 11, 17 extend so as to move the rear frame 19 so as to be substantially in the same plane as front frame 21. Preferably, the rear frame pivots about pivot point 23 until rails 44, 46 and rails 47, 49 are aligned. In this position, trough 18 and any tubular 12 contained therein can be smoothly advance from the home position to the rig floor 16.

[0040] In operation when tubulars are required on the rig floor 16, system 10 is erected or placed in a desired location where pipes are being stored near the rig. Preferably this is at or near the rig catwalk 14. However, the placement of system 10 can vary depending on the rig location or pipe storage layout. The scissor lifts 11, 17 can be utilized to adjust the height of the rear frame 19 so as to correspond to the height of the catwalk or the pipe storage rack. Preferably, front frame 21 is positioned so as to extend to the V-door 35. It should be appreciated, that depending on the rig design, front frame 21 may rest against the V-door 35 or may extend to the rig floor 16. In cases where the front frame 21 rests against the V-door 35, it should be appreciated that the front end 37, of the front frame 21 comprises a roller or other member that allows for movement of the front frame relative and against the V-door 35. The trough 18, which rotates as described hereinabove (FIGS. 5 and 6) to accept at least one tubular 12. Next, the one or more scissor lifts 11, 17 are actuated so as to raise the rear frame 19 so as to be at substantially the same angle as the front frame 21. Next, the trough 18, carrying at least one tubular 12 is moved from the home or loading/unloading position to the rig floor 16 where the tubular can be retrieved. It should be appreciated that a variety of methods can be used to move trough 18 along the rear frame 19 and the front frame 21 including, but not limited to, chain drives, cable drives, tracks, cogs, pistons, and the like. After the tubular 12 is removed from the trough 18, the trough is then returned to the home position, the scissor lifts 11, 17 retract and bring the rear frame 19 back to a more horizontal position aligned with the catwalk 14 or a pipe rack so that another tubular 12 may be loaded into the trough 18 as desired. When pipe is tripped out of the hole or otherwise required to be removed from the rig floor 16, the operation of system 10 is essentially reversed. Namely, with the scissor lifts 11, 17 extended and the trough 18 moved to the rig floor 16, the tubular or tubulars 12 to be removed are placed into the trough 18. Next, the trough is returned to its home position, the scissor lifts 11, 17 are retracted and the pipe is rolled out of the trough 18 as described hereinabove (FIGS. 5 and 6).

[0041] FIG. 10 illustrates another embodiment of the pipe handling system 10. Here, system 10 comprises a rear frame 29, which supports a conveyor system 53 and pipe 12 when conveyor system 53 is in a home position. It should be appreciated that conveyor system 53 comprises a foot member 32a or a similar member that can engage the thread protector 24 of pipe 12. It should be further appreciated that the pipe engaging member, such as foot member 32 may also directly engage the pipe 12, such as when no thread protector 24 is utilized. The conveyor system 53 may be a variety of conventional or specially designed conveyors including, but not limited to a conveyor belt. The conveyor belt can be designed so as to only extend the length of the rear frame 29 so long as the carried tubular 12 reaches sufficiently onto the rig floor 16 to be handled by the rig personnel or equipment. The conveyor

belt can also extend the length of both the rear frame 29 and the front frame 31. Other embodiments may utilize separate conveyor belts one rear frame 29 and a separate one for front frame 31. It should be appreciated that when the conveyor 53 only extends the length of rear frame 29, the tubular 12 must be sufficiently supported by rear frame 29 so as to not scrape or drag along front frame 31 so as to protect the tubular from any damage, marks, or scratches. As with the trough 18, the tubular 12 is preferably stationary with respect to the conveyor system 53 and the foot member 32a.

[0042] Rear frame 29 is preferably supported by rear scissor lift 27. However, if desired, additional scissor lifts may be used. It is foreseen that the positioning of the one or more scissor lifts would be in accordance to designs to allow for the proper support of the rear main frame 29, the conveyor system 53, and any tubulars 12 which may be carried therein. FIG. 8 illustrates a typical scissor lift. However, various design of scissor lifts or similar vertical type lifts can be used without departing from the scope of the instant invention. The scissor lift 27 can be attached to the rear frame 19 in a variety of conventional means and can be permanently attached such as by, but not limited to, welding or it can be removably attached. Preferably, scissor lift 27 is positioned on the catwalk 14 but can also be positioned on the ground 15 or other location as desired.

[0043] Still referring to FIG. 10, the rear frame 29 is connected or joined to a front frame 31 at a second pivot point 25 and is pivotal about a first pivot point 51. Pivot points 25, 51 may be a variety of connections including, but not limited to, pins, shafts, bolts, and any other connection that allows relative movement between rear frame 29 and scissor lift 27 (pivot point 51) and between rear frame 29 and front frame 31 (pivot point 25).

[0044] FIG. 10A illustrates an embodiment wherein front frame 31 can be folded so as to rest above rear frame 29. Those skilled in the art would recognize that such an embodiment would allow for a more compact system 10 particularly from a portability perspective wherein transportation between rigs can be by truck, trailer, barge, or other transportation method.

[0045] FIG. 11 illustrates the system 10 with the scissor lift 27 extended. As can be seen, the scissor lift 27 extends so as to move the rear frame 29 so as to be substantially in the same plane as front frame 31. Preferably, the rear frame 29 pivots about pivot point 25 until it aligns with front frame 31 to provide for even movement of the conveyor 53. In this position, conveyor 53 and any tubular 12 contained therein can be smoothly advance from the home position to the rig floor 16.

[0046] In operation when tubulars are required on the rig floor 16, system 10 is erected or placed in a desired location where pipes are being stored near the rig. Preferably this is at or near the rig catwalk 14. However, the placement of system 10 can vary depending on the rig location or pipe storage layout. The scissor lift 27 can be utilized to adjust the height of the rear frame 29 so as to correspond to the height of the catwalk 14 or the pipe storage rack. Preferably, front frame 31 is positioned so as to extend to the V-door 35. It should be appreciated, that depending on the rig design, front frame 31 may rest against the V-door 35 or may extend to the rig floor 16. In cases where the front frame 31 rests against the V-door 35, it should be appreciated that the front end 33, of the front frame 31 comprises a roller or other member that allows for movement of the front frame 31 relative to and/or against the V-door 35. Load arms (not shown) of the pipe rack are actu-

ated to move at least one tubular **12** onto the conveyor **53**. Next, the scissor lift **27** is actuated so as to raise the rear frame **29** so as to be at substantially the same angle as the front frame **31**. Next, the conveyor **53**, carrying at least one tubular **12** is moved from the home or loading/unloading position to the rig floor **16** where the tubular **12** can be retrieved. It should be appreciated that a variety of methods can be used to move conveyor **53** along the rear frame **29** and the front frame **31** including, but not limited to, endless belts, cogs, pistons, cables, and the like. After the tubular **12** is removed from the conveyor **53**, the conveyor **53** is then returned to the home position, the scissor lift **27** retracts and brings the rear frame **29** back to a more horizontal position aligned with the catwalk **14** or a pipe rack so that another tubular **12** may be loaded into the conveyor **53** as desired. When pipe is tripped out of the hole or otherwise required to be removed from the rig floor **16**, the operation of system **10** is essentially reversed. Namely, with the scissor lift **27** extended and the conveyor **53** moved to the rig floor **16**, the tubular or tubulars **12** to be removed are placed onto the conveyor **53**. Next, the conveyor **53** is returned to its home position, the scissor lift **27** is retracted and the pipe is pushed off of the conveyor **53** by the pipe rack loading arms (not shown) or kicker arms (not shown). It should be understood that different rigs may have different pipe raking and pipe manipulation equipment. Therefore, the movement of the pipe **12** onto the conveyor **53** may vary and the members which move the tubulars **12** may be integral with the pipe handling system **10**, the rig pipe rack, independently set up, manually operated by rig personnel, or any combination thereof. It should be appreciated that the conveyor system **53** may comprise additional guides and/rails to prevent the tubular **12** from rolling or otherwise coming off the conveyor **53**. Further, the conveyor **53** can be shaped or configured so as to provide a trough or other lowered center to allow the tubular to be retained within the conveyor system **53**. It should also be noted that either or both the conveyor system or the trough system can comprise additional sensors and/or stops which limit the travel of the tubular **12**, the lifts, the frame assemblies, and any other moving parts. Further, the operation of the pipe handling system **10** can be further controlled by computer system, radio controls, or any variety of control schemes adaptable to machinery operation and control.

[0047] It may be seen from the preceding description that a new and improved self supporting pipe pick-up and lay-down system and method has been provided. Although various embodiments may contact parts of the rig, the self supporting pipe handling system described herein does not rely on attachment to the rig as a means of supporting the system **10** while in operation. Although very specific examples have been described and disclosed, the invention is considered to comprise and is intended to comprise any equivalent structure and may be constructed in many different ways to function and operate in the general manner as explained hereinbefore. Accordingly, it is noted that the embodiment of the new and improved pipe pick-up and lay-down system and method described herein in detail for exemplary purposes is of course subject to many different variations in structure, design, application and methodology. Because many varying and different embodiments may be made within the scope of the inventive concept(s) herein taught, and because many modifications may be made in the embodiment herein detailed in accordance with the descriptive requirements of the law, it is

to be understood that the details herein are to be interpreted as illustrative and not in a limiting sense.

I claim:

1. A self supporting pipe handling machine for moving at least one oilfield tubular with respect to a rig floor, said pipe handling machine comprising:

an elongate moveable trough, said elongate moveable trough having a first lateral side and a second lateral side, said elongate moveable trough having a cross-sectional shape for receiving at least one oilfield tubular between said first lateral side and said second lateral side;

a first frame assembly having a longitudinal axis, wherein said elongate moveable trough is at least partially supported by said first frame assembly;

said elongate moveable trough being moveable to and from a first position away from said rig floor and a second position adjacent said rig floor;

one or more powered units for raising and lowering said first frame assembly toward and away from said rig floor;

a rotating mechanism for rotating said elongate moveable trough, said rotating mechanism being operable for rotating one lateral side to a higher elevation than the other lateral side; and

a second frame assembly having a longitudinal axis, wherein said one or more powered units raises said first frame assembly into substantial alignment of said longitudinal axis of said first frame assembly and said longitudinal axis of said second frame assembly.

2. The pipe handling machine of claim 1, wherein said pipe handling machine is operable from a remote location.

3. The pipe handling machine of claim 1, wherein said rotating mechanism is operable for rotating said elongate moveable trough to thereby unload an oilfield tubular laterally from said elongate moveable trough.

4. The pipe handling machine of claim 1, wherein said one or more powered units are scissor lifts.

5. The pipe handling machine of claim 1, wherein a V-door is in association with said rig floor, and wherein said second frame assembly moves along said V-door.

6. The pipe handling machine of claim 1, wherein said elongate moveable trough moves along both said first frame assembly and said second frame assembly.

7. A self supporting pipe handling machine for moving at least one oilfield tubular with respect to a rig floor, said pipe handling machine comprising:

a conveyor system having at least one member to contact said at least one oilfield tubular;

a first frame assembly having a longitudinal axis, wherein said conveyor system is at least partially supported by said first frame assembly;

said at least one member of said conveyor system being moveable between a first position and a second position with respect to said rig floor;

one or more powered units for raising and lowering said first frame assembly toward and away from said rig floor; and

a second frame assembly having a longitudinal axis, wherein said one or more powered units raises said first frame assembly into substantial alignment of said longitudinal axis of said first frame assembly and said longitudinal axis of said second frame assembly.

8. The pipe handling machine of claim 7, wherein said pipe handling machine is operable from a location remote from the pipe handling machine.

9. The pipe handling machine of claim 7, wherein said one or more powered units are scissor lifts.

10. The pipe handling machine of claim 7, wherein a V-door is in association with said rig floor, and wherein said second frame assembly moves along said V-door.

11. The pipe handling machine of claim 7, wherein said at least one member of said conveyor system moves along both said first frame assembly and said second frame assembly.

12. A self supporting pipe handling machine for moving at least one oilfield tubular with respect to a rig floor, said pipe handling machine comprising:

a lift frame;

said lift frame further comprising a first subframe having a longitudinal axis and a second subframe having a longitudinal axis;

one or more powered units for raising said first subframe with respect to said rig floor, wherein said raising substantially aligns the respective longitudinal axes of said first and said second subframe;

an elongate moveable trough supported by said lift frame, said elongate moveable trough being axially extendable and retractable with respect to said lift frame, said elongate moveable trough being shaped internally for receiving and supporting said at least one oilfield tubular; and one or more powered units for axially moving said elongate moveable trough with respect to said lift frame.

13. The pipe handling machine of claim 12, wherein said oilfield tubular is moveable toward or away from said rig floor by said elongate moveable trough with little or no axial sliding movement occurring between an oilfield tubular carried by said elongate moveable trough and said elongate moveable trough while said elongate moveable trough operates to move towards or away from said rig floor.

14. The pipe handling machine of claim 12, further comprising a trough foot member mounted to an end portion of elongate moveable trough for supporting an end of an oilfield tubular positioned in said trough.

15. The pipe handling machine of claim 14, wherein said trough foot member is fixed in position with respect to said elongate moveable trough when said elongate moveable trough is moving with respect to said lift frame.

16. The pipe handling machine of claim 14, wherein said trough foot member is movably mounted and wherein said

trough foot member is adjustable to position varied length tubulars with respect to said elongate moveable trough.

17. A method for picking up or laying down at least one oilfield tubular with respect to a rig floor, comprising:

positioning at least one oil field tubular on a carrier;

raising at least a portion of a frame assembly at least partially supporting said carrier, said frame assembly having a first subframe and a second subframe, wherein said raising step substantially aligns said first subframe and said second subframe in substantially the same plane; and

moving said carrier with respect to said frame assembly toward or away from the rig floor.

18. The method of claim 17, wherein said carrier is an elongate movable member.

19. The method of claim 17, wherein said carrier is a conveyor system.

20. The method of claim 17, further comprising:

mounting one or more lift members to a position adjacent said carrier;

actuating said one or more lift members to move at least a portion of said first subframe in a vertical direction; and moving said carrier across at least a portion of said first subframe and said second subframe, wherein said carrier is at least partially supported by said first subframe and/or said second subframe while moving.

21. A self supporting pipe handling machine for moving at least one oilfield tubular with respect to a rig floor, said pipe handling machine comprising:

a carrier, wherein said carrier is configured to carry at least one of a plurality of oilfield tubulars;

a lift frame further comprising a first subframe and a second subframe, said lift frame at least partially supporting said carrier; and

one or more powered units for raising and lowering at least a portion of said lift frame with respect to said rig floor, wherein the first subframe and the second subframe are substantially aligned in a longitudinal direction when said portion of lift frame is raised.

22. The pipe handling machine of claim 21, wherein said carrier is an elongate movable trough.

23. The pipe handling machine of claim 21, wherein said carrier is a conveyor system.

24. The pipe handling machine of claim 21, wherein said one or more powered units are scissor lifts.

* * * * *