

tubulars that must be handled manually. By eliminating unnecessary motions in the process from storage to delivery, the logistical flow improvement translates directly to improved reliability and consistent tripping efficiency.

[0005] Embodiments of this invention may simplify the processes of transporting and assembling tubulars by eliminating wasted movements. For example, pipe racking system ("PRS") travel time is reduced going from the well center to a setback slot and back again as embodiments of the invention presents tubulars to the well center directly with no wait time. Further, the manual handling of tubulars is dangerous and can be inconsistent. Embodiments of this invention may significantly minimizes human interface with moving tubulars and is a major step toward total automation of tubular handling.

BRIEF SUMMARY OF THE INVENTION

[0006] ~~The invention is directed to~~ According to a first aspect of the present invention, there is provided an apparatus comprising a tubular standbuilding conveyor apparatus that includes a horizontal conveyor belt apparatus running along a horizontal axis; a vertical conveyor belt apparatus oriented parallel to and vertically offset from the horizontal conveyor belt apparatus; a stand building hoist; and an iron roughneck. The horizontal and vertical conveyor belts are configured to convey vertically oriented tubulars along the horizontal axis and the stand building hoist and the iron roughneck are configured to attach a vertically oriented tubular to one or more other vertically oriented tubulars.

[0007] The horizontal conveyor belt apparatus is capable of supporting large point loads and includes a steel track shoe belt. The surface of the horizontal conveyor belt apparatus is covered with a protective surface. The protective surface is at least one of wood, nylon or rubber.

[0008] The vertical conveyor belt apparatus includes a cogged belt, which is mechanically coupled to the vertical conveyor belt apparatus through a set of right angle drive gears. At least one additional vertical conveyor belt apparatus is located parallel to and vertically offset from the vertical conveyor belt. In one embodiment, there exists at least one additional vertical conveyor belt apparatus. The vertical conveyor belt apparatuses are offset from each other on the horizontal ends of the vertical conveyor belts. The parallel vertical conveyor belt apparatuses are horizontally offset from each other. The vertical conveyor belts are horizontally offset from each other such that when a vertical tubular is on the horizontal conveyor apparatus and leaned against the vertical conveyor belt apparatus, the vertical

tubular would be at about a 3 degree angle from a plane running vertically through the horizontal center of the horizontal conveyor apparatus.

[0009] The apparatus further includes a stand delivery conveyor assembly configured to convey vertically oriented tubulars to or from the horizontal conveyor belt apparatus. The stand delivery conveyor assembly includes a delivery horizontal conveyor belt apparatus running along the horizontal axis; and at least one delivery vertical conveyor belt apparatus oriented parallel to and vertically offset from the horizontal conveyor belt apparatus. At least one additional vertical conveyor belt apparatus is located parallel to and vertically offset from the vertical conveyor belt.

[0010] There is further disclosed a tubular interchange device located between the tubular standbuilding conveyor apparatus and the stand delivery conveyor assembly, wherein the tubular interchange device is configured to convey vertically oriented tubulars from the horizontal conveyor belt apparatus to the stand delivery conveyor assembly.

[0011] ~~In one embodiment, there is included a drill rig containing the tubular standbuilding conveyor apparatus described above located on a moveable drill floor.~~

According to a second aspect of the present invention, there is provided a drill rig including an apparatus located on a drill floor comprising: a tubular standbuilding conveyor apparatus, comprising a horizontal conveyor belt apparatus running along a horizontal axis; a vertical conveyor belt apparatus oriented parallel to and vertically offset from the horizontal conveyor belt; a stand building hoist; and an iron roughneck; wherein the horizontal and vertical conveyor belts are configured to convey vertically oriented tubulars along the horizontal axis; and wherein the stand building hoist and the iron roughneck are configured to attach a vertically oriented tubular to one or more other vertically oriented tubulars.

[0011a] The drill rig includes a vertical tubular setback area located forward of the tubular standbuilding conveyor apparatus and a vertical assembled tubular setback area located aft of the tubular standbuilding conveyor apparatus and in proximity to the well center. A lower level bridge crane assembly is also included in which the lower level bridge crane assembly is configured to move a tubular from the setback area to the tubular standbuilding conveyor apparatus. An upper level bridge crane assembly is further included. The stand building hoist is attached to the upper level bridge crane assembly. The iron

roughneck may also be attached to the upper level bridge crane assembly. An additional tubular standbuilding apparatus is included in which each tubular standbuilding apparatus is oriented such that the horizontal conveyor belt apparatus is inboard of the vertical conveyor belt apparatus. Though this embodiment is directed toward a moveable drill floor, a person skilled in the art would recognize that the design is equally applicable to a fixed drill floor.

[0012] ~~A~~According to a third aspect of the present invention, there is provided a method for providing tubular assembly ~~includes~~comprising the steps of loading at least a first and a second vertically oriented tubular onto a conveyor assembly; raising the first tubular above the second tubular; and attaching the first tubular to the second tubular.

[0012a] The step of raising the first tubular is done with a standbuilding hoist.
Attaching the first tubular

to the second tubular is done with an iron roughneck.

[0012b] According to a fourth aspect of the present invention, there is provided a method for providing tubular disassembly includescomprising the steps of removing at least two attached tubulars from a well center; loading the attached tubulars onto a vertical conveyor assembly; separating the attached tubulars; and lowering the top most separated tubular onto the vertical conveyor assembly.

[0012c] A further step is conveying the separated tubulars to a storage setback using the vertical conveyor assembly in which separating the attached tubular is done with an iron roughneck and the lowering is done with a standbuilding hoist.

[0013] The foregoing has outlined rather broadly the features and technical advantages of the present invention in order that the detailed description of the invention that follows may be better understood. Additional features and advantages of the invention will be described hereinafter which form the subject of the claims of the invention. It should be appreciated by those skilled in the art that the conception and specific embodiment disclosed may be readily utilized as a basis for modifying or designing other structures for carrying out the same purposes of the present invention. It should also be realized by those skilled in the art that such equivalent constructions do not depart from the spirit and scope of the invention as set forth in the appended claims. The novel features which are believed to be characteristic of the invention, both as to its organization and method of operation, together with further objects and advantages will be better understood from the following description when considered in connection with the accompanying figures. It is to be expressly understood, however, that each of the figures is provided for the purpose of illustration and description only and is not intended as a definition of the limits of the present invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0014] For a more complete understanding of the present invention, reference is now made to the following descriptions taken in conjunction with the accompanying drawing, in which:

[0015] FIG. 1 is a profile view of a rig illustrating an embodiment of pipe storage and setback.

[0016] FIG. 2 is a profile view of a rig illustrating an embodiment of the pipe handling equipment.