Claims

What is claimed is:

1. A crane, comprising:

a rotatable base;

an inner boom extending from a base end to a first knuckle end, the base end pivotally connected at a base pivot point to the rotatable base such that the inner boom is pivotable in a vertical plane about the base pivot point;

an outer boom extending from a second knuckle end to a boom tip, the second knuckle end pivotally connected at a knuckle pivot point to the first knuckle end of the inner boom such that the outer boom is pivotable in the vertical plane about the knuckle pivot point;

a plurality of guide assemblies arranged along the length of the inner and outer boom and adapted for guiding a plurality of lines, each of the guide assemblies having a rack structure and a plurality of line guides arranged on the rack structure; and

a multi-line material handling system, comprising:

a first line having a first end secured to a first winch drum, an outgoing portion extending from the first winch drum and along one of the line guides of each of the plurality of guide assemblies to a sheave block, and an incoming portion returning from the sheave block to a supported anchor device; and

a second line having a first end secured to a second winch drum, an outgoing portion extending from the second winch drum and along one of the line guides of each of the plurality of guide assemblies to the sheave block, and an incoming portion returning from the sheave block to the supported anchor device.

2. The crane of claim 1, wherein the incoming portions of the first and second lines each extend along one of the line guides of each of the plurality of guide assemblies before returning to the supported anchor device.

3. The crane of claim 1, wherein the rack structure of each of the guide assemblies comprises a support bracket and a spindle.

4. The crane of claim 3, wherein the line guides are arranged in spaced apart relationship along the spindle.

5. The crane of claim 4, wherein the spindle extends transversely to the inner and outer boom.

6. The crane of claim 1, wherein the plurality of line guides comprise sheaves.

7. The crane of claim 6, wherein each of the guide assemblies includes four sheaves to accommodate the incoming and outgoing portion of the first line and the incoming and outgoing portion of the second line.

8. The crane of claim 1, wherein the first line is a right lay line and the second line is a left lay line.

9. The crane of claim 1, wherein the sheave block includes a line guide for each of the first and second lines.

10. The crane of claim 1, wherein one of the plurality of guide assemblies is arranged near the outer boom tip and comprises:

a first rack structure and a plurality of line guides arranged on a first side of the first and second lines; and

a second rack structure and a plurality of line guides arranged on a second side of the first and second lines.

11. The crane of claim 1, wherein the supported anchor device is an equalizing device.

12. The crane of claim 1, further comprising a monitoring system in communication with the equalizing device, wherein the equalizing device includes a sensor for determining the relative payout of the first and second line.

13. The crane of claim 12, wherein, when the relative payout is unequal the monitoring system automatically increases or reduces the operating speed of one of the first and second winch drums.

14. The crane of claim 11, further comprising a heave compensation device coupled to the equalizing device.

15. The crane of claim 14, wherein the heave compensation device selectively induces longitudinal motion of the equalizing device in a direction substantially parallel to the incoming portions of the first and second lines.

16. The crane of claim 1, further comprising a line routing system arranged along a line path between the base of the crane and each of the first and second winch drums and the supported anchor device.

17. The crane of claim 16, wherein the line routing system includes a routing guide arranged below the base of the crane and an intermediate routing guide arranged between the routing guide and the base of the crane.

18. The crane of claim 17, wherein the intermediate routing guide is configured to rotate a selected fraction of the crane rotation.

19. The crane of claim 18, wherein the selected fraction is ½.

20. A crane, comprising:

a knuckle boom crane having a base and a means for handling a load and lowering the load to a depth of 3500 meters below the base of the knuckle boom crane, the means for handling a load having a capacity of 800 metric tons.

Claims

What is claimed is:

1. A crane, comprising:

a rotatable base;

an inner boom extending from a base end to a first knuckle end, the base end pivotally connected at a base pivot point to the rotatable base such that the inner boom is pivotable in a vertical plane about the base pivot point;

an outer boom extending from a second knuckle end to a boom tip, the second knuckle end pivotally connected at a knuckle pivot point to the first knuckle end of the inner boom such that the outer boom is pivotable in the vertical plane about the knuckle pivot point;

a plurality of guide assemblies arranged along the length of the inner and outer boom and adapted for guiding a plurality of lines, each of the guide assemblies having a rack structure and a plurality of line guides arranged on the rack structure; and

a multi-line material handling system, comprising:

a first line having a first end secured to a first winch drum, an outgoing portion extending from the first winch drum and along one of the line guides of each of the plurality of guide assemblies to a sheave block, and an incoming portion returning from the sheave block to a supported anchor device; and

a second line having a first end secured to a second winch drum, an outgoing portion extending from the second winch drum and along one of the line guides of each of the plurality of guide assemblies to the sheave block, and an incoming portion returning from the sheave block to the supported anchor device.

2. The crane of claim 1, wherein the incoming portions of the first and second lines each extend along one of the line guides of each of the plurality of guide assemblies before returning to the supported anchor device.

3. The crane of claim 1, wherein the rack structure of each of the guide assemblies comprises a support bracket and a spindle.

4. The crane of claim 3, wherein the line guides are arranged in spaced apart relationship along the spindle.

5. The crane of claim 4, wherein the spindle extends transversely to the inner and outer boom.

6. The crane of claim 1, wherein the plurality of line guides comprise sheaves.

7. The crane of claim 6, wherein each of the guide assemblies includes four sheaves to accommodate the incoming and outgoing portion of the first line and the incoming and outgoing portion of the second line.

8. The crane of claim 1, wherein the first line is a right lay line and the second line is a left lay line.

9. The crane of claim 1, wherein the sheave block includes a line guide for each of the first and second lines.

10. The crane of claim 1, wherein one of the plurality of guide assemblies is arranged near the outer boom tip and comprises:

a first rack structure and a plurality of line guides arranged on a first side of the first and second lines; and

a second rack structure and a plurality of line guides arranged on a second side of the first and second lines.

11. The crane of claim 1, wherein the supported anchor device is an equalizing device.

12. The crane of claim 1, further comprising a monitoring system in communication with the equalizing device, wherein the equalizing device includes a sensor for determining the relative payout of the first and second line.

13. The crane of claim 12, wherein, when the relative payout is unequal the monitoring system automatically increases or reduces the operating speed of one of the first and second winch drums.

14. The crane of claim 11, further comprising a heave compensation device coupled to the equalizing device.

15. The crane of claim 14, wherein the heave compensation device selectively induces longitudinal motion of the equalizing device in a direction substantially parallel to the incoming portions of the first and second lines.

16. The crane of claim 1, further comprising a line routing system arranged along a line path between the base of the crane and each of the first and second winch drums and the supported anchor device.

17. The crane of claim 16, wherein the line routing system includes a routing guide arranged below the base of the crane and an intermediate routing guide arranged between the routing guide and the base of the crane.

18. The crane of claim 17, wherein the intermediate routing guide is configured to rotate a selected fraction of the crane rotation.

19. The crane of claim 18, wherein the selected fraction is ½.