CLAIMS

1. A drilling and tripping system, comprising:

a) a plurality of lifting systems;

b) a traveling differential roughneck associated with at least one of said plurality of lifting systems;

c) a top drive associated with at least one of said plurality of lifting systems, said top drive connected to a saver sub;

d) a pipe handling and storage system associated with said traveling differential roughneck;

e) a drilling fluid diverting system associated with said traveling differential roughneck; and

f) a control system, wherein said control system is operable to control the operation of said traveling differential roughneck.

2. The drilling and tripping system of claim 1, comprising a first lifting system, a second lifting system and a third lifting system.

3. The drilling and tripping system of claim 2, wherein said first lifting system, second lifting system or third lifting system comprises a drawworks, a winch, a hydraulic ram, a rack and pinion system, or a high load linear motor.

4. The drilling and tripping system of claim 2, wherein said first and second lifting system are associated with said traveling differential roughneck and said third lifting system is associated with said top drive.

5. The drilling and tripping system of claim 4, wherein said traveling differential roughneck comprises:

a) a frame;

b) a lower torque wrench;

c) an upper torque wrench; and

d) a mud bucket.

6. The drilling and tripping system of claim 5, wherein said mud bucket comprises:

a) an upper rotating chamber comprising at least a first upper pipe ram;

b) a middle stationary chamber comprising a blank ram; and

c) a lower rotating chamber comprising at least a first lower pipe ram.

7. The drilling and tripping system of claim 6, wherein said mud bucket further comprises a second upper pipe ram and a second lower pipe ram.

8. The drilling and tripping system of claim 5, wherein said lower torque wrench comprises:

a) a ring gear;

b) at least a first motor; and

c) a plurality of cam locked jaws.

9. The drilling and tripping system of claim 5, wherein said upper torque wrench comprises:

a) a ring gear;

b) at least a first motor; and

c) a plurality of cam locked jaws.

10. The drilling and tripping system of claim 9, wherein said upper torque wrench further comprises a float mechanism.

11. The drilling and tripping system of claim 1, wherein said top drive comprises a float mechanism.

12. The drilling and tripping system of claim 9, wherein said top drive comprises a float mechanism.

13. The drilling and tripping system of claim 1, wherein said control system comprises a computer, said computer further comprising instructions for operating the drilling and tripping system.

14. The drilling and tripping system of claim 13, wherein said control system comprises instructions for simultaneously controlling the operations of said lifting systems, said travelling differential roughneck, said top drive, said pipe handling and storage system, and said drilling fluid diverting system.

15. The drilling and tripping system of claim 14, wherein said control system comprises instructions responsive to data associated with drilling or tripping operations.

16. The drilling and tripping system of claim 15, wherein said control system comprises instructions responsive to data stored in non-volatile memory, real-time data associated with drilling or tripping operations, and user inputs.

17. A method for removing a portion of a drillstring from a hole, comprising:

a) outfitting a drilling rig with a drilling and tripping system comprising:

i) a plurality of lifting systems;

ii) a traveling differential roughneck associated with at least one of said plurality of lifting systems;

iii) a top drive associated with at least one of said plurality of lifting systems, said top drive connected to a saver sub;

iv) a pipe handling and storage system associated with said traveling differential roughneck;

v) a drilling fluid diverting system associated with said traveling differential roughneck; and

vi) a control system operable to control at least a plurality of operations of said traveling differential roughneck; and

b) operating said drilling and tripping system to remove at least a portion of said drillstring from said hole.

18. The method of claim 17, wherein said traveling differential roughneck comprises:

a) a frame;

b) a lower torque wrench;

c) an upper torque wrench; and

d) a mud bucket.

19. The method of claim 18, wherein said mud bucket comprises:

a) an upper rotating chamber comprising at least a first upper pipe ram;

b) a middle stationary chamber comprising a blank ram; and

c) a lower rotating chamber comprising at least a first lower pipe ram.

20. The method of claim 19, wherein said mud bucket further comprises a second upper pipe ram and a second lower pipe ram.

21. A method for drilling an oil or gas well, comprising:

a) outfitting a drilling rig with a drilling and tripping system comprising:

i) a plurality of lifting systems;

ii) a traveling differential roughneck associated with at least one of said plurality of lifting systems;

iii) a top drive associated with at least one of said plurality of lifting systems, said top drive connected to a saver sub;

iv) a pipe handling and storage system associated with said traveling differential roughneck;

v) a drilling fluid diverting system associated with said traveling differential roughneck; and

vi) a control system operable to control at least a plurality of operations of said traveling differential roughneck; and

b) operating said drilling and tripping system to drill said oil or gas well.

22. The method of claim 21, wherein said traveling differential roughneck comprises:

a) a frame;

b) a lower torque wrench;

c) an upper torque wrench; and

d) a mud bucket.

23. The method of claim 22, wherein said mud bucket comprises:

a) an upper rotating chamber comprising at least a first upper pipe ram;

b) a middle stationary chamber comprising a blank ram; and

c) a lower rotating chamber comprising at least a first lower pipe ram.

24. The method of claim 23, wherein said mud bucket further comprises a second upper pipe ram and a second lower pipe ram.

25. A method for removing a tubular from a riser or a cased hole without the need for fluid circulation or rotation of the tubular, comprising:

a) outfitting a drilling rig with a drilling and tripping system comprising:

i) a plurality of lifting systems;

ii) a traveling differential roughneck associated with at least one of said plurality of lifting systems;

iii) a top drive associated with at least one of said plurality of lifting systems, said top drive connected to a saver sub;

iv) a pipe handling and storage system associated with said traveling differential roughneck;

v) a drilling fluid diverting system associated with said traveling differential roughneck; and

vi) a control system operable to control at least a plurality of operations of said traveling differential roughneck; and

b) operating said drilling and tripping system to remove said tubular from said riser or said cased hole without the need for fluid circulation or rotation of the tubular.

26. The method of claim 25, wherein said traveling differential roughneck comprises:

a) a frame;

b) a lower torque wrench;

c) an upper torque wrench; and

d) a mud bucket.

27. The method of claim 26, wherein said mud bucket comprises:

a) an upper rotating chamber comprising at least a first upper pipe ram;

b) a middle stationary chamber comprising a blank ram; and

c) a lower rotating chamber comprising at least a first lower pipe ram.

28. The method of claim 27, wherein said mud bucket further comprises a second upper pipe ram and a second lower pipe ram.

CLAIMS

WHAT IS CLAIMED IS:

1. A drilling and tripping system, comprising:

a) a plurality of lifting systems;

b) a traveling differential roughneck associated with at least one of said plurality of lifting systems;

c) a top drive associated with at least one of said plurality of lifting systems, said top drive connected to a saver sub;

d) a pipe handling and storage system associated with said traveling differential roughneck;

e) a drilling fluid diverting system associated with said traveling differential roughneck; and

f) a control system, wherein said control system is operable to control the operation of said traveling differential roughneck.

2. The drilling and tripping system of claim 1, comprising a first lifting system, a second lifting system and a third lifting system.

3. The drilling and tripping system of claim 2, wherein said first lifting system, second lifting system or third lifting system comprises a drawworks, a winch, a hydraulic ram, a rack and pinion system, or a high load linear motor.

4. The drilling and tripping system of claim 2, wherein said first and second lifting system are associated with said traveling differential roughneck and said third lifting system is associated with said top drive.

5. The drilling and tripping system of claim 4, wherein said traveling differential roughneck comprises:

a) a frame;

b) a lower torque wrench;

c) an upper torque wrench; and

d) a mud bucket.

6. The drilling and tripping system of claim 5, wherein said mud bucket comprises:

a) an upper rotating chamber comprising at least a first upper pipe ram;

b) a middle stationary chamber comprising a blank ram; and

c) a lower rotating chamber comprising at least a first lower pipe ram.

7. The drilling and tripping system of claim 6, wherein said mud bucket further comprises a second upper pipe ram and a second lower pipe ram.

8. The drilling and tripping system of claim 5, wherein said lower torque wrench comprises:

a) a ring gear;

b) at least a first motor; and

c) a plurality of cam locked jaws.

9. The drilling and tripping system of claim 5, wherein said upper torque wrench comprises:

a) a ring gear;

b) at least a first motor; and

c) a plurality of cam locked jaws.

10. The drilling and tripping system of claim 9, wherein said upper torque wrench further comprises a float mechanism.

11. The drilling and tripping system of claim 1, wherein said top drive comprises a float mechanism.

12. The drilling and tripping system of claim 9, wherein said top drive comprises a float mechanism.

13. The drilling and tripping system of claim 1, wherein said control system comprises a computer, said computer further comprising instructions for operating the drilling and tripping system.

14. The drilling and tripping system of claim 13, wherein said control system comprises instructions for simultaneously controlling the operations of said lifting systems, said travelling

differential roughneck, said top drive, said pipe handling and storage system, and said drilling fluid diverting system.

15. The drilling and tripping system of claim 14, wherein said control system comprises instructions responsive to data associated with drilling or tripping operations.

16. The drilling and tripping system of claim 15, wherein said control system comprises instructions responsive to data stored in non-volatile memory, real-time data associated with drilling or tripping operations, and user inputs.

17. A traveling differential roughneck comprising:

a) a frame;

b) a lower torque wrench;

c) an upper torque wrench; and

d) a mud bucket.

18. The traveling differential roughneck of claim 17, wherein said mud bucket comprises:

a) an upper rotating chamber comprising at least a first upper pipe ram;

b) a middle stationary chamber comprising a blank ram; and

c) a lower rotating chamber comprising at least a first lower pipe ram.

19. The traveling differential roughneck of claim 18, wherein said mud bucket further comprises a second upper pipe ram and a second lower pipe ram.

20. The traveling differential roughneck of claim 17, wherein said lower torque wrench comprises:

a) a ring gear;

b) at least a first motor; and

c) a plurality of cam locked jaws.

21. The traveling differential roughneck of claim 17, wherein said upper torque wrench comprises:

a) a ring gear;

b) at least a first motor; and

c) a plurality of cam locked jaws.

22. A mud bucket, comprising:

a) an upper rotating chamber comprising at least a first upper pipe ram;

b) a middle stationary chamber comprising a blank ram; and

c) a lower rotating chamber comprising at least a first lower pipe ram.

23. The mud bucket of claim 22, further comprising a slew ring between said upper rotating chamber and said middle stationary chamber.

24. The mud bucket of claim 22, further comprising a slew ring between said middle stationary chamber and said lower rotating chamber.

25. The mud bucket of claim 23, further comprising a slew ring between said middle stationary chamber and said lower rotating chamber.

26. The mud bucket of claim 22, further comprising a plurality of mud ports.

27. A control system for a drilling and tripping system, comprising a computer comprising instructions for controlling at least a plurality of operations of the drilling and tripping system.

28. The control system of claim 27, wherein said computer further comprises instructions for simultaneously controlling the operations of a plurality of lifting systems, a travelling differential roughneck, a top drive, a pipe handling and storage system, and a drilling fluid diverting system.

29. The control system of claim 28, wherein said computer further comprises instructions responsive to data associated with at least a plurality of the operations of the drilling or tripping system.

30. The control system of claim 29, wherein said computer comprises instructions responsive to data stored in non-volatile memory, real-time data associated with drilling or tripping operations, or user inputs.

31. A method for removing a portion of a drillstring from a hole, comprising:

a) outfitting a drilling rig with a drilling and tripping system comprising:

i) a plurality of lifting systems;

ii) a traveling differential roughneck associated with at least one of said plurality of lifting systems;

iii) a top drive associated with at least one of said plurality of lifting systems, said top drive connected to a saver sub;

iv) a pipe handling and storage system associated with said traveling differential roughneck;

v) a drilling fluid diverting system associated with said traveling differential roughneck; and

vi) a control system operable to control at least a plurality of operations of said traveling differential roughneck.

b) operating said drilling and tripping system to remove at least a portion of said drillstring from said hole.

32. The method of claim 31, wherein said traveling differential roughneck comprises:

a) a frame;

b) a lower torque wrench;

c) an upper torque wrench; and

d) a mud bucket.

33. The method of claim 32, wherein said mud bucket comprises:

a) an upper rotating chamber comprising at least a first upper pipe ram;

b) a middle stationary chamber comprising a blank ram; and

c) a lower rotating chamber comprising at least a first lower pipe ram.

34. The method of claim 33, wherein said mud bucket further comprises a second upper pipe ram and a second lower pipe ram.

35. A method for drilling an oil or gas well, comprising:

a) outfitting a drilling rig with a drilling and tripping system comprising:

i) a plurality of lifting systems;

ii) a traveling differential roughneck associated with at least one of said plurality of lifting systems;

iii) a top drive associated with at least one of said plurality of lifting systems, said top drive connected to a saver sub;

iv) a pipe handling and storage system associated with said traveling differential roughneck;

v) a drilling fluid diverting system associated with said traveling differential roughneck; and

vi) a control system operable to control at least a plurality of operations of said traveling differential roughneck.

b) operating said drilling and tripping system to drill said oil or gas well.

36. The method of claim 35, wherein said traveling differential roughneck comprises:

a) a frame;

b) a lower torque wrench;

c) an upper torque wrench; and

d) a mud bucket.

37. The method of claim 36, wherein said mud bucket comprises:

a) an upper rotating chamber comprising at least a first upper pipe ram;

b) a middle stationary chamber comprising a blank ram; and

c) a lower rotating chamber comprising at least a first lower pipe ram.

38. The method of claim 37, wherein said mud bucket further comprises a second upper pipe ram and a second lower pipe ram.

39. A method for removing a tubular from a riser or a cased hole without the need for fluid circulation or rotation of the tubular, comprising:

a) outfitting a drilling rig with a drilling and tripping system comprising:

i) a plurality of lifting systems;

ii) a traveling differential roughneck associated with at least one of said plurality of lifting systems;

iii) a top drive associated with at least one of said plurality of lifting systems, said top drive connected to a saver sub;

iv) a pipe handling and storage system associated with said traveling differential roughneck;

v) a drilling fluid diverting system associated with said traveling differential roughneck; and

vi) a control system operable to control at least a plurality of operations of said traveling differential roughneck.

b) operating said drilling and tripping system to remove said tubular from said riser or said cased hole without the need for fluid circulation or rotation of the tubular.

40. The method of claim 39, wherein said traveling differential roughneck comprises:

a) a frame;

b) a lower torque wrench;

c) an upper torque wrench; and

d) a mud bucket.

41. The method of claim 40, wherein said mud bucket comprises:

a) an upper rotating chamber comprising at least a first upper pipe ram;

b) a middle stationary chamber comprising a blank ram; and

c) a lower rotating chamber comprising at least a first lower pipe ram.

42. The method of claim 41, wherein said mud bucket further comprises a second upper pipe ram and a second lower pipe ram.

43. A drilling and tripping system, comprising:

a) a plurality of lifting systems;

b) a plurality of traveling differential roughnecks, each associated with at least one of said plurality of lifting systems;

c) a pipe handling and storage system associated with at least one of said plurality of traveling differential roughnecks;

d) a drilling fluid diverting system associated with at least one of said plurality of traveling differential roughnecks; and

e) a control system.

44. The drilling and tripping system of claim 43, comprising a first lifting system and a second lifting system.

45. The drilling and tripping system of claim 44, wherein said first lifting system or said second lifting system comprises a drawworks, a winch, a hydraulic ram, a rack and pinion system, or a high load linear motor.

46. The drilling and tripping system of claim 43, comprising a first traveling differential roughneck and a second traveling differential roughneck.

47. The drilling and tripping system of claim 46, wherein said first traveling differential roughneck or said second traveling differential roughneck comprises:

a) a rotating elevator bowl;

b) a lower rotating torque wrench;

c) an upper rotating torque wrench;

d) a spinner;

e) a mud bucket; and

f) a fluid connection system.

48. The drilling and tripping system of claim 47, wherein said rotating elevator bowl comprises:

a) a main body;

b) a bowl;

c) a thrust bearing;

d) an aligned radial opening in said main body, bowl and thrust bearing;

e) a motor; and

f) a plurality of sensors.

49. The drilling and tripping system of claim 47, wherein said lower rotating torque wrench comprises:

a) a ring gear comprising a gate;

b) at least a first motor; and

c) a plurality of cam locked jaws.

50. The drilling and tripping system of claim 47, wherein said upper rotating torque wrench comprises:

a) a ring gear comprising a gate;

b) at least a first motor; and

c) a plurality of cam locked jaws.

51. The drilling and tripping system of claim 47, wherein said spinner is a two-part spinner.

52. The drilling and tripping system of claim 47, wherein said mud bucket is a two-part mud bucket.

53. The drilling and tripping system of claim 43, wherein said control system comprises a computer, said computer further comprising instructions for operating the drilling and tripping system.

54. The drilling and tripping system of claim 53, wherein said control system comprises instructions for simultaneously controlling the operations of said lifting systems, said travelling differential roughnecks, said pipe handling and storage system, and said drilling fluid diverting system.

55. The drilling and tripping system of claim 54, wherein said control system comprises instructions responsive to data associated with drilling or tripping operations.

56. The drilling and tripping system of claim 55, wherein said control system comprises instructions responsive to data stored in non-volatile memory, real-time data associated with drilling or tripping operations, and user inputs.

57. A method for removing a portion of a drillstring from a hole with continuous or nearly continuous rotation and near continuous mud circulation, comprising outfitting a drilling rig with the drilling and tripping system of claim 43, and operating said drilling and tripping system to remove at least a portion of a drillstring from a hole with continuous or nearly continuous rotation and nearly continuous mud circulation.

58. A method for drilling an oil or gas well, comprising outfitting a drilling rig with the drilling and tripping system of claim 43, and operating said drilling and tripping system to drill an oil or gas well.

59. A method for removing a tubular from a riser or a cased hole at maximum speed without the need for fluid circulation or rotation of the tubular, comprising outfitting a drilling rig with the drilling and tripping system of claim 43, and operating said drilling and tripping system to remove a tubular from a riser or a cased hole at maximum speed without the need for fluid circulation or rotation of the tubular.