of the reel. By engaging with the flange of the reel, the reel drive means are able to rotate the reel.

To move the skid cart SC over beams G2 hydraulic cylinders HSC are provided, each between a skid beam clamp SKC and the skid cart SC as is known in the art.

The invention may be summarized by the following clauses:

1. A system for continuously laying a pipeline on a floor of a body of water, said system comprising:
- at least one interchangeable reel for storing the pipeline to be laid, said reel comprising reel couplers;
- a pipelaying vessel having a floating body and arranged on the floating body a support frame and a guide, said support frame being configured to vertically support said reel and comprising frame couplers to releasably couple with the respective reel couplers of said reel, and said guide being configured to guide the pipeline to be laid into the body of water towards the floor of the body of water;
- an assembly and winding site for assembling the pipeline to be laid and winding said pipeline on said reel, said assembly and winding site comprising an assembly line with at least one working station to join pipe sections end to end, and a support frame to vertically support said reel, said support frame comprising frame couplers to releasably couple with the respective reel couplers of said reel; and
- a crane to transfer said reel between the support frame of the pipelaying vessel and the support frame of the assembly and winding site.

2. A system according to clause 1, wherein said interchangeable reel comprises reel drive means to rotate the reel.

3. A system according to clause 1 or 2, wherein said interchangeable reel comprises an axle body and a cylindrical reel body, said reel couplers being arranged on the axle body, and said cylindrical reel body being rotatable with respect to the axle body.

4. A system according to clause 2 and 3, wherein the reel drive means are arranged between the axle body and the cylindrical reel body.

5. A system according to clause 4, wherein the reel drive means comprise at least one actuator arranged on the axle body and a reaction element cooperating with said actuator, wherein said reaction element is arranged on the reel body.

6. A system according to clause 5, wherein the reaction element is a rack, and wherein the at least one actuator comprises a gear cooperating with said rack.

7. A system according to any of the preceding clauses, wherein the support frame of the pipelaying vessel is skiddable in a horizontal direction perpendicular to a longitudinal axis of the floating body of the pipelaying vessel.

8. A system according to any of the preceding clauses, wherein the pipelaying vessel comprises a further support frame, said further support frame being configured to support said reel and comprising frame couplers to releasably couple with the respective reel couplers of said reel.

9. A system according to clause 8, wherein the support frame and the further support frame of the pipelaying vessel are both skiddable in a horizontal direction perpendicular to a longitudinal axis of the floating body of the pipelaying vessel.

10. A system according to clause 8 or 9, wherein the support frame and the further support frame of the pipelaying vessel are arranged next to each other seen in a horizontal direction perpendicular to a longitudinal axis of the floating body of the pipelaying vessel.

11. A system according to clause 9 and 10, wherein the support frame and the further support frame of the pipelaying vessel are skiddable along a common track.

12. A system according to any of the preceding clauses, wherein the number of interchangeable reels is less than the sum of support frames on the pipelaying vessel and the assembly and winding site.

13. A system according to any of the preceding clauses, wherein the assembly and winding site is located on a floating body of a supply vessel.

14. A system according to any of the preceding clauses, wherein the support frame of the assembly and winding site is arranged in line with the assembly line.

15. A system according to any of the preceding clauses, wherein the support frame of the assembly and winding site and the assembly line are moveable with respect to each other in a horizontal direction perpendicular to a longitudinal axis of the assembly line.

16. A system according to any of the preceding clauses, wherein the assembly line comprises a frame and guidance members for supporting and guiding pipe sections, and wherein the at least one working station and the guidance members are arranged on the frame.

17. A system according to any of the preceding clauses, wherein the assembly line comprises a tensioner at an end of the assembly line that is closest to the support frame to apply tension to the pipeline that is wound on said reel.

18. A system according to any of the preceding clauses, wherein the assembly and winding site comprises a further assembly line with at least one working station to join pipe sections end to end, and a further support frame comprising frame couplers to releasably couple with the respective reel couplers of said reel.

19. A system according to any of the preceding clauses, wherein the assembly and winding site comprises a pipe section storage for storing pipe sections to be joined.

20. A system according to clause 13 and 19, wherein the pipe section storage is located on another deck of the floating body of the supply vessel then the assembly line and the support frame of the assembly and winding site.

21. A system according to any of the preceding clauses, wherein the crane is arranged on the pipelaying vessel.

22. An interchangeable reel for use in a system according to any of the preceding clauses, comprising a cylindrical reel body and reel couplers to releasably couple said reel to a support frame.

23. A reel according to clause 22, comprising reel drive means to rotate said reel body.

24. A reel according to clause 22 or 23, comprising an axle body, wherein said reel body is rotatable with respect to the axle body.

25. A reel according to clause 23 and 24, wherein the reel drive means are arranged between the axle body and said reel body.

26. A system according to clause 25, wherein the reel drive means comprise at least one actuator arranged on the axle body and a reaction element cooperating with said actuator, said reaction element being arranged on the reel body.

27. A system according to clause 26, wherein the reaction element is a rack, and wherein the at least one actuator comprises a gear cooperating with said rack.

28. A reel according to any of clauses 22-27, wherein said reel body comprises sidewalls on each side of said reel body seen in axial direction of said reel body.

29. A pipelaying vessel for continuously laying a pipeline on a floor of a body of water, said vessel comprising:
- a floating body;
- a support frame arranged on the floating body for vertically supporting an interchangeable reel, said support frame comprising frame couplers to releasably couple with respective reel couplers on said reel.

30. A pipelaying vessel according to clause 29, wherein the support frame of the pipelaying vessel is skiddable in a horizontal direction perpendicular to a longitudinal axis of the floating body of the pipelaying vessel.

31. A pipelaying vessel according to clause 29 or 30, comprising a further support frame, said further support frame being configured to vertically support said reel and comprising frame couplers to releasably couple with respective reel couplers of said reel.

32. A pipelaying vessel according to clause 31, wherein the support frame and the further support frame of the pipelaying vessel are both skiddable in a horizontal direction perpendicular to a longitudinal axis of the floating body of the pipelaying vessel.

33. A pipelaying vessel according to clause 31 or 32, wherein the support frame and the further support frame of the pipelaying vessel are arranged next to each other seen in a horizontal direction perpendicular to a longitudinal axis of the floating body of the pipelaying vessel.

34. A pipelaying vessel according to clause 32 and 33, wherein the support frame and the further support frame of the pipelaying vessel are skiddable along a common track.

35. A pipelaying vessel according to any of the clauses 29-34, comprising a guide for guiding the pipeline to be laid into the body of water towards the floor of the body of water.

36. A pipelaying vessel according to any of the clauses 29-35, comprising a crane to transfer reels to and from the pipelaying vessel.

37. A supply vessel for assembling a pipeline to be laid and winding said pipeline on an interchangeable reel, comprising:
- a floating body;
- an assembly and winding site with an assembly line having at least one working station to join pipe sections end to end, and a support frame to vertically support said reel, said support frame comprising frame couplers to releasably couple with respective reel couplers of said reel.

38. A supply vessel according to clause 37, wherein the support frame of the assembly and winding site is arranged in line with the assembly line.

39. A supply vessel according to clause 37 or 38, wherein the support frame of the assembly and winding site and the assembly line are moveable with respect to each other in a horizontal direction perpendicular to a longitudinal axis of the assembly line.

40. A supply vessel according to any of the clauses 37-39, wherein the assembly line comprises a frame and guidance members for supporting and guiding pipe sections, and wherein the at least one working station and the guidance members are arranged on the frame.

41. A supply vessel according to any of the clauses 37-40, wherein the assembly line comprises a tensioner at an end of the assembly line that is closest to the support frame to apply tension to the pipeline that is wound on said reel.

42. A supply vessel according to any of the clauses 37-41, wherein the assembly and winding site comprises a further assembly line with at least one working station to join pipe sections end to end, and a further support frame to vertically support said reel, said support

frame comprising frame couplers to releasably couple with respective reel couplers of said reel.

43. A supply vessel according to any of the preceding clauses, comprising a pipe section storage for storing pipe sections to be joined.

44. A system according to clause 43, wherein the pipe section storage is located on another deck of the floating body of the supply vessel then the assembly line and the support frame of the assembly and winding site.

45. A method for continuously laying a pipeline on the floor of a body of water, said method comprising the steps of:
a) providing a filled interchangeable reel by assembling the pipeline to be laid by joining pipe sections end to end, and winding the pipeline to be laid on said reel at an assembly and winding site remote from a pipelaying vessel;
b) transferring the filled reel from the assembly and winding site to the pipelaying vessel;
c) laying the pipeline from the pipelaying vessel into the body of water by unwinding said reel and guiding the pipeline towards the floor of the body of water until said reel is empty;
d) transferring the empty reel from the pipelaying vessel to the assembly and winding site.

46. A method according to clause 45, wherein the assembly and winding site is located on a separate supply vessel.

47. A method according to clause 45 or 46, wherein transferring of said reel in steps b) and d) is performed by a crane located on the pipelaying vessel.

48. A method according to any of the clauses 45-47, wherein step a) comprises the steps:
a1) assembling a portion of the pipeline to be laid in an assembly line by joining pipe sections end to end;
a2) winding said portion of said pipeline on the reel until the assembly line is free to assemble a next portion of the pipeline to be laid;
wherein steps a1) and a2) are repeated as many times until the entire pipeline to be laid is wound on the reel.

49. A method according to clause 48, wherein during steps a1) and a2) the assembly line is aligned with a last piece of the pipeline wound on the reel.

50. A method according to any of the clauses 45-49, wherein during step c) a portion of the pipeline present on the reel that is about to be unwound from the reel is aligned with a guide that guides the pipeline into the body of water towards the floor of the body of water.

51. A method according to any of the clauses 45-50, wherein transferring of the reel in step b) and d) includes transferring the reel drive means associated with said reel.

52. A method according to clause 46, wherein the supply vessel is moved to the pipelaying vessel in order to transfer the reel from or to the pipelaying vessel.

53. A method according to any of the clauses 45-52, wherein transferring the interchangeable reel comprises the steps:
- uncoupling the reel from a support frame;
- moving the reel to another support frame;
- coupling the reel to said other support frame.

54. A support assembly for an interchangeable reel with reel couplers, comprising a support frame to vertically support said reel having:
- a base member;
- a first arm extending vertically from the base member, said first arm comprising a frame coupler at or near a free end thereof to engage with a respective reel coupler of said reel;
- a second arm extending from the base member, said second arm comprising a frame coupler at or near a free end thereof to engage with a respective reel coupler of said reel,

wherein the second arm is pivotably connected to the base member to move between a horizontal open position for receiving said reel and a vertical position for engagement with said reel.

55. A support assembly according to clause 54, wherein the support assembly further includes separate reel supports to temporarily support the reel.

56. A support assembly according to clause 55, wherein the support frame and the separate reel supports are moveable relative to each other.

57. A support assembly according to one or more of clauses 54-56, wherein each of the first and second arm is provided with a respective actuator to adjust the length of the corresponding arm.

58. A support assembly according to one or more of clauses 54-57, wherein the support assembly further comprises a reel handler to remove a reel from the support frame while the second arm is in the vertical position.

60. A method for transferring an interchangeable vertical reel to a support frame comprising:

- a base member;
- a first arm extending vertically from the base member;
- a second arm extending from the base member,

wherein the second arm is pivotably connected to the base member to move between a horizontal open position for receiving said reel and a vertical position for engagement with said reel, said method comprising the following steps:

a) supporting the reel by separate reel supports;
b) positioning the second arm in the horizontal open position;
c) moving the support frame and the separate reel supports relative to each other until the reel is positioned above the base member and the frame coupler of the first arm is aligned with the respective reel coupler of the reel;
d) positioning the second arm in the vertical position.
e) coupling the reel to the support frame;
f) transferring the weight of the reel from the separate reel supports to the support frame.

61. A method for transferring a vertical reel, e.g. an empty reel, from a support frame comprising:

- a base member;
- a first arm extending vertically from the base member;
- a second arm extending from the base member,

wherein the second arm is pivotably connected to the base member to move between a horizontal open position for receiving said reel and a vertical position for engagement with said reel, said method comprising the following steps:

a) moving a reel handler below the empty reel;
b) transferring the weight of the empty reel from the support frame to the reel handler;

c) disengaging the reel from the support frame;
d) moving the reel handler away from the support frame in a horizontal direction perpendicular to a rotation axis of the reel.

62. A method for reel-laying pipelines from a vessel comprising a reel support, a guide wheel, tensioners, and a hang off clamp, wherein a first reel with a first pipeline supported by a reel support is replaced by a second reel with a second pipeline, said method comprising the following steps:

a) reel laying the first pipeline by unwinding the first reel, and guiding the pipeline via the guide wheel through the tensioners and the hang off clamp into the sea;
b) closing the hang off clamp;
c) while the launched first pipeline is supported by the hang off clamp, connecting the end portion of the first pipeline which has not yet passed the guide wheel to a retaining system in the vicinity of the reel;
d) replacing the first reel by the second reel;
e) providing a temporary connection between an end portion of the second pipeline and the end portion of the first pipeline while the first pipeline is supported by the retaining system;
f) disconnecting the first pipeline from the retaining system;
g) opening hang off clamp;
h) continue reel laying by unwinding the second reel and allowing the second pipeline to pass over the guide wheel and through the tensioners;
i) closing hang off clamp;
j) removing the temporary connection between the first and second pipeline;

connecting the first and second pipeline end to end between the tensioners and hang off clamp.

63. A reel and reel support assembly for supporting said reel, said reel support assembly comprising:

- at least two support frames, each support frame being configured to support the weight of the reel, and each support frame being moveable along a corresponding path;
- a skid cart which is skiddable along at least one skid beam, wherein a skidding path defined by the at least one skid beam overlaps with the corresponding paths of the at least two support frames,

wherein the skid cart comprises:

- a skidding frame;

- connecting means to connect the skidding frame to one of the at least two support frames;
- a skidding drive unit arranged between the at least one skid beam and the skidding frame to skid the skidding frame along the at least one skid beam; and
- a reel drive unit arranged on the skidding frame to engage with the reel for rotation of the reel.

64. A reel and reel support assembly according to clause 63, wherein the corresponding paths of the support frames are parallel to a rotation axis of the reel when supported by the respective support frame.

65. A reel and reel support assembly according to clause 63, wherein the skid cart can be skidded to a position underneath the reel while supported by the support frame, thereby allowing the reel drive unit to engage with the reel from beneath.

66. A reel and reel support assembly according to clause 63, wherein the at least two support frames are moveable along a common path.

67. A reel and reel support assembly according to clause 63, wherein the skid cart is able to pass a support frame, preferably below the reel supported by said support frame.

68. A reel and reel support assembly according to clause 63, wherein the reel comprises a rotation axis and a reel body rotatable about said rotation axis, and wherein the reel drive unit is configured to engage with the reel body to rotate the reel body relative to the rotation axis.

69. A support assembly according to clause 63, wherein at least the portion of the reel drive unit that is configured to engage with the radially seen outer contour of the cylindrical body of the reel is moveable between an engaged position in which said portion is engaged with said reel, and a disengaged position in which said portion is disengaged from the reel thereby allowing the skid cart to skid independently of the reel and support frame.

70. A support assembly according to clause 63, wherein the support frame is skiddable along a second track.

71. A support assembly according to clause 70, wherein the first and second track are parallel to each other.

72. A support assembly according to clause 70, wherein the support frame comprises first locking means to lock the position of the support frame relative to the second track.

73. A support assembly according to clause 63, wherein the skid cart comprises second locking means to engage with the support frame thereby locking the position of the skid cart relative to the support frame.

74. A support assembly according to clause 70 and 73, wherein in case of the skid cart being locked to the support frame, the skid cart is able to skid both the skid cart and the support frame along their respective tracks.

75. A support assembly according to clause 71, wherein the first and second track comprise rails, and wherein the rails of the first track are arranged in between the rails of the second track.

76. A support assembly according to clause 63, wherein the cylindrical body of the reel comprises two reel flanges and a central part in between the two reel flanges, and wherein the reel drive unit is configured to engage with a radially seen outer contour of one of the reel flanges.

77. A support assembly according to clause 76, wherein the outer contour of said reel flange comprises a rack, and wherein the reel drive unit comprises a gear to cooperate with said rack and a motor to drive said gear.

78. A support assembly according to clause 77, wherein the rack is provided on an outer side of a rack flange, and wherein the rack flange is configured to allow guide wheels which are part of the reel drive unit to run on both sides of the rack flange, thereby at least partially constraining the reel with the guide wheels.

79. A support assembly according to clause 78, wherein the guide wheel that is configured to run on the inside surface of the rack flange of the reel is mounted on a guide wheel assembly that is moveable between an open position in which the rack

flange is able to pass the guide wheel and a closed position in which the guide wheel is able to engage with the inside surface of the rack flange.

80. A support assembly according to clause 63, wherein the reel is an interchangeable reel comprising reel couplers which are configured to engage with respective frame couplers on the support frame.

81. A vessel for reel-laying of a pipeline, comprising a support assembly according to one or more of the clauses 63-80.

82. A vessel according to clause 81, wherein the vessel has a working deck and a longitudinal direction, and wherein the support assembly is provided on the working deck such that the first track extends perpendicular to the longitudinal direction of the vessel.

83. A vessel according to clause 81, comprising a crane to handle reels.

84. A method for continuously laying a pipeline on the floor of a body of water, said method comprising the steps:
a) providing a support assembly according to one or more of the clauses 63-80;
b) providing a reel filled with pipeline on the support frame;
c) positioning the skid cart below the filled reel;
d) engaging the reel drive means with the radially seen outer contour of the reel;
e) laying the pipeline into the body of water by unwinding the reel with said reel drive means;
f) disengaging the reel drive means from the reel;
g) moving the skid cart away from the support frame.

85. A method according to clause 84, wherein during step e) the portion of the pipeline to be unwound from the reel is aligned with a guide that guides the pipeline to be laid towards the floor of the body of water, said aligning being performed by skidding the support frame along a second track by using the skid cart.

Claims:

1. A pipelaying vessel for continuously laying a pipeline on a floor of a body of water, said vessel being configured to receive an interchangeable reel with the pipeline stored on said reel, and to lay the pipeline from said reel into the body of water, wherein said vessel is configured to store multiple interchangeable reels with pipeline stored on said reels on the vessel, wherein a support frame for each reel is provided, and wherein at least one skid drive unit arranged separately from the support frame is provided allowing each reel with pipeline stored on said reel to be moved between a storage position and an operational position in which the pipeline stored on the reel can be unwound from the reel and laid on the bottom of the body of water, said skid drive unit comprising:
   - a skid cart;
   - connecting means to connect the skid cart to a support frame;
   - skidding means operable between the skid cart and at least one skid beam on a deck of the vessel to skid the skid cart along the at least one skid beam.
2. A pipelaying vessel according to claim 1, wherein the pipeline is a rigid pipeline stored on the reel by plastic deformation.
3. A pipelaying vessel according to claim 1, wherein the reel is interchangeable as a unit with the respective support frame.
4. A pipelaying vessel according to claim 1, wherein the skid drive unit comprises reel drive means to rotate the reel with pipeline stored on said reel.
5. A pipelaying vessel according to claim 4, wherein the skid cart can be skidded to a position underneath the reel while supported by the support frame, thereby allowing the reel drive means on the skid cart to engage with the reel from beneath.
6. A pipelaying vessel according to claim 4, wherein at least a portion of the reel drive means is configured to engage with a radially seen outer portion of a rotatable part of the reel, and wherein said portion of the reel drive means is moveable relative to the skid cart between an engaged position in which said portion is engaged with said reel, and a disengaged position in which said portion is disengaged from the reel.
7. A pipelaying vessel according to claim 1, wherein the pipelaying vessel is provided with two storage positions, such that the two storage positions and the operational position are arranged on a common line extending perpendicular to a longitudinal axis of the vessel.
8. A pipelaying vessel according to claim 7, wherein at least one additional storage position is provided on the pipelaying vessel , which at least one additional storage position is arranged adjacent one of the other storage positions seen in the longitudinal direction of the pipelaying vessel.
9. A pipelaying vessel according to claim 8, wherein the storage positions and the operational position together form a L-, T-, U-, or H-shape, wherein the operational position is positioned near or at the centre of the shape.

of the reel. By engaging with the flange of the reel, the reel drive means are able to rotate the reel.

To move the skid cart SC over beams G2 hydraulic cylinders HSC are provided, each between a skid beam clamp SKC and the skid cart SC as is known in the art.

The disclosure may be summarized as follows:

A system for continuously laying a pipeline on a floor of a body of water, said system comprising:
- at least one interchangeable reel for storing the pipeline to be laid, said reel comprising reel couplers;
- a pipelaying vessel having a floating body and arranged on the floating body a support frame and a guide, said support frame being configured to vertically support said reel and comprising frame couplers to releasably couple with the respective reel couplers of said reel, and said guide being configured to guide the pipeline to be laid into the body of water towards the floor of the body of water;
- an assembly and winding site for assembling the pipeline to be laid and winding said pipeline on said reel, said assembly and winding site comprising an assembly line with at least one working station to join pipe sections end to end, and a support frame to vertically support said reel, said support frame comprising frame couplers to releasably couple with the respective reel couplers of said reel; and
- a crane to transfer said reel between the support frame of the pipelaying vessel and the support frame of the assembly and winding site.

In an embodiment said interchangeable reel comprises reel drive means to rotate the reel.

In an embodiment said interchangeable reel comprises an axle body and a cylindrical reel body, said reel couplers being arranged on the axle body, and said cylindrical reel body being rotatable with respect to the axle body.

In an embodiment the reel drive means are arranged between the axle body and the cylindrical reel body.

In an embodiment the reel drive means comprise at least one actuator arranged on the axle body and a reaction element cooperating with said actuator, wherein said reaction element is arranged on the reel body.

In an embodiment the reaction element is a rack, wherein the at least one actuator comprises a gear cooperating with said rack.

In an embodiment the support frame of the pipelaying vessel is skiddable in a horizontal direction perpendicular to a longitudinal axis of the floating body of the pipelaying vessel.

In an embodiment the pipelaying vessel comprises a further support frame, said further support frame being configured to support said reel and comprising frame couplers to releasably couple with the respective reel couplers of said reel.

In an embodiment the support frame and the further support frame of the pipelaying vessel are both skiddable in a horizontal direction perpendicular to a longitudinal axis of the floating body of the pipelaying vessel.

In an embodiment the support frame and the further support frame of the pipelaying vessel are arranged next to each other seen in a horizontal direction perpendicular to a longitudinal axis of the floating body of the pipelaying vessel.

In an embodiment the support frame and the further support frame of the pipelaying vessel are skiddable along a common track.

In an embodiment the number of interchangeable reels is less than the sum of support frames on the pipelaying vessel and the assembly and winding site.

In an embodiment the assembly and winding site is located on a floating body of a supply vessel.

In an embodiment the support frame of the assembly and winding site is arranged in line with the assembly line.

In an embodiment the support frame of the assembly and winding site and the assembly line are moveable with respect to each other in a horizontal direction perpendicular to a longitudinal axis of the assembly line.

In an embodiment the assembly line comprises a frame and guidance members for supporting and guiding pipe sections, wherein the at least one working station and the guidance members are arranged on the frame.

In an embodiment the assembly line comprises a tensioner at an end of the assembly line that is closest to the support frame to apply tension to the pipeline that is wound on said reel.

In an embodiment the assembly and winding site comprises a further assembly line with at least one working station to join pipe sections end to end, and a further support frame comprising frame couplers to releasably couple with the respective reel couplers of said reel.

In an embodiment the assembly and winding site comprises a pipe section storage for storing pipe sections to be joined.

In an embodiment the pipe section storage is located on another deck of the floating body of the supply vessel then the assembly line and the support frame of the assembly and winding site.

In an embodiment the crane is arranged on the pipelaying vessel.

The disclosure also relates to an interchangeable reel for use in a system according to any of the preceding clauses, comprising a cylindrical reel body and reel couplers to releasably couple said reel to a support frame.

In an embodiment, the reel comprises reel drive means to rotate said reel body.

In an embodiment, the reel comprises an axle body, wherein said reel body is rotatable with respect to the axle body.

In an embodiment the reel drive means are arranged between the axle body and said reel body.

In an embodiment the reel drive means comprise at least one actuator arranged on the axle body and a reaction element cooperating with said actuator, said reaction element being arranged on the reel body.

In an embodiment the reaction element is a rack, wherein the at least one actuator comprises a gear cooperating with said rack.

In an embodiment said reel body comprises sidewalls on each side of said reel body seen in axial direction of said reel body.

The disclosure further relates to a pipelaying vessel for continuously laying a pipeline on a floor of a body of water, said vessel comprising:

- a floating body;
- a support frame arranged on the floating body for vertically supporting an interchangeable reel, said support frame comprising frame couplers to releasably couple with respective reel couplers on said reel.

In an embodiment the support frame of the pipelaying vessel is skiddable in a horizontal direction perpendicular to a longitudinal axis of the floating body of the pipelaying vessel.

In an embodiment, the pipelaying vessel comprises a further support frame, said further support frame being configured to vertically support said reel and comprising frame couplers to releasably couple with respective reel couplers of said reel.

In an embodiment the support frame and the further support frame of the pipelaying vessel are both skiddable in a horizontal direction perpendicular to a longitudinal axis of the floating body of the pipelaying vessel.

In an embodiment the support frame and the further support frame of the pipelaying vessel are arranged next to each other seen in a horizontal direction perpendicular to a longitudinal axis of the floating body of the pipelaying vessel.

In an embodiment the support frame and the further support frame of the pipelaying vessel are skiddable along a common track.

In an embodiment, the pipelaying vessel comprises a guide for guiding the pipeline to be laid into the body of water towards the floor of the body of water.

In an embodiment, the pipelaying vessel comprises a crane to transfer reels to and from the pipelaying vessel.

The disclosure also relates to a supply vessel for assembling a pipeline to be laid and winding said pipeline on an interchangeable reel, comprising:
- a floating body;
- an assembly and winding site with an assembly line having at least one working station to join pipe sections end to end, and a support frame to vertically support said reel, said support frame comprising frame couplers to releasably couple with respective reel couplers of said reel.

In an embodiment the support frame of the assembly and winding site is arranged in line with the assembly line.

In an embodiment the support frame of the assembly and winding site and the assembly line are moveable with respect to each other in a horizontal direction perpendicular to a longitudinal axis of the assembly line.

In an embodiment the assembly line comprises a frame and guidance members for supporting and guiding pipe sections, wherein the at least one working station and the guidance members are arranged on the frame.

In an embodiment the assembly line comprises a tensioner at an end of the assembly line that is closest to the support frame to apply tension to the pipeline that is wound on said reel.

In an embodiment the assembly and winding site comprises a further assembly line with at least one working station to join pipe sections end to end, and a further support frame to vertically support said reel, said support frame comprising frame couplers to releasably couple with respective reel couplers of said reel.

In an embodiment, the supply vessel comprises a pipe section storage for storing pipe sections to be joined.

In an embodiment the pipe section storage is located on another deck of the floating body of the supply vessel then the assembly line and the support frame of the assembly and winding site.

The disclosure further relates to a method for continuously laying a pipeline on the floor of a body of water, said method comprising the steps of:

a) providing a filled interchangeable reel by assembling the pipeline to be laid by joining pipe sections end to end, and winding the pipeline to be laid on said reel at an assembly and winding site remote from a pipelaying vessel;

b) transferring the filled reel from the assembly and winding site to the pipelaying vessel;

c) laying the pipeline from the pipelaying vessel into the body of water by unwinding said reel and guiding the pipeline towards the floor of the body of water until said reel is empty;

d) transferring the empty reel from the pipelaying vessel to the assembly and winding site.

In an embodiment the assembly and winding site is located on a separate supply vessel.

In an embodiment transferring of said reel in steps b) and d) is performed by a crane located on the pipelaying vessel.

In an embodiment step a) comprises the steps:

a1) assembling a portion of the pipeline to be laid in an assembly line by joining pipe sections end to end;

a2) winding said portion of said pipeline on the reel until the assembly line is free to assemble a next portion of the pipeline to be laid;

wherein steps a1) and a2) are repeated as many times until the entire pipeline to be laid is wound on the reel.

In an embodiment, during steps a1) and a2), the assembly line is aligned with a last piece of the pipeline wound on the reel.

In an embodiment, during step c), a portion of the pipeline present on the reel that is about to be unwound from the reel is aligned with a guide that guides the pipeline into the body of water towards the floor of the body of water.

In an embodiment transferring of the reel in step b) and d) includes transferring the reel drive means associated with said reel.

In an embodiment the supply vessel is moved to the pipelaying vessel in order to transfer the reel from or to the pipelaying vessel.

In an embodiment transferring the interchangeable reel comprises the steps:

- uncoupling the reel from a support frame;
- moving the reel to another support frame;
- coupling the reel to said other support frame.

The disclosure also relates to a support assembly for an interchangeable reel with reel couplers, comprising a support frame to vertically support said reel having:

- a base member;
- a first arm extending vertically from the base member, said first arm comprising a frame coupler at or near a free end thereof to engage with a respective reel coupler of said reel;
- a second arm extending from the base member, said second arm comprising a frame coupler at or near a free end thereof to engage with a respective reel coupler of said reel,

wherein the second arm is pivotably connected to the base member to move between a horizontal open position for receiving said reel and a vertical position for engagement with said reel.

In an embodiment the support assembly further includes separate reel supports to temporarily support the reel.

In an embodiment the support frame and the separate reel supports are moveable relative to each other.

In an embodiment each of the first and second arm is provided with a respective actuator to adjust the length of the corresponding arm.

In an embodiment the support assembly further comprises a reel handler to remove a reel from the support frame while the second arm is in the vertical position.

The disclosure further relates to a method for transferring an interchangeable vertical reel to a support frame comprising:

- a base member;
- a first arm extending vertically from the base member;
- a second arm extending from the base member,

wherein the second arm is pivotably connected to the base member to move between a horizontal open position for receiving said reel and a vertical position for engagement with said reel, said method comprising the following steps:

a) supporting the reel by separate reel supports;
b) positioning the second arm in the horizontal open position;
c) moving the support frame and the separate reel supports relative to each other until the reel is positioned above the base member and the frame coupler of the first arm is aligned with the respective reel coupler of the reel;
d) positioning the second arm in the vertical position.
e) coupling the reel to the support frame;
f) transferring the weight of the reel from the separate reel supports to the support frame.

The disclosure also relates to a method for transferring a vertical reel, e.g. an empty reel, from a support frame comprising:

- a base member;
- a first arm extending vertically from the base member;
- a second arm extending from the base member,

wherein the second arm is pivotably connected to the base member to move between a horizontal open position for receiving said reel and a vertical position for engagement with said reel, said method comprising the following steps:

a) moving a reel handler below the empty reel;
b) transferring the weight of the empty reel from the support frame to the reel handler;
c) disengaging the reel from the support frame;
d) moving the reel handler away from the support frame in a horizontal direction perpendicular to a rotation axis of the reel.

The disclosure further relates to a method for reel-laying pipelines from a vessel comprising a reel support, a guide wheel, tensioners, and a hang off clamp, wherein a first reel with a first pipeline supported by a reel support is replaced by a second reel with a second pipeline, said method comprising the following steps:

a) reel laying the first pipeline by unwinding the first reel, and guiding the pipeline via the guide wheel through the tensioners and the hang off clamp into the sea;
b) closing the hang off clamp;
c) while the launched first pipeline is supported by the hang off clamp, connecting the end portion of the first pipeline which has not yet passed the guide wheel to a retaining system in the vicinity of the reel;
d) replacing the first reel by the second reel;

e) providing a temporary connection between an end portion of the second pipeline and the end portion of the first pipeline while the first pipeline is supported by the retaining system;

f) disconnecting the first pipeline from the retaining system;

g) opening hang off clamp;

h) continue reel laying by unwinding the second reel and allowing the second pipeline to pass over the guide wheel and through the tensioners;

i) closing hang off clamp;

j) removing the temporary connection between the first and second pipeline;

connecting the first and second pipeline end to end between the tensioners and hang off clamp.

The disclosure also relates to a reel and reel support assembly for supporting said reel, said reel support assembly comprising:

- at least two support frames, each support frame being configured to support the weight of the reel, and each support frame being moveable along a corresponding path;

- a skid cart which is skiddable along at least one skid beam, wherein a skidding path defined by the at least one skid beam overlaps with the corresponding paths of the at least two support frames,

wherein the skid cart comprises:

- a skidding frame;

- connecting means to connect the skidding frame to one of the at least two support frames;

- a skidding drive unit arranged between the at least one skid beam and the skidding frame to skid the skidding frame along the at least one skid beam; and

- a reel drive unit arranged on the skidding frame to engage with the reel for rotation of the reel.

In an embodiment the corresponding paths of the support frames are parallel to a rotation axis of the reel when supported by the respective support frame.

In an embodiment the skid cart can be skidded to a position underneath the reel while supported by the support frame, thereby allowing the reel drive unit to engage with the reel from beneath.

In an embodiment the at least two support frames are moveable along a common path.

In an embodiment the skid cart is able to pass a support frame, preferably below the reel supported by said support frame.

In an embodiment the reel comprises a rotation axis and a reel body rotatable about said rotation axis, wherein the reel drive unit is configured to engage with the reel body to rotate the reel body relative to the rotation axis.

In an embodiment at least the portion of the reel drive unit that is configured to engage with the radially seen outer contour of the cylindrical body of the reel is moveable between an engaged position in which said portion is engaged with said reel, and a disengaged position in which said portion is disengaged from the reel thereby allowing the skid cart to skid independently of the reel and support frame.

In an embodiment the support frame is skiddable along a second track.

In an embodiment the first and second track are parallel to each other.

In an embodiment the support frame comprises first locking means to lock the position of the support frame relative to the second track.

In an embodiment the skid cart comprises second locking means to engage with the support frame thereby locking the position of the skid cart relative to the support frame.

In an embodiment, in case of the skid cart being locked to the support frame, the skid cart is able to skid both the skid cart and the support frame along their respective tracks.

In an embodiment the first and second track comprise rails, wherein the rails of the first track are arranged in between the rails of the second track.

In an embodiment the cylindrical body of the reel comprises two reel flanges and a central part in between the two reel flanges, wherein the reel drive unit is configured to engage with a radially seen outer contour of one of the reel flanges.

In an embodiment the outer contour of said reel flange comprises a rack, wherein the reel drive unit comprises a gear to cooperate with said rack and a motor to drive said gear.

In an embodiment the rack is provided on an outer side of a rack flange, wherein the rack flange is configured to allow guide wheels which are part of the reel drive unit to run on both sides of the rack flange, thereby at least partially constraining the reel with the guide wheels.

In an embodiment the guide wheel that is configured to run on the inside surface of the rack flange of the reel is mounted on a guide wheel assembly that is moveable between an open position in which the rack flange is able to pass the guide wheel and a closed position in which the guide wheel is able to engage with the inside surface of the rack flange.

In an embodiment the reel is an interchangeable reel comprising reel couplers which are configured to engage with respective frame couplers on the support frame.

The disclosure also relates to a vessel comprising a support assembly according to the disclosure.

In an embodiment the vessel has a working deck and a longitudinal direction, wherein the support assembly is provided on the working deck such that the first track extends perpendicular to the longitudinal direction of the vessel.

In an embodiment, the vessel comprises a crane to handle reels.

The disclosure further relates to a method for continuously laying a pipeline on the floor of a body of water, said method comprising the steps:

a) providing a support assembly according to the disclosure;

b) providing a reel filled with pipeline on the support frame;

c) positioning the skid cart below the filled reel;

d) engaging the reel drive means with the radially seen outer contour of the reel;

e) laying the pipeline into the body of water by unwinding the reel with said reel drive means;

f) disengaging the reel drive means from the reel;

g) moving the skid cart away from the support frame.

In an embodiment,during step e), the portion of the pipeline to be unwound from the reel is aligned with a guide that guides the pipeline to be laid towards the floor of the body of water, said aligning being performed by skidding the support frame along a second track by using the skid cart.

CLAIMS

1. A pipelaying vessel for continuously laying a pipeline on a floor of a body of water, said vessel being configured to receive an interchangeable reel with the pipeline stored on said reel, and to lay the pipeline from said reel into the body of water, wherein said vessel is configured to store multiple interchangeable reels with pipeline stored on said reels on the vessel, wherein a support frame for each reel is provided, and wherein at least one skid drive unit arranged separately from the support frame is provided allowing each reel with pipeline stored on said reel to be moved between a storage position and an operational position in which the pipeline stored on the reel can be unwound from the reel and laid on the bottom of the body of water, said skid drive unit comprising:
   - a skid cart;
   - connecting means to connect the skid cart to the support frame;
   - skidding means operable between the skid cart and at least one skid beam on a deck of the vessel to skid the skid cart along the at least one skid beam.

2. A pipelaying vessel according to claim 1, wherein the pipeline is a rigid pipeline stored on the reel by plastic deformation.

3. A pipelaying vessel according to claim 1, wherein the reel is interchangeable as a unit with the respective support frame.

4. A pipelaying vessel according to claim 1, wherein the skid drive unit comprises reel drive means to rotate the reel with pipeline stored on said reel.

5. A pipelaying vessel according to claim 4, wherein the skid cart can be skidded to a position underneath the reel while supported by the support frame, thereby allowing the reel drive means on the skid cart to engage with the reel from beneath.

6. A pipelaying vessel according to claim 4, wherein at least a portion of the reel drive means is configured to engage with a radially seen outer portion of a rotatable part of the reel, and wherein said portion of the reel drive means is moveable relative to the skid cart between an engaged position in which said portion is engaged with said reel, and a disengaged position in which said portion is disengaged from the reel.

7. A pipelaying vessel according to claim 1, wherein the pipelaying vessel is provided with two storage positions, such that the two storage positions and the operational position are arranged on a common line extending perpendicular to a longitudinal axis of the vessel.

8. A pipelaying vessel according to claim 7, wherein at least one additional storage position is provided on the pipelaying vessel , which at least one additional storage position is arranged adjacent one of the other storage positions seen in the longitudinal direction of the pipelaying vessel.

9. A pipelaying vessel according to claim 8, wherein the storage positions and the operational position together form a L-, T-, U-, or H-shape, wherein the operational position is positioned near or at the centre of the shape.