

Claims

1. Subsea drilling machine comprising:
 - a drill assembly comprising:
 - 5 ○ a riser pipe having a first end, a second end, and a length extending between said first and second ends; and
 - a drilling machine body coupled to the first end of said riser pipe, said drilling machine body comprising a drilling head;
 - and
 - a feed system configured for advancing said drill assembly in a first direction;
- 10 wherein said riser pipe is provided with at least one rack extending along at least a part of the length of the riser pipe; and
- wherein said feed system comprises a motor coupled to a pinion, said pinion arranged for engaging with said rack for advancing said drill assembly in said first direction.
- 15 2. The subsea drilling machine according to claim 1, wherein said at least one rack extends over substantially the entire length of the riser pipe.
3. The subsea drilling machine according to claim 1 or 2, wherein said riser pipe is provided with a plurality of said racks, said racks distributed along a circumference of said riser pipe, each rack extending along at least a part of the
- 20 length of the riser pipe, and wherein said feed system comprises a corresponding plurality of pinions or sets of pinions, each pinion or set of pinions arranged for cooperating with one rack.
4. The subsea drilling machine according to any one of the preceding claims, wherein said feed system comprises a plurality of pinions for each rack.

5. The subsea drilling machine according to any one of the preceding claims,
wherein said feed system is a vertical feed system and said first direction is a
vertical direction.
6. The subsea drilling machine according to any one of the preceding claims,
5 wherein said riser pipe comprises a plurality of riser pipe modules, each riser pipe
module provided with at least one rack extending along its length;

said riser pipe modules coupled to one another such that the at least one rack of
the different modules are substantially aligned with one another.
7. The subsea drilling machine according to any one of the preceding claims,
10 wherein said feed system is coupled to a tube, said tube configured for coupling
to a second entity such as a drilling machine receiving section of a template, and
substantially fixating said feed system with respect to said second entity.
8. The subsea drilling machine according to any one of the preceding claims, further
comprising:
15 - a spoil removal system;

said spoil removal system comprising a conduit extending through said drilling
head and said riser pipe, and a spoil exhaust provided at the second end of said
riser pipe.
9. The subsea drilling machine according to claim 8, further comprising a pump
20 arranged in said drilling machine body, said pump arranged for pumping said
spoil from said drilling head to said spoil exhaust.
10. The subsea drilling machine according to any one of the preceding claims,
wherein the drilling machine body further comprises a drilling head driving
system for operating the drilling head.
- 25 11. The subsea drilling machine according to any one of the preceding claims, further
comprising a control unit configured for controlling operation of one or more of

the feed system, the drilling machine, in particular the drilling head driving system, and/or the spoil removal system.

12. Subsea drilling machine comprising:

- a drill assembly comprising:

- 5 ○ a riser pipe having a first end, a second end, and a length extending between said first and second ends; and
- a drilling machine body coupled to the first end of said riser pipe, said drilling machine body comprising a drilling head;

and

- 10 - a feed system configured for advancing said drill assembly in a first direction, wherein said feed system comprises:
- a first feed subsystem, comprising a first set of hydraulic actuators arranged to induce a movement of a first gripper along said first direction, said first gripper comprising first gripping means for gripping and/or clamping the riser
- 15 pipe upon actuation of said first gripping means; and
- a second feed subsystem, comprising a second set of hydraulic actuators arranged to induce a movement of a second gripper along said first direction, said second gripper comprising second gripping means for gripping and/or clamping the riser pipe upon actuation of said second gripping means.

20 13. The subsea drilling machine according to claim 12, wherein said feed system is coupled to a tube, said tube configured for coupling to a second entity such as a drilling machine receiving section of a template, and substantially fixating said feed system with respect to said second entity.

14. The subsea drilling machine according to claim 12 or 13, further comprising:

- 25 - a spoil removal system;

- said spoil removal system comprising a conduit extending through said drilling head and said riser pipe, and a spoil exhaust provided at the second end of said riser pipe.
15. Subsea drilling machine comprising:
- 5 - a drill assembly comprising:
- a riser pipe having a first end, a second end, and a length extending between said first and second ends; and
 - a drilling machine body coupled to the first end of said riser pipe, said drilling machine body comprising a drilling head;
- 10 - a feed system configured for advancing said drill assembly in a first direction; and
- a spoil removing system comprising a conduit extending through said drilling head and said riser pipe, and a spoil exhaust provided at the second end of said riser pipe.
- 15 16. The subsea drilling machine according to claim 15, further comprising a pump arranged in said drilling machine body, said pump arranged for pumping said spoil from said drilling head to said spoil exhaust.
17. A method for drilling a hole in seabed, said method comprising the steps of:
- 20 - providing a drill assembly comprising a riser pipe and a drilling machine body coupled to the first end of said riser pipe, said drilling machine body comprising a drilling head;
- providing a feed system configured for advancing said drill assembly in a first direction;
- 25 - assembling said drill assembly with said feed system to form a drilling machine;

- arranging a template onto the seabed, said template comprising one or more drilling machine receiving sections;
 - arranging said drilling machine in one of said drilling machine receiving sections;
 - 5 - fixating said feed system with respect to said template;
 - advancing said drill assembly into said seabed by operating said feed system, by substantially continuously moving said riser pipe with respect to said feed system, while operating said drilling head; and
 - retracting said drill assembly from said vertical bore hole after having reached
10 a final depth of said bore hole.
18. The method according to claim 17, wherein said advancing said drill assembly is performed by a rotating pinion engaging with a rack extending along at least a part of a length of said riser pipe.
19. The method according to claim 17, wherein said advancing said drill assembly is
15 performed by alternately operating a first feed subsystem and a second feed system; wherein one of the first and second feed subsystem is operated to advance the drill assembly while the other one of the first and second feed subsystem is reset.
20. The method according to any one of claims 17 to 19, further comprising the step
20 of:
- prior to said step of arranging said drilling machine in one of said drilling machine receiving sections, arranging a casing substantially around said drilling machine body.
21. The method according to claim 20, wherein said casing is advanced into the
25 seabed together with said drill assembly.

22. The method according to claim 20 or 21, wherein during said step of advancing the drill assembly into the seabed, said drilling head protrudes ahead of the casing.
23. The method according to claim 20 or 21, wherein during said step of advancing
5 the drill assembly into the seabed, said drilling head is arranged within said casing.
24. The method according to any one of claims 20 to 23, comprising, when the casing has been inserted into the seabed to a casing depth, further advancing said drilling head into said ground.
- 10 25. The method according to any one of claims 20 to 24, further comprising the step of:
- removing spoil via a spoil return pipe arranged within said drilling machine body and said riser pipe, and discharging said spoil at spoil discharge arranged at a second end of said riser pipe.
- 15 26. The method according to any one of claims 17 to 25, wherein said retracting is performed by operating said vertical feed system in reverse.