Claims

1. Device for coating a surface area of a gap in the coating of a pipeline, said surface area having a length along the central longitudinal axis of the pipeline and a width of at least part of the circumference of the pipeline, said device comprising:

- a frame;

- a spray nozzle support element supporting a number of spray nozzles;

- a linear motion mechanism configured for translating the spray nozzle support element relative to the frame and parallel to a longitudinal axis of the frame; and

- support members configured for arranging the frame stationary relative to the pipeline with said longitudinal axis of said frame coinciding with the central longitudinal axis of the pipeline;

~~.~~

~~—~~such that by translating the spray nozzle support element relative to the frame by means of said linear motion mechanism, the spray nozzles are displaceable along the length of said surface area with said spray nozzles directed at said surface area; ~~.~~

wherein ~~2. Device according to claim 1,~~the device further compris~~ing~~es:

- a rotary motion mechanism configured for rotating the spray nozzle support element relative to the frame about said longitudinal axis of the frame;

such that by rotating the spray nozzle support element relative to the frame about said longitudinal axis of the

frame the spray nozzles are displaceable along the width of said surface area;~~.~~

~~3. Device according to claim 1 or 2,~~

~~- configured such that the linear motion mechanism and the rotary motion mechanism are arranged in series and have separate drives.~~

~~4. Device according to any of the claims 1 to 3,~~

wherein

- the spray nozzle support element extends along ~~at least part of~~ a full circle about said longitudinal axis of the frame~~;~~ and

~~-~~ a plurality of spray nozzles is distributed along said ~~at least part of a~~ full circle~~;, preferably equidistantly distributed along said at least part of a circle.~~

and wherein

- the spray nozzles are cone spray nozzles and are arranged such that in use adjacent spray cones partly overlap.

2. Device according to claim 1,

- configured such that the linear motion mechanism and the rotary motion mechanism are arranged in series and have separate drives

3~~5~~. Device according to claim ~~4~~1 or 2,

wherein

- ~~the spray nozzle support element extends along a full circle about said longitudinal axis of the frame~~the

plurality of spray nozzles is equidistantly distributed along said at least part of a circle.

~~6~~4. Device according to claim ~~5~~1, 2, or 3, wherein

- said spray nozzle support element comprises a plurality of sub elements each extending along a part of said circle about said longitudinal axis of the frame, which sub elements are interconnected via hinges such that said sub elements are rotatable relative to each other to be able to arrange said spray nozzle support element around the circumference of said pipeline;

wherein preferably the device further comprises

- a number of actuators for rotating said sub elements relative to each other.

~~7. Device according to any of the claims 4 to 6, wherein~~

~~- the spray nozzles are cone spray nozzles and are arranged such that in use adjacent spray cones partly overlap.~~

~~5~~8. Device according to any of the claims 1 to ~~4~~7, wherein

- the spray nozzle support element comprises a spray chamber defined by a number of walls, which chamber is open towards said longitudinal axis of the frame and in which spray chamber said spray nozzles are arranged; and

wherein

- said spray chamber is configured to extend from said spray nozzles towards said longitudinal axis of the frame such that together with the surface area to be coated said spray chamber encloses a spray space.

69. Device according to claim 58, wherein the spray nozzle support element further comprises a seal member arranged at an end of the spray chamber away from the spray nozzles and configured to close a gap between the spray chamber and the surface area to be coated.

710. Device according to claim 58 or 69, further comprising

- a number of suction elements arranged in said spray chamber and connectable to a suction apparatus.

811. Device according to claim 7, 10 wherein said spray nozzle support element comprises a number of separation walls arranged in the spray chamber between the suction elements and the spray nozzles, and configured for partly separating said suction elements from said spray nozzles.

912. Device according to claim 710 or 811, wherein said suction elements are arranged on opposite sides of said spray nozzles.

1013. Device according to any of claims 1 to 912, wherein

- the device comprises an output adjustment mechanism configured for adjusting the output rate of a coating material sprayed by each of said spray nozzles, wherein preferably each of the spray nozzles comprise an adjustment mechanism configured for adjusting the output rate thereof.

1114. Device according to any of claims 1 to 1013, wherein

said support members include adjusting members configured for adjusting the position of said longitudinal axis of said frame relative to the central longitudinal axis of said pipeline.

12~~15~~. Device according to any of claims 1 to 1~~1~~4, wherein said support members are arranged to support said frame on a coated surface area of said pipeline.

13~~16~~. Device according to any of claims 1 to ~~15~~12, wherein said support members include clamping members configured for clamping the frame on the pipeline such that the frame is stationary relative to the pipeline.

14~~17~~. Device according to any of claims 1 to ~~16~~13, wherein the frame comprises two parallel U-shaped frame elements extending perpendicular to said longitudinal axis of the frame and spaced apart along said longitudinal axis of the frame, wherein said support members are arranged on said U-shaped frame elements, and wherein said linear motion mechanism is arranged such that said spray nozzle support element is translatable in between said U-shaped frame elements.

15~~18~~. Method for coating a surface area of a coated pipeline, said surface area having a length along the central longitudinal axis of the pipeline and a width of at least part of the circumference of the pipeline, said method comprising the steps of:

(a) arranging stationary relative to the pipeline, a frame having displaceable attached thereto a spray nozzle support element having arranged thereon a number of spray nozzles;

(b) forcing a coating forming material through said spray nozzles while displacing said spray nozzle support element relative to the frame such that

- said spray nozzles are translated in a first direction parallel to said longitudinal axis of said pipeline along the length of said surface area, and

- said coating forming material is applied on said surface area~~,~~.

wherein the method further comprises

~~19. Method according to claim 18, further comprising~~ after step (b), the steps of

(c) displacing said spray nozzle support element relative to the frame such that said spray nozzles are rotated about said longitudinal axis of said pipeline; and subsequently

(d) forcing said coating forming material through said spray nozzles while displacing said spray nozzle support element relative to the frame, such that

- said spray nozzles are translated in the direction opposite to the first direction along the length of said surface area; and

- said coating forming material is applied on said surface area;

wherein

- steps (c) and (d) are executed such that the coating material applied by a spray nozzle on the surface area in step (d) partly overlaps the coating material applied by said spray nozzle in the surface area in step (b).

~~20~~16. Method for coating a surface area of a coated pipeline, said surface area having a length along the central longitudinal axis of the pipeline and a width of at

least part of the circumference of the pipeline, said method comprising the steps of:

(a) arranging stationary relative to the pipeline, a frame having displaceable attached thereto a spray nozzle support element having arranged thereon a number of spray nozzles;

(b) forcing a coating forming material through said spray nozzles while displacing said spray nozzle support element relative to the frame such that

- said spray nozzles are translated in a first direction parallel to said longitudinal axis of said pipeline along the length of said surface area, and

- said coating forming material is applied on said surface area;

wherein the method further comprises ~~Method according to claim 18 comprising~~ during step b:

- displacing said spray nozzle support element relative to the frame such that said spray nozzles are rotated back and forth about said longitudinal axis of said pipeline in an oscillating motion while said spray nozzles are translated in said first direction parallel to said longitudinal axis of said pipeline.

17~~21~~. Method according to claim 15~~19~~ or 16~~20~~, wherein

- the spray nozzle support element extends along at least part of a circle about said longitudinal axis of the pipeline, a plurality of spray nozzles is equidistantly distributed along said at least part of a circle, and the displacement of said spray nozzle support element relative to the frame such that said spray nozzles are rotated about said longitudinal axis of said pipeline is half the distance

between adjacent spray nozzles along said at least part of a circle.

18~~22~~. Method according to any of the claims ~~16~~15 to ~~21~~17, further comprising the step of

- adjusting the output rate of each of said spray nozzles such that the variation in the influence of the gravitational force on the coating forming material as a result of different positions of the spray nozzles is compensated for.

Claims

1. Device for coating a surface area of a gap in the coating of a pipeline, said surface area having a length along the central longitudinal axis of the pipeline and a width of at least part of the circumference of the pipeline, said device comprising:

- a frame;

- a spray nozzle support element supporting a number of spray nozzles;

- a linear motion mechanism configured for translating the spray nozzle support element relative to the frame and parallel to a longitudinal axis of the frame; and

- support members configured for arranging the frame stationary relative to the pipeline with said longitudinal axis of said frame coinciding with the central longitudinal axis of the pipeline;

such that by translating the spray nozzle support element relative to the frame by means of said linear motion mechanism, the spray nozzles are displaceable along the length of said surface area with said spray nozzles directed at said surface area;

wherein the device further comprises:

- a rotary motion mechanism configured for rotating the spray nozzle support element relative to the frame about said longitudinal axis of the frame;

such that by rotating the spray nozzle support element relative to the frame about said longitudinal axis of the frame the spray nozzles are displaceable along the width of said surface area;

wherein

- the spray nozzle support element extends along a full circle about said longitudinal axis of the frame and a

plurality of spray nozzles is distributed along said full circle;
and wherein

- the spray nozzles are cone spray nozzles and are arranged such that in use adjacent spray cones partly overlap.

2. Device according to claim 1,

- configured such that the linear motion mechanism and the rotary motion mechanism are arranged in series and have separate drives.

3. Device according to claim 1 or 2,
wherein

- the plurality of spray nozzles is equidistantly distributed along said at least part of a circle.

4. Device according to claim 1, 2, or 3,
wherein

- said spray nozzle support element comprises a plurality of sub elements each extending along a part of said circle about said longitudinal axis of the frame, which sub elements are interconnected via hinges such that said sub elements are rotatable relative to each other to be able to arrange said spray nozzle support element around the circumference of said pipeline;
wherein preferably the device further comprises

- a number of actuators for rotating said sub elements relative to each other.

5. Device according to any of the claims 1 to 4,
wherein

- the spray nozzle support element comprises a spray chamber defined by a number of walls, which chamber is open towards said longitudinal axis of the frame and in which spray chamber said spray nozzles are arranged; and wherein

- said spray chamber is configured to extend from said spray nozzles towards said longitudinal axis of the frame such that together with the surface area to be coated said spray chamber encloses a spray space.

6. Device according to claim 5, wherein the spray nozzle support element further comprises a seal member arranged at an end of the spray chamber away from the spray nozzles and configured to close a gap between the spray chamber and the surface area to be coated.

7. Device according to claim 5 or 6, further comprising

- a number of suction elements arranged in said spray chamber and connectable to a suction apparatus.

8. Device according to claim 7, wherein said spray nozzle support element comprises a number of separation walls arranged in the spray chamber between the suction elements and the spray nozzles, and configured for partly separating said suction elements from said spray nozzles.

9. Device according to claim 7 or 8, wherein said suction elements are arranged on opposite sides of said spray nozzles.

10. Device according to any of claims 1 to 9, wherein

- the device comprises an output adjustment mechanism configured for adjusting the output rate of a coating material sprayed by each of said spray nozzles, wherein preferably each of the spray nozzles comprise an adjustment mechanism configured for adjusting the output rate thereof.

11. Device according to any of claims 1 to 10, wherein said support members include adjusting members configured for adjusting the position of said longitudinal axis of said frame relative to the central longitudinal axis of said pipeline.

12. Device according to any of claims 1 to 11, wherein said support members are arranged to support said frame on a coated surface area of said pipeline.

13. Device according to any of claims 1 to 12, wherein said support members include clamping members configured for clamping the frame on the pipeline such that the frame is stationary relative to the pipeline.

14. Device according to any of claims 1 to 13, wherein the frame comprises two parallel U-shaped frame elements extending perpendicular to said longitudinal axis of the frame and spaced apart along said longitudinal axis of the frame, wherein said support members are arranged on said U-shaped frame elements, and wherein said linear motion mechanism is arranged such that said spray nozzle support element is translatable in between said U-shaped frame elements.

15. Method for coating a surface area of a coated pipeline, said surface area having a length along the

central longitudinal axis of the pipeline and a width of at least part of the circumference of the pipeline, said method comprising the steps of:

(a) arranging stationary relative to the pipeline, a frame having displaceable attached thereto a spray nozzle support element having arranged thereon a number of spray nozzles;

(b) forcing a coating forming material through said spray nozzles while displacing said spray nozzle support element relative to the frame such that

- said spray nozzles are translated in a first direction parallel to said longitudinal axis of said pipeline along the length of said surface area, and

- said coating forming material is applied on said surface area,

wherein the method further comprises after step (b), the steps of

(c) displacing said spray nozzle support element relative to the frame such that said spray nozzles are rotated about said longitudinal axis of said pipeline; and subsequently

(d) forcing said coating forming material through said spray nozzles while displacing said spray nozzle support element relative to the frame, such that

- said spray nozzles are translated in the direction opposite to the first direction along the length of said surface area; and

- said coating forming material is applied on said surface area;

wherein

- steps (c) and (d) are executed such that the coating material applied by a spray nozzle on the surface area in

step (d) partly overlaps the coating material applied by said spray nozzle in the surface area in step (b).

16. Method for coating a surface area of a coated pipeline, said surface area having a length along the central longitudinal axis of the pipeline and a width of at least part of the circumference of the pipeline, said method comprising the steps of:

(a) arranging stationary relative to the pipeline, a frame having displaceable attached thereto a spray nozzle support element having arranged thereon a number of spray nozzles;

(b) forcing a coating forming material through said spray nozzles while displacing said spray nozzle support element relative to the frame such that

- said spray nozzles are translated in a first direction parallel to said longitudinal axis of said pipeline along the length of said surface area, and

- said coating forming material is applied on said surface area;

wherein the method further comprises during step b:

- displacing said spray nozzle support element relative to the frame such that said spray nozzles are rotated back and forth about said longitudinal axis of said pipeline in an oscillating motion while said spray nozzles are translated in said first direction parallel to said longitudinal axis of said pipeline.

17. Method according to claim 15 or 16, wherein

- the spray nozzle support element extends along at least part of a circle about said longitudinal axis of the pipeline, a plurality of spray nozzles is equidistantly

distributed along said at least part of a circle, and the displacement of said spray nozzle support element relative to the frame such that said spray nozzles are rotated about said longitudinal axis of said pipeline is half the distance between adjacent spray nozzles along said at least part of a circle.

18. Method according to any of the claims 15 to 17, further comprising the step of

- adjusting the output rate of each of said spray nozzles such that the variation in the influence of the gravitational force on the coating forming material as a result of different positions of the spray nozzles is compensated for.