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(54) **METHOD FOR WELDING A RAIL FOR A STAIRLIFT, A RAIL FOR A STAIRLIFT AND A STAIRLIFT COMPRISING SUCH RAIL**

VERFAHREN ZUM SCHWEISSEN EINER SCHIENE FÜR EINEN TREPPENAUFZUG, SCHIENE
FÜR TREPPENAUFZUG UND TREPPENLIFT MIT SOLCH EINER SCHIENE

PROCÉDÉ POUR SOUDER UN RAIL DESTINÉ À UN MONTE-ESCALIER, RAIL POUR
MONTE-ESCALIER ET MONTE-ESCALIER COMPRENANT UN TEL RAIL

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(72) Inventor: **DE KROON, Marthijs**

1723 BG Noord-Scharwoude (NL)

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(74) Representative: **EP&C**

P.O. Box 3241

2280 GE Rijswijk (NL)

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(56) References cited:

EP-A1- 0 137 577

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(73) Proprietor: **Handicare Stairlifts B.V.**

1704 SB Heerhugowaard (NL)

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EP 3 390 262 B1

Description

FIELD OF THE INVENTION

[0001] The invention relates to a method of producing a rail for a stairlift.

BACKGROUND OF THE INVENTION

[0002] EP0137577, US2014/0124293 and WO99/38790 disclose stair lifts with a rail. WO 2010/071410 discloses a method for manufacturing a rail for a stairlift, the method comprising: providing a curved support to a welding device; providing a strip with a rack with teeth to the welding device; positioning the support with respect to the strip with a positioning and holding device; and, welding the strip with the welding device on the support to form the rail. The strip with the rack with teeth may be provided in long pieces or may be provided on a reel and a strip feeder may be constructed and arranged to unroll the strip from the reel.

[0003] The rail for the stairlift will be mounted in a stair case which makes it necessary to make the rail in a curved form following the stair case. A carriage for moving a load up and down the rail will be provided with a gearwheel driven by a motor for engagement with the strip with the rack of the rail. The strip with the rack and the gearwheel have teeth which should substantially have the same intermediate distance or pitch P to allow for a smooth running operation. Having a curved rail the rack may be curved which may influence the pitch P of the teeth of the rack. This is especially the case if the rack is provided on an inside or an outside of a bend of the rail whereby the running operation of the rail may be deteriorated.

[0004] The carriage may be provided with a wheel constructed and arranged to run on a side of the strip to provide the required rotational stability for the carriage around the rail. The side of the strip should therefore be carefully formed to the required shape to allow a smooth running operation.

[0005] JPH11278772 discloses a rail for a stairlift comprising a curved support for the rail, a first pin positioned and mounted on the curved support, subsequent pins creating a rack on the curved support, and a guiding strip mounted against the pins.

SUMMARY OF THE INVENTION

[0006] It is an objective of the invention to provide a rail which is easy to manufacture and allows a smooth running operation.

[0007] Accordingly, there is provided a method according to claim 1.

[0008] By individually positioning and mounting the pins on the support the pins can be individually positioned to assure a good matching with a gearwheel of a carriage for a smooth operation even if the rail is curved. By mount-

ing a guiding strip against the pins a smooth guiding surface may be created for a guiding wheel of the carriage running over the rail assuring a smooth operation of the stairlift.

[0009] According to an embodiment mounting the first pin on the support comprises welding the first pin on the support with a welding device.

[0010] By welding a strong connection between the pin and the support is made.

[0011] According to a further embodiment welding comprises stud-welding the first pin by allowing an electric current to flow through the first pin and the support.

[0012] Stud-welding allows a fast and strong way to individually position and fasten the pin of a rack on a support whereby the position can be chosen such as to allow for a smooth running rack. The current provides the thermal energy for melting a portion of the pin and the support to form the weld pool in the welding process.

[0013] According to a further embodiment the pin is provided near its first end with a ceramic protector and the method comprises stud-welding the first end of the pin on the support.

[0014] The ceramic protector surrounds the pin at its first end to protect and support the weld pool, stabilize the arc and mold the displaced weld pool to form a weld collar. The method comprises removing the ceramic protector from the pin after the pin has been stud-welded to the support.

[0015] According to an embodiment welding comprises providing a shielding gas to the area surrounding the pin and the support.

[0016] The shielding gas protects the welding material from the surrounding air which may cause the welding pool to oxidize. The shielding gas may comprise argon.

[0017] According to an embodiment welding comprises one welding method out of the group of laser welding, spot welding, friction welding, induction welding, MIG welding, TIG welding, oxyacetylene welding and ultrasonic welding to weld the first pin on the support. Laser welding is a viable alternative for stud welding. Alternatively, spot welding, friction welding, induction welding, MIG welding, TIG welding, oxyacetylene welding or ultrasonic welding may be used.

[0018] According to an embodiment mounting the first pin on the support comprises drilling a hole in the support, followed by one of:

cutting a screw thread in the hole and screwing a pin with a screw thread in the hole; and,
providing a blind rivet in the hole and drawing a mandrel in a blind end of the rivet with a tool to expand and fasten the blind end of the rivet.

[0019] By screwing or riveting a strong connection can be made between the support and the pin. By screwing the pin may be releasable from the support.

[0020] According to an embodiment mounting the first pin on the support may comprise shooting the pin on the

support.

[0021] By shooting with powder or air a very quick way of mounting the pins on the support is created.

[0022] According to an embodiment the pin has a circular cross-section.

[0023] The circular cross-section makes it possible for a gearwheel to run on the side of the pins. Running on the side of the pins makes a very compact design of the stairlift possible.

[0024] According to an embodiment the method comprises providing a bush over the pin.

[0025] The bush may be provided with harder metal than the pin so that wear of the pin is decreased.

[0026] According to an embodiment the method comprises creating the pins at a regular pitch P.

[0027] The regular pitch makes it possible for a gearwheel with teeth to engage with the pins.

[0028] According to an embodiment repeating b to c for subsequent pins comprises:

providing a second pin;
positioning and mounting the second pin on the support substantially at a distance of N (natural number) times a pitch P from the first pin.

[0029] In this way a rail with pins at a regular distance are created making it possible for a gearwheel with teeth at a pitch P to engage with the pins of the rack.

[0030] According to an embodiment positioning the second pin on the curved support comprises taking into account the curvature of the support and the distance the gear wheel is running from the surface of the support to determine the position of the second pin with respect to the first pin on the support.

[0031] During positioning of the pins on the support the curve of the support and the distance of the gear wheel with respect to the support is taken into consideration to assure a smooth running gearwheel.

[0032] According to an embodiment the method comprises:

providing a third pin;
positioning and mounting the third pin on the support substantially at a distance of N (natural number) times the pitch P from the first and/or second pin.

[0033] In this way pins at regular distances are created making it possible for a gearwheel with teeth at a pitch P to engage with the pins of the rack.

[0034] According to an embodiment of the method the support has one of a circular, elliptical, and polygonal cross section.

[0035] The support thereby provides a good surface for the carriage to run over it.

[0036] According to an object there is provided a rail according to claim 12.

[0037] According to an object of the invention the pins have a circular cross-section and the pins are stud-weld-

ed at a first end with their circular cross-section on the support.

[0038] The circular cross-section makes it possible for a gearwheel to run on the side of the pins.

5 **[0039]** According to the invention, mounting a guiding strip against the pins comprises welding the guiding strip near a second end of the pin.

[0040] The guiding strip provides for guiding of a guiding wheel provided to the carriage at a distance from the rail to prevent rotation of the carriage around the rail. Since the guiding strip is welded near the second end of the pin the forces on the guiding strip are smaller than would be the case if the guiding strip is mounted close to the support. Optionally, the guiding strip may be welded at the top of the pins.

10 **[0041]** As an alternative option according to the invention, mounting a guiding strip against the pins comprises welding the guiding strip on a side of the pin.

[0042] Welding the guiding strip on a side of the pin allows for a strong connection between the pins and the guiding strip.

15 **[0043]** According to a further embodiment there is provided a stairlift to move a load, such as a person or goods along a staircase, the stairlift comprising:

20 the rail provided with a mount to mount the rail in the staircase; and,
a carriage for moving the load up and down the rail.

25 **[0044]** The carriage may be provided with a gearwheel for engagement with the pins on the rail and driven by a motor, the gearwheel having substantially the same pitch P as the pins. In this way pins with regular pitch P are created making it possible for a gearwheel with teeth at a pitch P to engage with the pins of the rack.

30 **[0045]** According to an embodiment the carriage is provided with a guide wheel for guiding the carriage along the guiding strip mounted to the pins.

35 **[0046]** The guiding strip provides for guiding of the guiding wheel at a distance from the rail to prevent rotation of the carriage around the rail. Since the guiding strip is a pin length away from the rail the forces on the guiding strip are smaller than would be the case if the guiding strip is close to the support.

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BRIEF DESCRIPTION OF THE DRAWINGS

45 **[0047]** Embodiments of the stairlift will be described by way of example only, with reference to the accompanying schematic drawings in which corresponding reference symbols indicate corresponding parts, and in which:

Figure 1 schematically shows a view in perspective of the stairlift for using a carriage according to the invention,

Figure 2 depicts a rail for the stairlift of figure 1;

Figure 3 depicts a rail for the stairlift of figure 1 with a rack with pins rotating around a support;

Figures 4a to 4d depict a stud-welding method;
 Figure 5 schematically depicts the engagement of the gearwheel with the pins of the rack;
 Figure 6 depicts a further embodiment of a rail for a stairlift; and,
 Figure 7 depicts a cross section of the rail of figure 6.

DETAILED DESCRIPTION OF THE DRAWINGS

[0048] Figure 1 shows a view in perspective of a stairlift 1 to move a load, such as a person or goods, along a staircase 2. The stairlift 1 comprises a curved rail 3 extending along the staircase 2. The stairlift 1 comprises a load bearing surface 5 to carry the load. The load bearing surface 5 is formed by a seat of a chair and a foot rest 4. In another example of the stairlift 1, the load bearing surface 5 is formed by a platform. The stairlift 1 comprises a carriage 6 to move the load bearing surface 5 along the rail 3. The carriage 6 may be covered by a carriage housing.

[0049] Figures 2 and 3 depict a rail for the stairlift of figure 1. The rail 3 comprising a curved or straight support 7. Multiple pins 9 may be individually positioned and mounted on the support 7 by for example welding e.g. stud-welding them on the support at a fixed distance pitch P from each other. The pins 9 may have a circular cross-section. The pins may be stud-welded at a first end with their circular cross-section on the support 7 forming a rack 11. By positioning the pins along a line on the support and the circular cross-section of the pin makes it possible for a gearwheel 13 to run on the side of the pin 9. Running on the side of the pins makes a very compact design of the stairlift possible because the gear wheel can be positioned very close to the support.

[0050] The rail is provided with a guiding strip 15 welded near a second end of the pins 9. The guiding strip may be welded on top of the second end of the pins. The guiding strip 15 provides for guiding of a guiding wheel 17 provided to the carriage at a distance from the support 7 to prevent rotation of the carriage around the rail. Since the guiding strip may be welded near the second end of the pin the forces on the guiding strip 15 may be limited. Optionally, the guiding strip may be welded at the side of the pins which makes an easy and strong connection possible.

[0051] The rail 3 for the stairlift 1 may be manufactured by:

- a) providing a curved or straight support 7 for the rail 3;
- b) providing a first pin 9;
- c) positioning the first pin on the support 7 with a robot or by hand;
- d) mounting, by for example stud-welding the first pin 9 on the support with a stud-welding device; and,
- e) repeating b) to d) for subsequent pins creating a rack 11 on the curved support with pins.

[0052] Stud-welding allows a fast and strong way to individually position and mount the pins 9 of the rack 11 on the support 7 whereby the position can be individually chosen along a line on the support 7 such as to allow for a smooth running rack 11. The stud-welded pins may be welded at a regular distance from each other for accommodating a gear wheel to run on its side. The regular distance makes it possible for the gearwheel 13 to successfully engage with the pins 9. During stud-welding a current may be allowed to flow through the pin and the support. The current provides the thermal energy for melting a portion of the pin and the support to form the weld pool in the welding process such that a rigid weld is formed. After the weld pool has been created the pin may be pressed in the pool.

[0053] A shielding gas may be provided to the area surrounding the pin and the support during stud-welding. The shielding gas protects the welding material from the surrounding air circumventing that the welding pool oxidizes. The shielding gas may comprise argon.

[0054] Welding may comprise laser welding the pin on the support. Alternatively, spot welding, friction welding, induction welding, MIG welding, TIG welding, oxyacetylene welding or ultrasonic welding may be used.

[0055] Repeating b to d for subsequent pins comprises:

- providing a second pin to the stud-welding device or a different welding device;
- positioning the second pin on the support substantially at a distance of N (natural number) times a pitch P from the first pin along a line on the surface of the support; and,
- welding the second pin on the support creating a rack with welded pins.

[0056] In this way pins positioned at regular distances along a line are created making it possible for a gearwheel with teeth at a pitch P to engage with the pins of the rack. The distance between the pins should be N (natural number) times a pitch P at a place on the pin where the gearwheel 13 is engaging the pins 9 of the rack 11.

[0057] The latter is important if, for example the support is making a curve in plane parallel to the pins. This causes the pins to be oriented not parallel to each other but a little angled with respect to each other. It is important that the distance between the portion of the pin where the gearwheel is running is at a fixed distance (pitch) with respect to the other pins. During positioning and mounting the second pin on the support substantially at a distance of N (natural number) times a pitch P from the first pin the curve of the support and the distance of the gear wheel with respect to the support is taken into consideration to assure a smooth running gearwheel.

[0058] The method further comprises:

- providing a third pin to the stud-welding device or a

different welding device;
positioning the third pin on the support substantially at a distance of a N (natural number) times the pitch P from the first and/or second pin along the line; and, welding the third pin on the support creating a rack with welded pins along a line of the surface of the support. In this way pins at regular distances along a line are created making it possible for a gearwheel with teeth at a pitch P to engage with the pins of the rack.

[0059] The support 7 may have one of a circular, elliptical, and polygonal cross section. The support thereby provides a good surface for the carriage to run over it.

[0060] Again, it is important that the distance between the portion of the pin where the gearwheel is running is at a fixed distance (pitch) with respect to the other pins. During positioning of the pins on the support the curve of the support and the distance of the gear wheel with respect to the support will be taken into consideration to assure a smooth running gear wheel.

[0061] A stairlift to move a load, such as a person or goods along a staircase making use of the rail 3. The stairlift comprising:

the rail provided with a mount to mount the rail in the staircase; and,
a carriage for moving the load up and down the rail. The carriage may be provided with a gearwheel 13 for engagement with the pins on the rail and driven by a motor, the teeth of the gearwheel having substantially the same pitch P as the pins of the track. In this way it is possible for a gearwheel 13 with teeth at a pitch P to engage with the pins of the rack 15.

[0062] According to a further embodiment the pin is provided near its first end with a ceramic protector and the method comprises stud-welding the first end of the pin on the support.

[0063] Figures 4a to 4d depict a stud-welding method for welding the pins 9 on the support 7 using a protector 17. The protector 17 may be ceramic and may surround the pin 9 at its first end 19 to protect the weld pool from oxygen. The protector 17 may support the weld pool 21, stabilize the arc 23 and mold the displaced weld pool to form a weld collar 25. In figure 4a the pin is provided to a part of the stud-welding device 27 and pressed against the support 7 and an electrical current is flowing between the stud-welding device 27 and the support via the pin 9.

[0064] In figure 4b the pin is moved a little bit away from the support 7 while the current remains creating an arc 23. The arc 23 creates a weld pool 21 in which the pin 9 is pressed (see figure 4c) down. Subsequently, the pin 9 is cooled and the ceramic protector may be removed from the pin (see figure 4d).

[0065] Figure 5 schematically depicts the engagement of the teeth 29 of the gearwheel 13 with the pins 9 of the rack. The distance pitch P of the teeth 29 of the gearwheel

13 should be equal to the pitch of the pins 9 of the rack. Further the diameter de of the pin 9 should fit in between the teeth 29 of the gearwheel.

[0066] Alternatively, the pins may be mounted on the support by drilling a hole in the support, cutting a screw thread in the sides of the hole and screwing a pin with a screw thread in the hole.

[0067] Alternatively, the pins may be mounted on the support by shooting the pins on the support. Powder actuated tools such as available from Hilti™ from Lichtenstein or compressed air actuated tools can be used to shoot the pin in the support.

[0068] Alternatively, the pins may be mounted on the support by drilling a hole in the support, providing a blind rivet (i.e. pop rivet) in the hole. Subsequently a specially designed tool may be used to draw a mandrel in a blind end of the rivet. This expands the blind end of the rivet which secures it in the hole of the support. Thereafter the mandrel may snap off but the rivet will be kept in its place by the expanded blind end.

[0069] Other mounting techniques such as friction welding, ultra-sonic welding, rotation welding, spot welding or laser welding may be used to mount the pins on the support.

[0070] Figure 6 depicts a portion of a further embodiment of a rail 3 for a stairlift in perspective view for use in the stairlift of figure 1. Figure 7 depicts a cross section of the rail of figure 6. The curved rail 3 comprises a curved or straight support of which a support part 8 is shown in perspective. The support part 8 may be a part in perspective of a pipe forming the support 7 in figures 2 and 3.

[0071] Multiple pins 9 may be individually positioned and mounted on the part of the support 8 by any suitable mounting method. For example, the pins 9 may be mounted by welding e.g. stud-welding, laser welding, spot welding, friction welding, induction welding, MIG welding, TIG welding, oxyacetylene welding or ultrasonic welding them on the support at a fixed distance pitch P from each other. The pins 9 may also be mounted by drilling a hole in the support 8 and screwing a threaded pin in the hole or by providing a blind rivet in the hole. The pins 9 may have a circular cross-section.

[0072] A hollow bush 10 may be provided over the pin 9. The pins 9 may be welded at a first end with their (circular) cross-section on the support part 8 forming a rack 11. By positioning the pins 9 along a line on the support part 8 and by providing the circular bush 10 around the pins 9 it becomes possible for a gearwheel to run on the side of the bush 10. Running on the side of the bush 10 makes a very compact design of the stairlift possible because the gear wheel can be positioned very close to the support. The bush 10 may at least be partially surrounding the pin 9 and in use be in contact with the gearwheel. The bush 10 may be hardened (with respect to the hardness of the pin) so that it doesn't significantly wear when the gearwheel is running over it. The pin 9 may be softer relative to the bush 10 giving it a higher tensile strength increasing strength of the overall con-

struction. Optionally, the bush may be rotatable mounted around the pin.

[0073] The rail 3 is provided with a guiding strip 15 welded near a second end of the pins 9. The guiding strip may be welded on top of the second end of the pins 9. The guiding strip 15 provides for guiding of a guiding wheel provided to the carriage at a distance from the support to prevent rotation of the carriage around the rail 3. Since the guiding strip may be welded near the second end of the pin 9 the forces on the guiding strip 15 may be limited. The guiding strip 15 may also assure that the bushes 10 are kept around the pins 9. The guiding strip 15 may allow the bushes 10 to rotate around the pins 9.

[0074] Alternatively, the guiding strip 15 may be welded to the bushes 10 in which case the bushes cannot rotate around the pin 9.

[0075] The method of producing a rail 3 for a stair lift with a bush 10 may comprise:

- a) providing a curved support for the rail;
- b) providing a first pin 9;
- c) positioning and mounting the first pin 9 on the curved support;
- d) repeating b) to c) for subsequent pins creating a rack 11 on the curved support with individually positioned pins; and,
- e) providing bushes 10 over the pins.

[0076] Subsequently a guiding strip 15 may be mounted against the pins. The guiding strip mounted on the pins may keep the bushes 10 at their place on the pins. If it is not necessary that the bushes 10 are able to rotate around the pins the guiding strip may also be welded on the bushes. However it may be preferred that the guiding strip is welded on the pins so that the hardened bush is not softened by the welding step.

[0077] As required, detailed embodiments of the present invention are disclosed herein; however, it is to be understood that the disclosed embodiments are merely exemplary of the invention, which can be embodied in various forms. Therefore, specific structural and functional details disclosed herein are not to be interpreted as limiting, but merely as a basis for the claims and as a representative basis for teaching one skilled in the art to variously employ the present invention in virtually any appropriately detailed structure. Further, the terms and phrases used herein are not intended to be limiting, but rather, to provide an understandable description of the invention.

[0078] The terms "a" or "an", as used herein, are defined as one or more than one. The term plurality, as used herein, is defined as two or more than two. The term another, as used herein, is defined as at least a second or more. The terms including and/or having, as used herein, are defined as comprising (i.e., open language, not excluding other elements or steps). Any reference signs in the claims should not be construed as limiting the scope of the claims or the invention.

[0079] It will be apparent to those skilled in the art that various modifications can be made to the device and method without departing from the scope as defined in the claims.

Claims

1. A method of producing a rail (3) for a stairlift (1), wherein the method comprises:
 - a) providing a curved support (7) for the rail (3);
 - b) providing a first pin (9);
 - c) positioning and mounting the first pin (9) on the curved support (7);
 - d) repeating b) to c) for subsequent pins (9) creating a rack (11) on the curved support (7) with individually positioned pins (9); and,
 - e) mounting a guiding strip (15) against the pins (9), wherein mounting the guiding strip (15) against the pins (9) comprises welding the guiding strip (15) near a second end of the pin (9) and on a side of the pin (9) or on top of the second end of the pins (9).
2. The method according to claim 1, wherein mounting the first pin on the support comprises welding the first pin on the support with a welding device.
3. The method according to claim 2, wherein welding comprises stud-welding the first pin by allowing an electric current to flow through the first pin and the support.
4. The method according to claim 2 or 3, wherein the pin is provided near its first end with a ceramic protector and the method comprises stud-welding the first end of the pin on the support.
5. The method according to claim 4, wherein the method comprises removing the ceramic protector from the pin after the pin has been stud-welded to the support.
6. The method according to claim 1, wherein mounting the first pin on the support comprises drilling a hole in the support, followed by one of:
 - cutting a screw thread in the hole and screwing a pin with a screw thread in the hole; and,
 - providing a blind rivet in the hole and drawing a mandrel in a blind end of the rivet with a tool to expand and fasten the blind end of the rivet.
7. The method according to claim 1, wherein mounting the first pin on the support comprises shooting the pin in the support.

8. The method according to any one of the claims 1-7, wherein d) repeating b) to c) for subsequent pins comprises:

providing a second pin; 5
positioning and mounting the second pin on the support substantially at a distance of N (natural number) times a pitch P from the first pin.

9. The method according to claim 8, wherein positioning the second pin on the curved support comprises taking into account the curvature of the support and the distance the gear wheel is running from the surface of the support to determine the position of the second pin with respect to the first pin on the support. 10 15

10. The method according to claim 8 or 9, wherein d) repeating b) to c) for subsequent pins comprises:

providing a third pin; 20
positioning and mounting the third pin on the support substantially at a distance of a N (natural number) times the pitch P from the first and/or second pin. 25

11. The method according to any one of the claims 1-9, wherein the support has one of a circular, elliptical, and polygonal cross section.

12. A rail (3) for a stairlift (1) comprising a curved support (7), wherein multiple pins (9) are mounted on the support (7) at a fixed pitch P and a guiding strip (15) is provided against the pins (9), and **characterised in that** the guiding strip (15) is welded near a second end of the pins (9) and on a side of the pin (9) or on top of the second end of the pins (9). 30 35

13. The rail according to claim 12, wherein the pins have a circular cross-section and the pins are stud-welded at a first end with their circular cross-section on the support. 40

14. The rail according to claim 12 or 13, wherein the support has one of a circular, elliptical, and polygonal cross section. 45

15. A stairlift to move a load, such as a person or goods along a staircase, the stairlift comprising: a rail according to any one of the claims 12-14 and provided with a mount to mount the rail in the staircase; and, a carriage for moving the load up and down the rail. 50

Patentansprüche 55

1. Verfahren zum Herstellen einer Schiene (3) für einen Treppenlift (1), wobei das Verfahren umfasst:

a) Bereitstellen eines gekrümmten Trägers (7) für die Schiene (3);
b) Bereitstellen eines ersten Stiftes (9);
c) Positionieren und Montieren des ersten Stiftes (9) an dem gekrümmten Träger (7);
d) Wiederholen von b) bis c) für nachfolgende Stifte (9), wodurch eine Zahnstange (11) an dem gekrümmten Träger (7) mit individuell positionierten Stiften (9) erzeugt wird; und
e) Montieren eines Führungstreifens (15) gegen die Stifte (9), wobei das Montieren des Führungstreifens (15) gegen die Stifte (9) das Verschweißen des Führungstreifens (15) in der Nähe eines zweiten Endes des Stiftes (9) und auf einer Seite des Stiftes (9) oder oben an dem zweiten Ende der Stifte (9) umfasst.

2. Verfahren nach Anspruch 1, wobei das Montieren des ersten Stiftes an dem Träger das Anschweißen des ersten Stiftes an den Träger mit einer Schweißvorrichtung umfasst.

3. Verfahren nach Anspruch 2, wobei das Schweißen das Bolzenschweißen des ersten Stifts umfasst, indem man einen elektrischen Strom durch den ersten Stift und den Träger fließen lässt.

4. Verfahren nach Anspruch 2 oder 3, wobei der Stift in der Nähe seines ersten Endes mit einer keramischen Schutzvorrichtung versehen ist und das Verfahren das Bolzenschweißen des ersten Endes des Stiftes auf den Träger umfasst.

5. Verfahren nach Anspruch 4, wobei das Verfahren das Entfernen der keramischen Schutzvorrichtung von dem Stift umfasst, nachdem der Stift mit dem Träger durch Bolzenschweißen verschweißt worden ist.

6. Verfahren nach Anspruch 1, wobei das Montieren des ersten Stiftes an dem Träger das Bohren eines Loches in den Träger umfasst, gefolgt von einem der folgenden Schritte:

Schneiden eines Schraubengewindes in das Loch und Einschrauben eines Stiftes mit einem Schraubengewinde in das Loch; und
Bereitstellen eines Blindnietes in dem Loch und Ziehen eines Dorns in ein Blindende des Nietes mit einem Werkzeug zum Aufweiten und Befestigen des Blindendes des Nietes.

7. Verfahren nach Anspruch 1, wobei das Montieren des ersten Stiftes an dem Träger das Einschießen des Stiftes in den Träger umfasst.

8. Verfahren nach einem der Ansprüche 1-7, wobei d) das Wiederholen von b) bis c) für nachfolgende Stifte

umfasst:

Bereitstellen eines zweiten Stifts;
Positionieren und Montieren des zweiten Stifts an dem Träger im Wesentlichen in einer Entfernung von einem N (natürliche Zahl) -fachen des Abstands P von dem ersten Stift.

9. Verfahren nach Anspruch 8, wobei die Positionierung des zweiten Stifts an dem gekrümmten Träger die Berücksichtigung der Krümmung des Trägers und der Entfernung, in der das Zahnrad von der Oberfläche des Trägers läuft, umfasst, um die Position des zweiten Stifts in Bezug auf den ersten Stift an dem Träger zu bestimmen. 10
10. Verfahren nach Anspruch 8 oder 9, wobei d) das Wiederholen von b) bis c) für nachfolgende Stifte umfasst: 15

Bereitstellen eines dritten Stifts;
Positionieren und Montieren des dritten Stifts an dem Träger im Wesentlichen in einer Entfernung von einem N (natürliche Zahl) -fachen des Abstands P von dem ersten und/oder zweiten Stift. 20
11. Verfahren nach einem der Ansprüche 1-9, wobei der Träger einen von einem kreisförmigen, einem elliptischen und einem polygonalen Querschnitt hat. 25
12. Schiene (3) für einen Treppenlift (1), die einen gekrümmten Träger (7) umfasst, wobei eine Vielzahl von Stiften (9) an dem Träger (7) in einem festen Abstand P zueinander angebracht ist und ein Führungstreifen (15) gegen die Stifte (9) vorgesehen ist, **dadurch gekennzeichnet, dass** der Führungstreifen (15) in der Nähe eines zweiten Endes der Stifte (9) und auf einer Seite des Stiftes (9) oder oben auf dem zweiten Ende der Stifte (9) geschweißt ist. 30
13. Schiene nach Anspruch 12, wobei die Stifte einen kreisförmigen Querschnitt haben und die Stifte an einem ersten Ende mit ihrem kreisförmigen Querschnitt durch Bolzenschweißen an dem Träger befestigt sind. 35
14. Schiene nach Anspruch 12 oder 13, wobei der Träger einen von einem kreisförmigen, einem elliptischen oder einem polygonalen Querschnitt hat. 40
15. Treppenlift zum Bewegen einer Last, wie z.B. einer Person oder von Gütern, entlang eines Treppenaufgangs, wobei der Treppenlift umfasst: 45

eine Schiene nach einem der Ansprüche 12-14, die mit einer Halterung zum Montieren der Schiene in dem Treppenaufgang versehen ist; und einen Wagen zum Bewegen der Last auf der Schiene nach

oben und unten.

Revendications

1. Procédé de fabrication d'un rail (3) pour un monte-escalier (1), dans lequel le procédé comprend les étapes de :
 - a) fournir un support (7) incurvé pour le rail (3) ;
 - b) fournir un premier ergot (9) ;
 - c) positionner et monter le premier ergot (9) sur le support (7) incurvé ;
 - d) répéter les étapes b) à c) pour les ergots (9) suivants de façon à créer une crémaillère (11) sur le support (7) incurvé avec des ergots (9) positionnées individuellement ; et,
 - e) monter une bande de guidage (15) contre les ergots (9), dans lequel le montage de la bande de guidage (15) contre les ergots (9) comprend le soudage de la bande de guidage (15) à proximité d'une deuxième extrémité de l'ergot (9) et sur un côté de l'ergot (9) ou au dessus de la deuxième extrémité de l'ergot (9).
2. Procédé selon la revendication 1, dans lequel le montage du premier ergot sur le support comprend le soudage du premier ergot sur le support avec un dispositif de soudage.
3. Procédé selon la revendication 2, dans lequel le soudage comprend le soudage de goujon du premier ergot en permettant à un courant électrique de circuler à travers le premier ergot et le support.
4. Procédé selon la revendication 2 ou 3, dans lequel l'ergot est prévu à proximité de sa première extrémité avec une protection en céramique et le procédé comprend le soudage de goujon de la première extrémité de l'ergot sur le support.
5. Procédé selon la revendication 4, dans lequel le procédé comprend l'élimination de la protection en céramique de l'ergot après que l'ergot ait été soudé par goujon au support.
6. Procédé selon la revendication 1, dans lequel le montage du premier ergot sur le support comprend le forage d'un trou dans le support, suivi par l'un de :

la découpe d'un filetage dans le trou et le vissage d'un ergot avec un filetage dans le trou ; et,

la fourniture d'un rivet aveugle dans le trou et l'emboutissage d'un mandrin dans une extrémité aveugle du rivet avec un outil pour développer et fixer l'extrémité aveugle du rivet.
7. Procédé selon la revendication 1, dans lequel le

montage du premier ergot sur le support comprend l'insertion de l'ergot dans le support.

8. Procédé selon l'une quelconque des revendications 1-7, dans lequel l'étape d) répétant les étapes b) à c) pour les ergots suivants comprend :

la fourniture d'un deuxième ergot ;
le positionnement et le montage du deuxième ergot sur le support sensiblement à une distance de N (nombre naturel) fois un pas P du premier ergot.

9. Procédé selon la revendication 8, dans lequel le positionnement du deuxième ergot sur le support incurvé comprend la prise en compte de la courbure du support et de la distance que la roue dentée exécute à partir de la surface du support pour déterminer la position du deuxième ergot par rapport au premier ergot sur le support.

10. Procédé selon la revendication 8 ou 9, dans lequel l'étape d) répétant les étapes b) à c) pour les ergots suivants comprend :

la fourniture d'un troisième ergot ;
le positionnement et le montage du troisième ergot sur le support sensiblement à une distance de N (nombre naturel) fois le pas P du premier et / ou deuxième ergot.

11. Procédé selon l'une quelconque des revendications 1-9, dans lequel le support a l'une d'une section transversale circulaire, elliptique, et polygonale.

12. Un rail (3) pour un monte-escalier (1) comprenant un support incurvé (7), dans lequel de multiple ergots (9) sont montés sur le support (7) selon un pas fixe P et une bande de guidage (15) est prévue contre les ergots (9), et **caractérisé en ce que** la bande de guidage (15) est soudée à proximité d'une deuxième extrémité de l'ergot (9) et sur un côté de l'ergot (9) ou au dessus de la deuxième extrémité de l'ergot (9) .

13. Rail selon la revendication 12, dans lequel les ergots ont une section transversale circulaire et les ergots sont soudés par goujon à une première extrémité avec leur section transversale circulaire sur le support.

14. Rail selon la revendication 12 ou 13, dans lequel le support a l'une d'une section transversale circulaire, elliptique, et polygonale.

15. Un monte-escalier pour déplacer une charge, telle qu'une personne ou des marchandises le long d'un escalier, le monte-escalier comprenant :

un rail selon l'une quelconque des revendications 12-14 et pourvu d'une monture pour monter le rail dans l'escalier ; et un chariot pour déplacer la charge de haut en bas du rail.

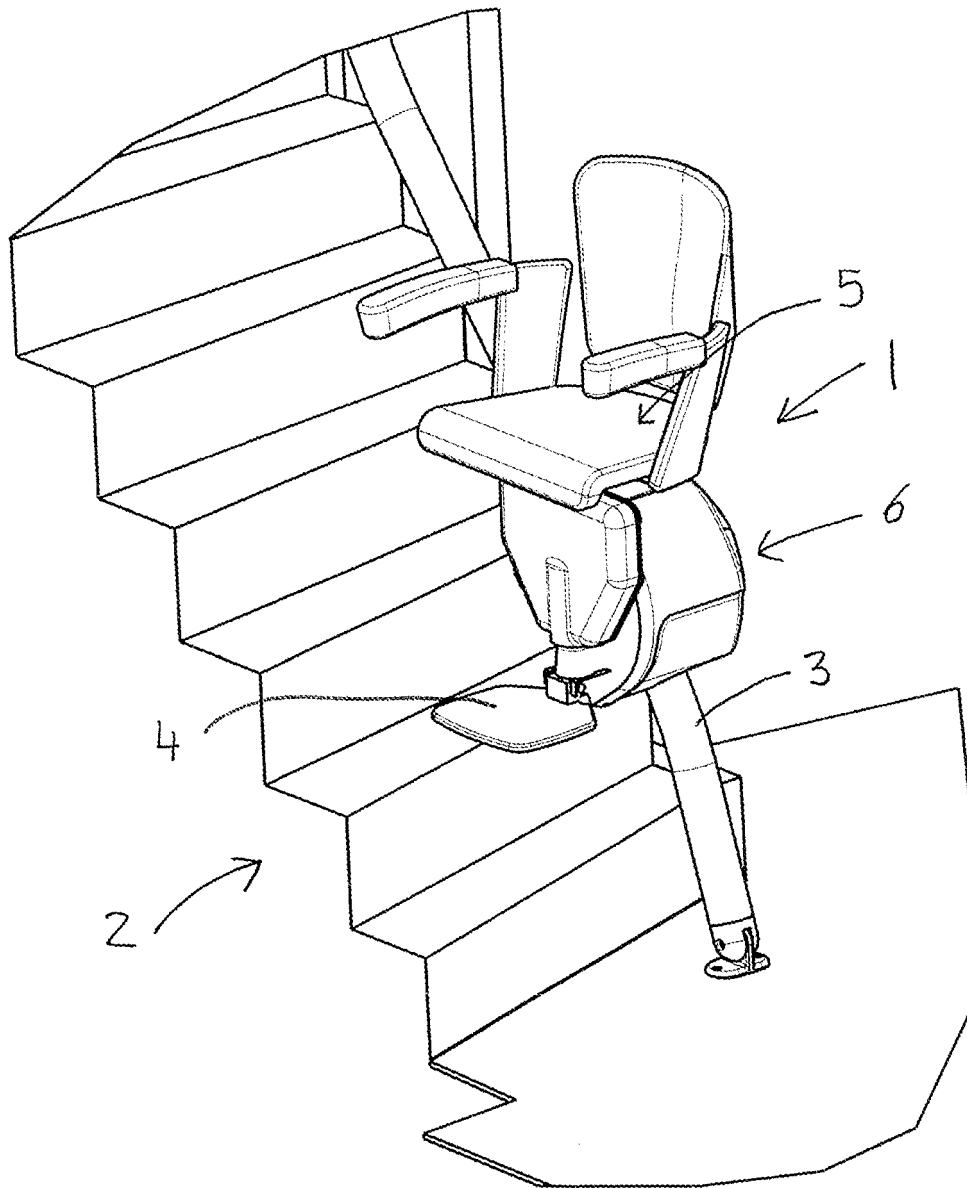


Fig. 1

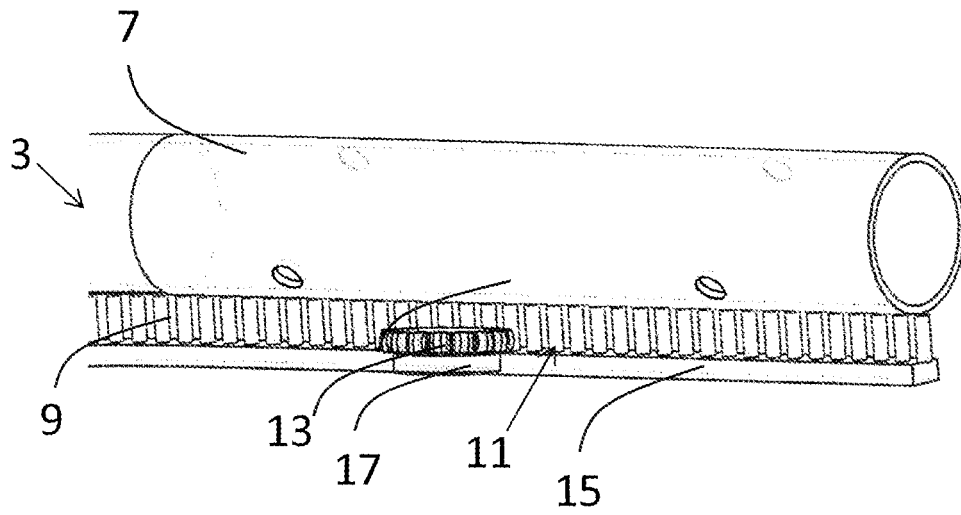


Fig. 2

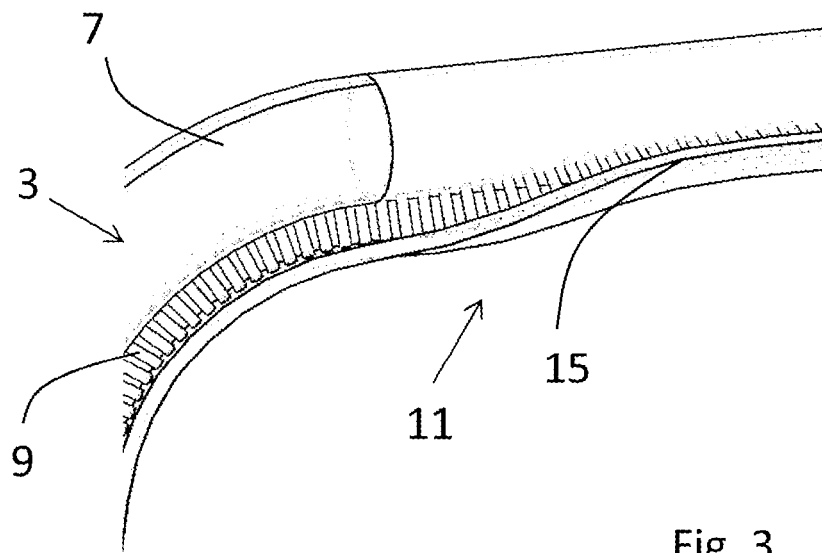
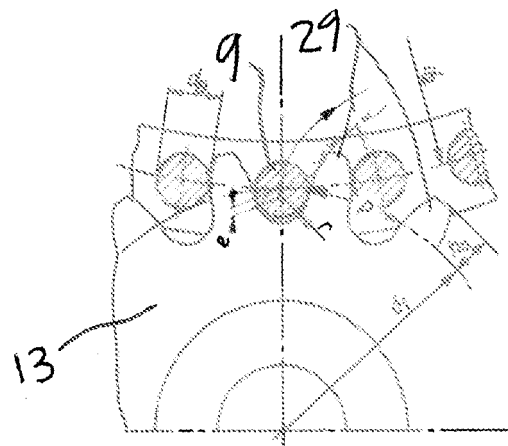
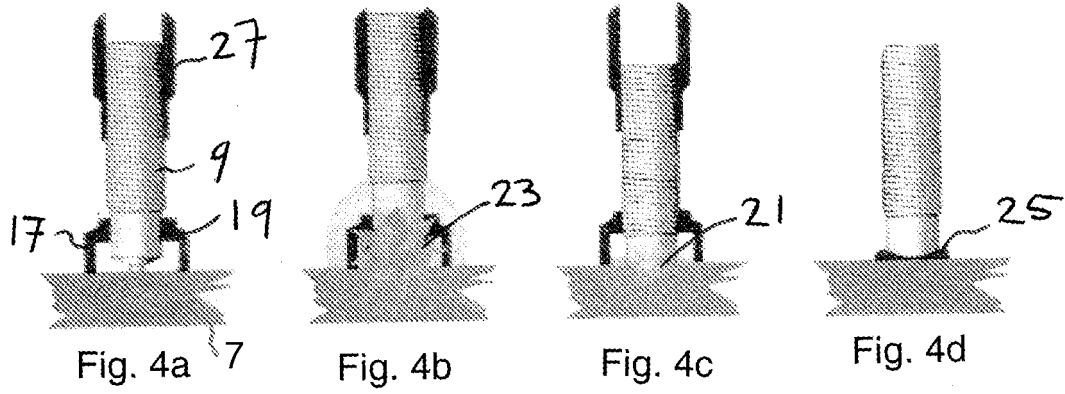
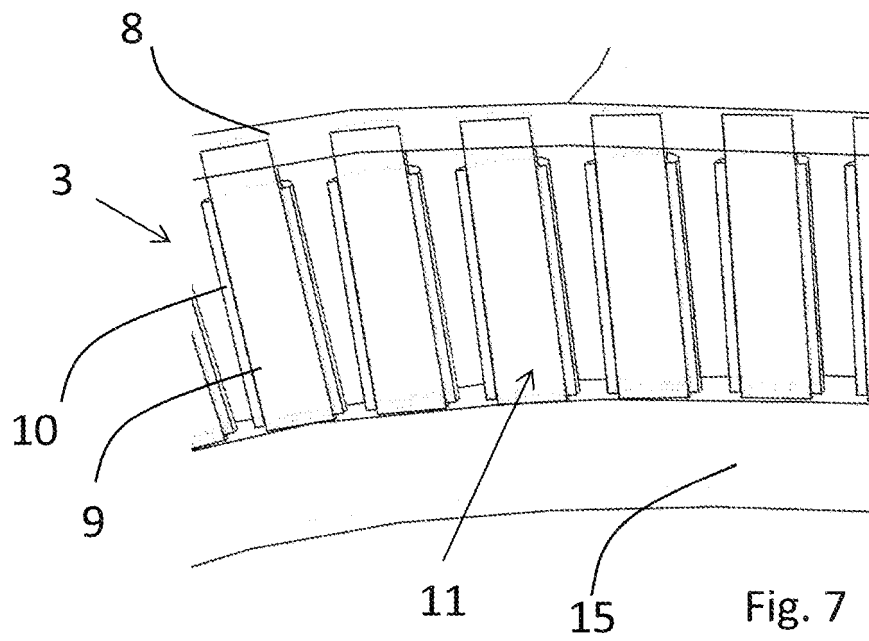
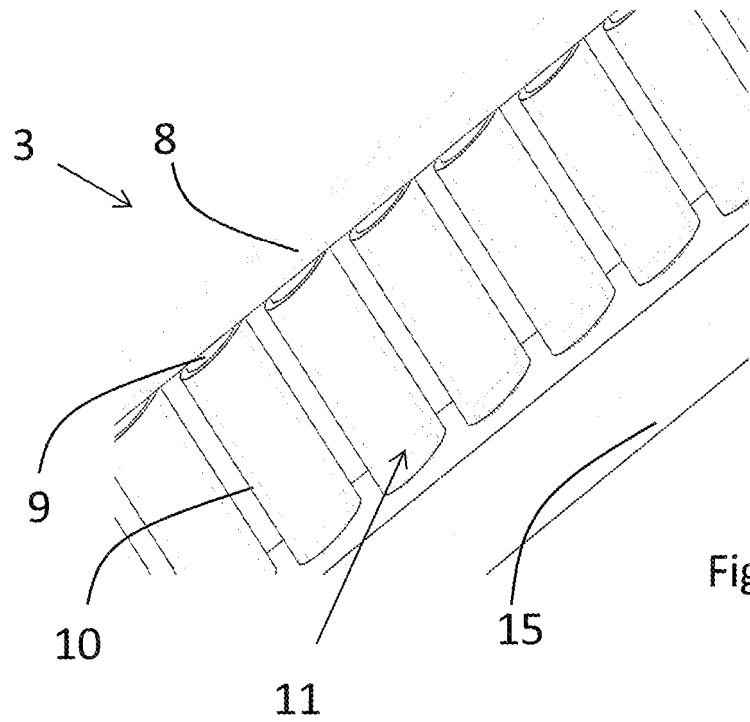


Fig. 3





REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- EP 0137577 A [0002]
- US 20140124293 A [0002]
- WO 9938790 A [0002]
- WO 2010071410 A [0002]
- JP H11278772 B [0005]