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(54) Lifting system

(57) The lifting system comprises a first (2) and second type (3) of steps being provided displaceable in relation to each other, an upper section of at least one baluster (5) being attached to a banister (7), extending from a proximate end (6A) to a distant end (6B) of the stairway, wherein the at least one step of the first type (2) is fixed to at least one lifting means (4) for raising and low-

ering the at least one first (2) and second type of step (3), and the at least one step of the second type (3) is fixed to a lower end of at least one substantially vertically extending baluster (5). The system may e.g. be used for stable and safe lifting of a person using a wheelchair or in other ways being physically disabled together with functioning as an ordinary stairway, also usable for walking-enabled persons.

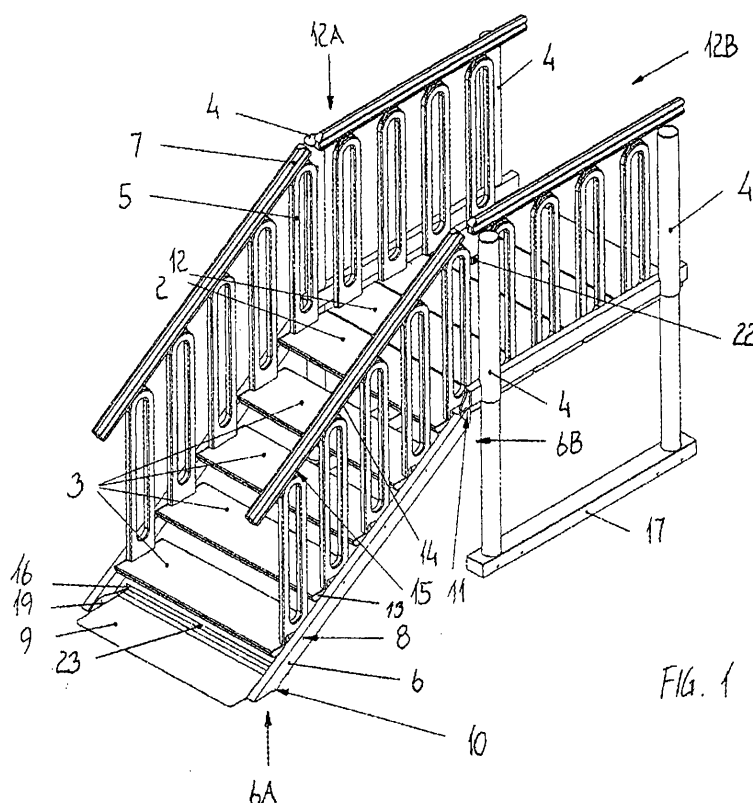


FIG. 1

EP 1 600 416 A1

Description

FIELD OF THE INVENTION

[0001] The invention relates to a lifting system for a stairway of a type, where the steps of the stairway remain horizontal at all times. The system may e.g. be used for lifting a person using a wheelchair or in other ways being physically disabled together with functioning as an ordinary stairway, also usable for walking-enabled persons.

BACKGROUND ART

[0002] In modern buildings, a significant problem posing a challenge to an architect is the connection between different levels in the building. The connections have to facilitate transportation of people that are not able to use regular stairways or only with great difficulty, e.g. physically impaired people using wheelchairs or parents with children in perambulators. The number of possibilities of lifting people is many, but they all involve considerable drawbacks.

[0003] A first solution is the use of an elevator, which has the advantage of being capable of transporting all kinds of persons and their goods and chattels. Further, it does not take up as much space as some of the other solutions. The disadvantages of elevators include the fact that they have to be combined with stairs to ensure safety and that they are very expensive to establish in new buildings as well as in existing buildings. Also, elevators are non-secure ways of escape during a fire or other emergency necessitating leaving the building.

[0004] A second solution is to combine stairs with a lifting system where the system includes a platform and rails following the stairs. The platform is held in a horizontal position as it slides up and down on the rails just above the stairs. When the platform is not in use, it is raised to a vertical storage position. One of the disadvantages is the unattractive and bulky look that this kind of system adds to the overall appearance of the stairs and the building. Also, the functioning of such platform limits the number of persons being able to escape during a fire or other emergency necessitating leaving the building.

[0005] A third solution is illustrated in US 5,234,078. The solution combines the functionality of stairways with the ones of elevators, which creates the possibility of stairway types that may be used as regular stairways as well as for lifting an impaired person in a wheelchair from one level to another. The lifting system involves lifting of a platform connected to the upper end of the stairway by raising the platform and the stairway itself to a higher level.

[0006] The movement is established by a motor means lifting the lower end of the stairway along two posts. This is a problem since the motor means, among other, disturb the aesthetic appearance of the system

and require a space below the stairs to facilitate the motor means.

[0007] A forth solution is described in EP 1 254 858 A1. This solution succeeds in providing a solution for a number of the above mentioned drawbacks and describes a lifting system including a first and a second section of the lifting system and describes means for connecting the first and second section.

SUMMARY OF THE INVENTION

[0008] An object of the invention may be to create a lifting system without the above-mentioned drawbacks of the background art.

[0009] Another object of the invention may also be to provide a lifting system that is steady and self-supporting and still requires the lowest possible number of simple, lightweight and easy to assemble elements,

[0010] Another object of the invention may be to provide a construction that due to its design and the solutions provided is a safe lifting system that provides a safe lifting function. A still further object of the invention may be to provide a lifting system that requires an absolute minimum of maintenance, if any.

[0011] According to the above objects of the invention a lifting system is envisaged for a stairway for providing a self-supporting lifting system, the lifting system comprising

- at least one step of a first type and at least one step of a second type, the first type of steps and second type of steps being provided displaceable in relation to each other,
- an upper section of at least one baluster being attached to a banister, the banister extending from a proximate end of the stairway to a distant end of the stairway,
- the at least one second type of step and the at least one baluster being pivotally joined at first swivel joints to two sidepieces of the stairway in the proximity of the lower end of the baluster, the at least two sidepieces extending from the proximate end of the stairway to the distant end of the stairway, and
- the at least one baluster being pivotally joined to the banister at second swivel joints in the proximity of the upper end of the at least one baluster, and
- each of said two sidepieces being pivotally hinged to the lifting means at third swivel joints in the proximity of distant ends of the two sidepieces, and
- wherein the at least one step of the first type is fixed to at least one lifting means for raising and lowering the at least one first type of step and the at least one second type of step, and the at least one step of the second type is fixed to a lower end of at least one substantially vertically extending baluster, and activating the lifting means provides a raising or a lowering of the at least one first type of step and hereby a raising or lowering of the at least one sec-

ond type of step.

[0012] By attaching the baluster rigidly to the steps at a lower end of the baluster according to the invention a steady lifting system is provided as this increases the rigidity of the system. By also attaching the sidepieces to the lifting means according to the invention, the steadiness of the invention is further improved and the independence of the lifting system is greatly increased in relation to the possible building the lifting system is to be functioning together with and in relation to any different functioning of the lifting system.

[0013] The lifting means may be electrical actuators, air-pressurised or hydraulically pressurised cylinders or the like means adapted to provide a displacement suitable for lifting of e.g. a wheelchair with a walking-impaired person.

[0014] The steps or any part supporting the steps may be formed in a way such as to at least partially support other steps, when the lifting means is in their lowest position. The support may be provided by the steps at least partly overlapping each other or being interconnected in any suitable manner. The upper surfaces of the steps should though still be at the same level non-dependent on any mutual overlapping or interconnection. This may e.g. be provided by a step overlapping another step and vice versa and dove-tail groves being provided in neighbouring edges of the steps in order for the overlapping part not to prevent the surfaces of the steps from being at the same level when the stairway is in a lowermost position. Thus, any overlapping or interconnection must preferably not impair a surface of the steps being flush, when the steps are in a lowermost position.

[0015] According to a preferred embodiment of the invention one of the first type of steps is attached to a platform or is forming a platform, said platform being intended for being raised or lowered by the lifting means by the attachment of the first type of step to the lifting means, and said lifting means being adapted for providing a force on said first type of step, which is substantially in the direction of gravity, and said sidepieces in a proximate end being provided with means for allowing a lateral displacement of the sidepieces.

[0016] The means allowing lateral displacement of the sidepieces is provided in order to make it easy for the sidepieces to slide on the flooring and as part of the means to prevent forces other than in the direction of gravity to act on the lifting means. The first step or the platform may be adapted so as to provide a number of lifting means for support and substantially only having forces in the direction of gravity acting on the first step of platform or such as to at least minimise the magnitude of forces not acting in the direction of gravity. By providing the lifting system in this way e.g. the maintenance of the system is limited along with fulfilling other objects of the invention.

[0017] Preferably, a first step of the second type of step is provided with a ramp for enabling a walking-im-

paired person and/or an aid for a walking-impaired person to enter or exit the first step, when said first step is in a lowermost position. Even more preferred, the ramp is flush with the flooring when the first step of the second type is not in its lowermost position, and the ramp is activated only when the first step of the second type is in its lowermost position. Activation of the ramp takes place automatically, when the first step of the second type is lowered towards the lowermost position. The ramp may be provided as described under the detailed description, but may also be provided to act as a stop, when the step at the ramp is not in its lowermost position and act as a ramp, when the step is in its lowermost position, i.e. the ramp is pivoted upwards when the step is not in a lowermost position. The safety is enhanced against accidental rolling off of a wheel-chair.

[0018] According to a possible embodiment, the steps are rigidly attached to the lower end of the balusters by a first attachment means such as an L-shaped bracket, said first attachment means also being provided with means for attaching said first attachment means to the first swivel joints of the sidepieces. Thereby, said first attachment means interconnects the steps with the sidepieces by means of the first swivel joints, and the number of individual elements is reduced for ensuring the functioning of the lifting system. Thus, in a possible embodiment, the possible L-shaped bracket may be provided with the swivel joint itself, thus incorporating the attachment of the steps with the attachment of the balusters and even also with the attachment of the sidepieces.

[0019] The first attachment means may be provided as a frame extending along the outer edges of the step and hereby also extending from one sidepiece to the other opposite sidepiece and still also be used to attach the balusters at each side of the step. Thereby, the first supporting means may support at least a part of the surface of a step. Hereby, the first supporting means may be provided so as to make the rigidity and strength of the step and the lifting system as such independent of the choice of material for the surface of the step and hereby let the user or the architect choose the material. The first attachment means may be two separate parts, one part provided in each side of the step. The first attachment means may only consist in a bar that is attached to the side of the step for insertion in the sidepiece, and the baluster may be attached to the steps directly by fastening means such as screws, glue, key and groove or a combination thereof.

[0020] According to a possible additional or alternative embodiment, the upper end of the baluster is being pivotally attached to the banister by rigidly attaching the upper end of the baluster to a second attachment means, said second attachment means also being provided with means for forming the second swivel joint with the banister, said second attachment means thus interconnecting the baluster with the banister by means of the second swivel joints. Thereby, said second attach-

ment means such as a longitudinal bar interconnects the balusters with the banisters by means of the second swivel joints, and the number of individual elements is reduced for ensuring the functioning of the lifting system. Thus, in a possible embodiment, the possible longitudinal bar may be provided with the swivel joint itself, thus incorporating the attachment of the banisters to the lifting system as such with the attachment of the balusters to the banisters.

[0021] The second attachment means is especially for use, when the material, such as tree, of the baluster is not strong enough. The second attachment means may as an alternative or additionally also be used to form part of a swivel joint being hidden in a groove at the underside of the banister. As an alternative, the second attachment means is rigidly attached to the banister and the upper end of the baluster is provided with means for connecting the second attachment means to the banister. Thus, many possibilities are listed of enhancing the security and limiting the number of elements of the lifting system.

[0022] By providing lifting means in both ends of the sidepieces, there is no need for a platform at the one end of the stairs. Additionally or alternatively, by the feature of the steps being provided in a rigid connection to the balusters, the construction according to the invention, such stairway and combined lifting system form a space saving and steady construction.

[0023] According to yet further embodiments of the invention, at least one of the first type of steps or second type of steps comprises a first detection means at an underside of the step for detection of any objects obstructing the steps from being lowered.

[0024] According to yet another embodiment of the invention, at least one of the first type of steps comprises a second detection means for detection of any objects present on the at least one first type of steps. The first and second detection means may also be combined with load detection means comprised with a control means for the lifting means.

[0025] According to embodiments of the invention the lifting system further comprises a control means being provided for receiving an input by a user and being connected to the lifting means and to the first detection means, said control means being capable of activating the lifting means according to user input and at the same time controlling the lifting means to be lowered only when clear signals are received from the first detection means.

[0026] Hereby further safety is Incorporated into the system, where a platform is always present.

[0027] According to further embodiments of the invention the lifting system further comprises a control means being provided for receiving an input by a user and being connected to the lifting means and to the first and second detection means, said control means being capable of activating the lifting means according to user input and at the same time controlling the lifting means to be

lowered only when clear signals are received from the first and second detection means.

[0028] Hereby further safety is incorporated into the system, where a platform is formed by the steps, when the lifting means in both ends of the sidepieces is at the same level. When a person or object is present on the platform formed by the steps, the platform may not be transferred into an ordinary stairway. If this could happen, the objects may fall from the platform and be damaged or the persons may fall from the platform and be injured.

[0029] All the embodiments of lifting systems described may be used in a way such as to activate the lifting means thereby provide a height difference between the steps being appropriate for physio-therapeutic training of a walking person. The invention is intended for being powered electrically by mains power supply. However, in case of an emergency situation or In case of a power drop-out of the mains electrical supply, an electrical power back-up may be envisaged, such as a battery for powering the lifting means. Also, for ensuring the safety also in emergency situations, emergency lighting may be provided for lighting up or at least for indicating the location of the lifting system.

BRIEF DESCRIPTION OF THE FIGURES

[0030] The invention will hereafter be described with reference to the figures, where

FIG.1 and FIG. 1A-1D are perspective views of an embodiment of the invention with a separate stairway and lifting platform,

FIG.2 is a perspective view of an embodiment of the invention constituting a combined stairway and lifting platform,

FIG.3A-3D shows the lifting system as shown in FIG.1, when the stairs are forming a flat surface, FIG.4A-4B shows a sideview of a ramp and other parts, when a step is in a position different from a lowermost position, and

FIG.5A-5B show a sideview of the ramp and other parts, when the step shown is in a lowermost position.

DETAILED DESCRIPTION OF THE INVENTION

[0031] FIG.1 and FIG. 1A-1D show a lifting system 1 according to an embodiment of the invention. The figure shows a first type of step 2 being in a fixed relation in relation to lifting means 4 and being attached to at least one of the lifting means 4. In this embodiment of the invention, the lifting means consists of four electrically energised linear actuators connected to each corner of a platform 12. A baluster bracket 22 is provided for attaching the lifting means to a substantially vertically extending baluster 5. The fixed step 2 is also connected to a sidepiece 6 at a hinge 11. A second type of step 3 is

provided and the vertical level position of this second type of step is displaceable in relation to the fixed step 2 and hereby vertically displaceable in relation to the fitting means 4. In the embodiment of the invention shown, four steps 3 of the second type are provided. As seen from FIG. 1, both type of steps 2,3 are horizontal. Both types of steps will remain horizontal during raising and lowering of the lifting system.

[0032] At each side, all steps are rigidly attached to the substantially vertically extending baluster 5. Thus, the balusters 5 are shown here as being provided perpendicular to the steps. Each step of the second type of step 3 is supported by sidepieces 6 and each second type of step 3 is capable of pivoting at a swivel joint 8 in the proximity of the lower end of the balusters 5. Each baluster 5 is attached to a banister 7 by a swivel joint 15 and each baluster 5 is thereby able to pivot in relation to the banister 7. Each baluster 5 is also capable of pivoting in relation to the sidepieces 6 at the swivel joints 8.

[0033] Each of the two sidepieces 6 is in a distant end 6B hinged to the lifting means at a third swivel joint 11. In a proximate end 6A of the sidepieces 6, a wheel 10 or other like means is provided in order for the sidepieces 6 to displace laterally across a flooring (not shown) as the lifting system lowers or raises together with the platform 12 and the steps 2,3 of the first and second type.

[0034] When the sidepieces 6 lowers and the proximate end 6A of the sidepieces 6 displaces laterally across the flooring (not shown), the sidepieces will force a bar 16 downwards and hereby a ramp 9 will be lifted to form a surface extending from the surface of the flooring to an upper level of the second type of step 3 at the proximate end of the stairway. This feature of the invention is further described in Fig. 4 and FIG. 5.

[0035] The baluster 5 is connected to the steps 2,3 of the first and second type by a first attachment means 13 and a second attachment means 14 is provided for attaching the baluster 5 to the banister 7. The linear actuators forming part of the lifting means 4 is two and two mutually interconnected by beams 17, where only one beam 17 is shown in the figure, the other one in the perspective view being hidden by the platform 12. The beams 17 serve as part of other elements of the lifting system, thereby making the lifting system 'self-supporting', steady and rigid and hereby not necessary to require to be connected to any parts of the building, where the lifting system is installed. The beams 17 may however be omitted, and the linear actuators secured to the flooring (not shown) in one way or another.

[0036] Each step 2,3 may be installed with a first detection means (not shown) along an underside of the step for detection of any objects obstructing the steps from being lowered. One or more user terminals (not shown) may be placed at one or more places such as at the proximate end 6A of the stairway, on a proximate end 12A of the platform 12 at the distant end 6B of the stairway or at a distant end 12B of the platform 12. The

detection means and the one or more user terminals may be connected to the lifting means and any energy source necessary for activating the lifting means through a control box (not shown) for controlling the lifting system. The control box will control the lowering and raising of the platform 12 and the steps 2,3 of stairway according to the user input and the detected signals by the detection means.

[0037] When activating the lifting means 4, all steps 2,3 of the first and second type will, due to the connections between the steps, the banisters 7, the balusters 5 and the lifting means 4, remain horizontal, but the vertical level of height of the upper surfaces of the steps 2,3 above the flooring level will change. As an example, the stairway may form a normal stairway and the platform 12 together with step 2 of the first type may be in a HIGH, raised level of height above the flooring as shown in FIG. 1. A user is sitting in a wheelchair on a LOW, flooring level of height. The user inputs on the user input means a signal signalling that the user wishes to be lifted from the LOW level to the HIGH level. If no objects are detected by the detection means at the underside of the steps 2,3 of the first type and the second type, the platform will be lowered until the steps form a flat surface and the ramp 9 connects the top surface of the steps with the LOW level surface of the flooring. The wheelchair user may enter the steps now forming a crossing from the flooring (not shown) to the platform 12, and the wheelchair user may move on until the user is positioned on the platform 12. When the user is positioned on the platform 12, the user may activate the lifting means and be lifted to the HIGH level.

[0038] FIG.2 shows another embodiment according to the invention. In this embodiment of the invention two steps 2 of the first type is shown, and three steps 3 of the second type is provided. In this embodiment of the invention, the lifting means consists of four electrically energised linear actuators placed in each corner of the stairway. The steps 3 are vertically displaceable in relation to the fixed steps 2 and hereby vertically displaceable in relation to the lifting means 4. The lifting means may in one or both ends of the stairway be connected to the baluster, by baluster brackets 22 as shown in FIG. 1. In this embodiment of the invention, the sidepieces 18 are hinged to the lifting means 4 in both ends of the sidepieces 18 by means of a third swivel joint 11. The banisters 7 are connected to the balusters 5 and the balusters 5 are connected to the steps 3 as described in the description of FIG. 1.

[0039] According to the embodiment of the invention as shown in FIG. 2, the lifting means may be activated so as to form a platform by all the five steps 2,3 of the stairway shown. The user may then move onto the platform formed by the steps and activate the lifting means in both ends and hereby be lifted to another level. As an example, the stairway may form a normal stairway and the step 2 of the first type may be in a HIGH, raised level of height above the flooring as shown in FIG. 2. A user

is sitting in a wheelchair on a LOW, flooring level of height. The user inputs on the user input means a signal signalling that the user wishes to be lifted from the LOW level to the HIGH level. If no objects are detected by the detection means at the underside of the steps 2,3 of the first type and the second type, the platform will be lowered until the steps form a flat surface at the LOW level surface of the flooring. The wheelchair user may enter the steps now forming a platform. When the user is positioned on the steps, when the steps are in the LOW level position, the user may activate the lifting means and be lifted to the HIGH level.

[0040] The steps may be installed with a second detecting means (not shown) for detection of any objects present on the steps. This is especially needed, when the steps form a platform and a user input is given that request the platform to transform into a stairway. This must not be possible, when an object such as a wheelchair with a walking-impaired person or a non-impaired person is present on the platform. The lifting means may in one end of the system be provided with wheels or the like so as to enable the movement of the lifting means along the flooring when the mutual distance between the actuators at the proximate end of the sidepieces 18 during raising or lowering of the stairway alters.

[0041] In an embodiment according to FIG. 2, the embodiment may be equipped with a ramp as described with reference to FIG. 1. Thus, when the sidepieces 18 lowers and a proximate end 18A of the sidepieces 18 displaces laterally, the sidepieces 18 will force a bar 16 (see FIG. 1) downwards and hereby a ramp may be lifted to form a surface extending from the surface of the flooring to an upper level of the second type of step 3 at the proximate end of the stairway. This feature of the invention is further described in Fig. 4 and FIG. 5.

[0042] FIG. 3A-3D show the lifting system as shown in FIG.1, when the steps of the stairway is forming a flat surface and the ramp forms a surface connecting the surface of the steps and the surface of the flooring.

[0043] FIG. 4A-4B show the proximate end of the sidepiece 6 having a wheel 10 or the like attached. In particular is shown the ramp 9 attached to the sidepiece 6 at a joint 19. The ramp 9 is provided with an element 21 capable of pivoting around a hinge 20. The element 21 also includes the bar 16 already shown and described on FIG.1. In FIG. 4, the step 3 of the second type is in a position different from its lowermost position. When the step 3 of the second type and the sidepiece 6 lower towards the flooring, the sidepiece 6 activates the bar 16, and the element 21 will pivot clockwise around the hinge 20. When the sidepiece 6 continues to lower, the pivoting will continue until the one edge of the ramp being closest to the step 4 of the second type is in a vertical level flush with the step 3 of the second type. A supporting beam 23 extending transversely and being connected to the bar 16 is provided so that when the ramp 9 is in its lifted position, the supporting beam 23 is also in a lifted position and is supporting the ramp

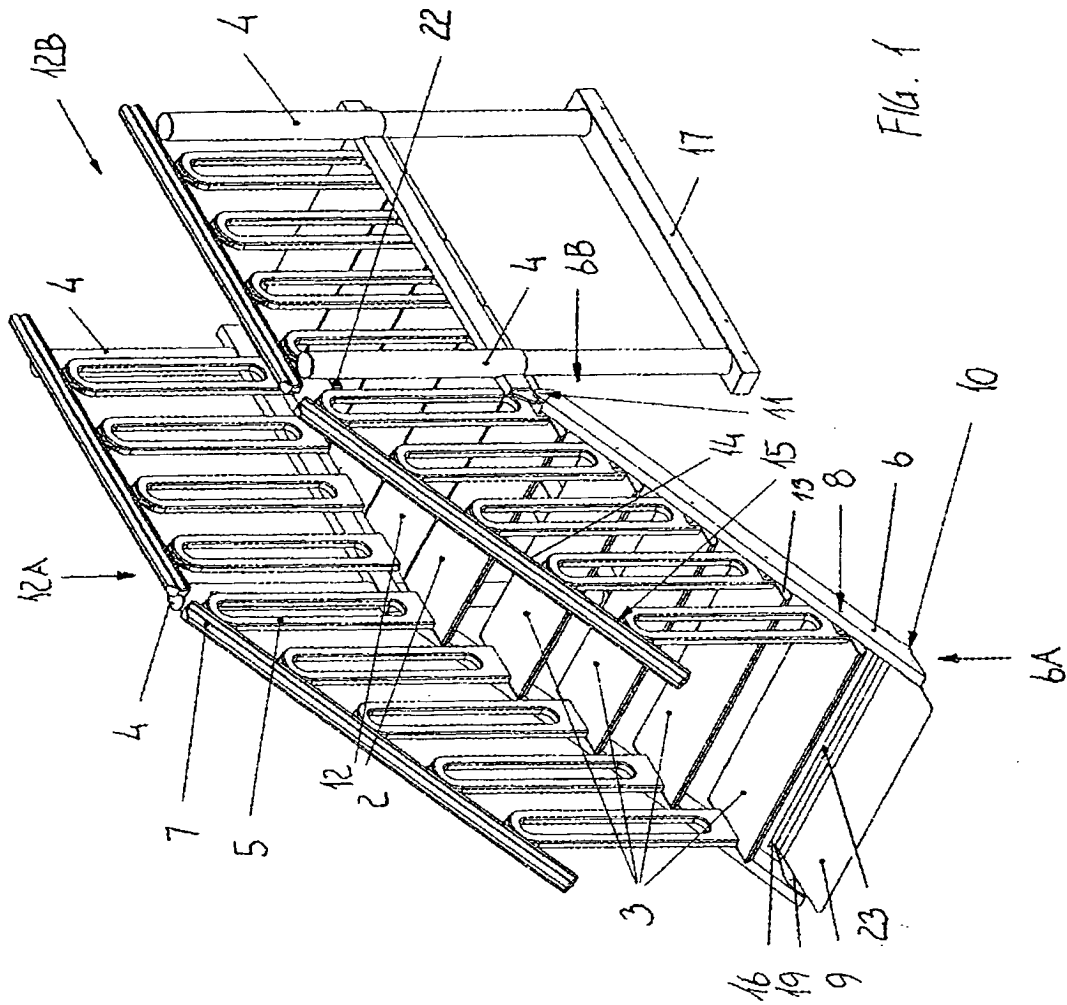
9 along the entire transverse extension. Thereby, the load on the joints 19 and the hinges 20 is reduced, and even heavy loads may pass the ramp 9 without the risk of the joints 19 and the hinges 20 being over-loaded and perhaps being damaged.

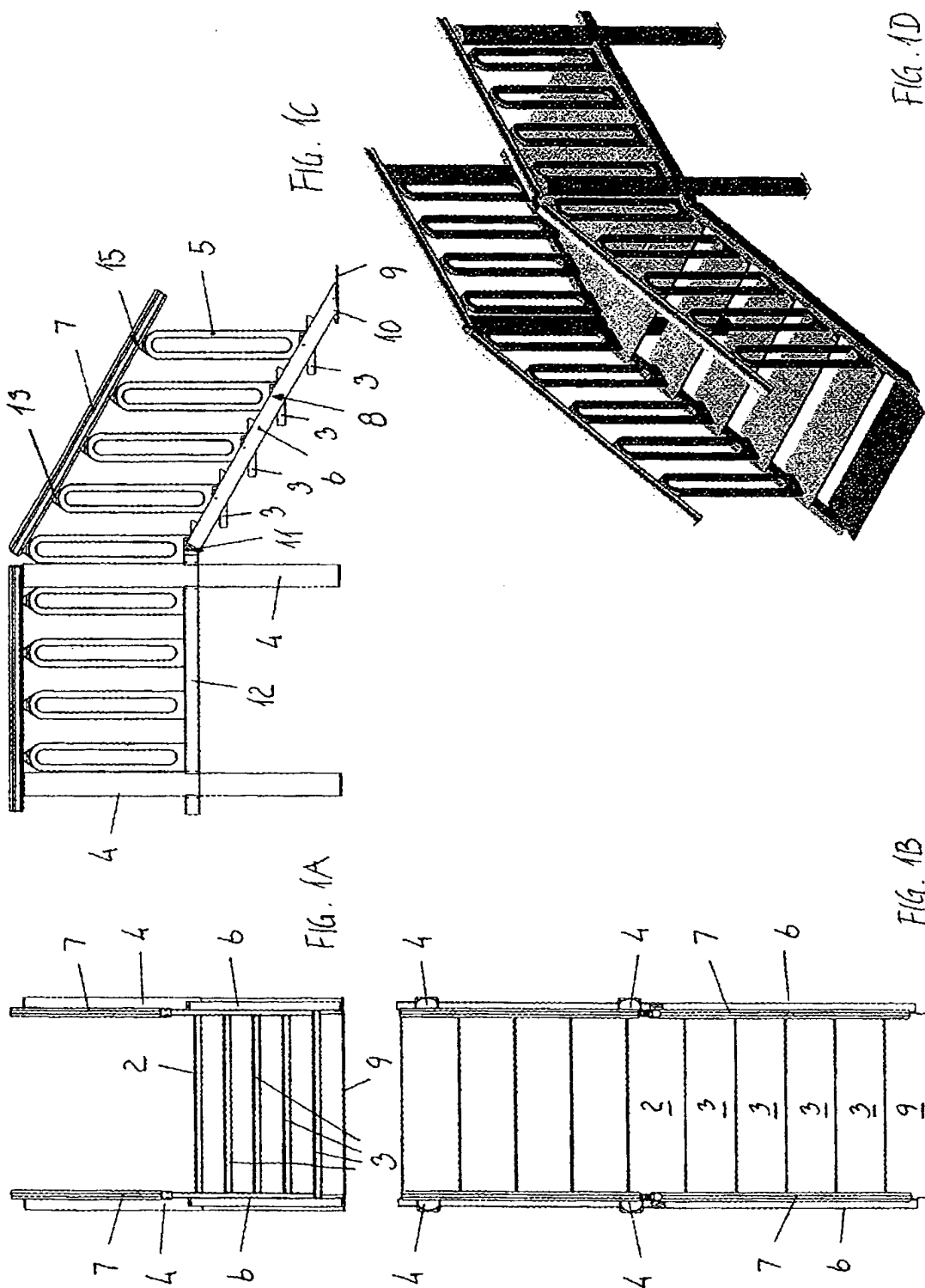
[0044] FIG. 5A-5B show the one end of the sidepiece 6 as shown in FIG. 4, but in FIG.5 the step 3 is in a lowermost position in relation to the flooring (not shown). The one edge of the ramp being closest to the step 4 of the second type is in a vertical level flush with the step 3. The surface 23 of the element 21 is provided for supporting the ramp 9 along at least a part of the ramp when the step 3 is in a lowermost position to the flooring (not shown).

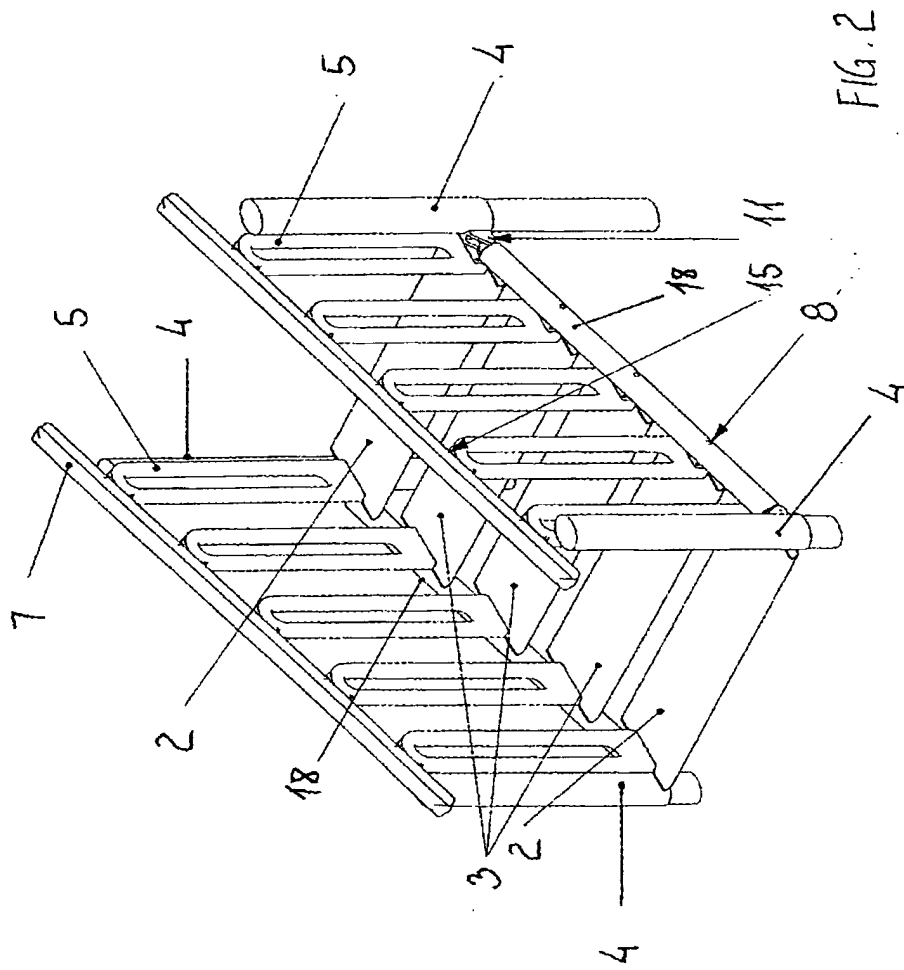
Claims

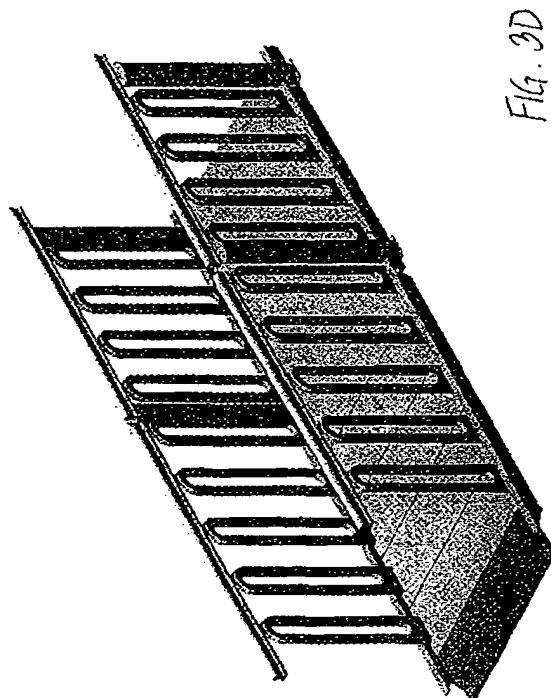
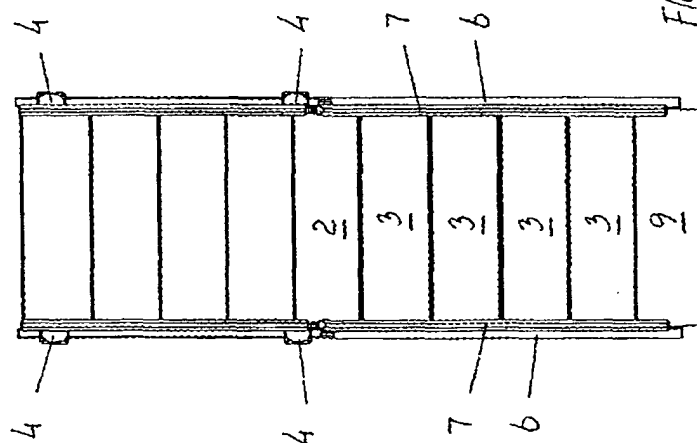
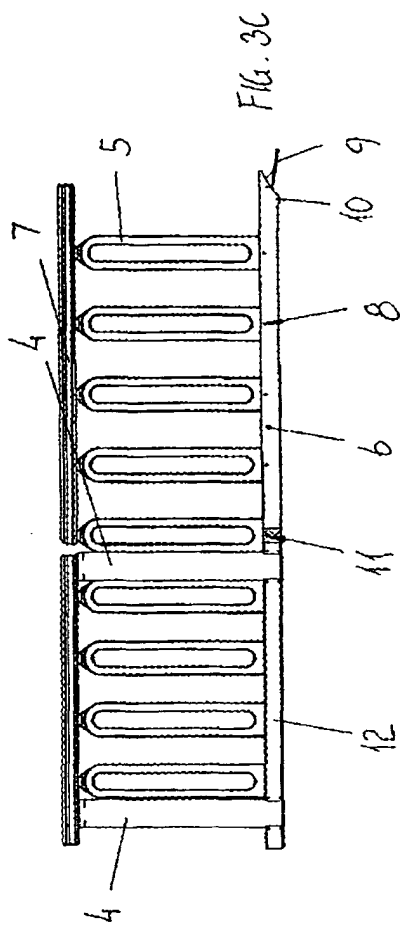
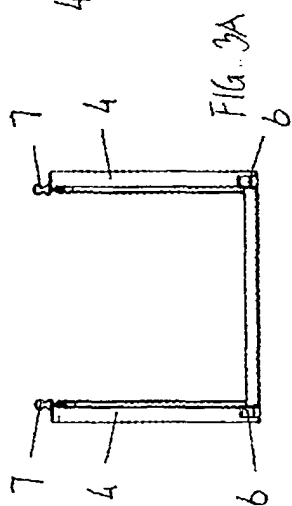
1. A lifting system for a stairway for providing a self-supporting lifting system, the lifting system comprising
 - at least one step of a first type (2) and at least one step of a second type (3), said first type of steps (2) and second type of steps (3) being provided displaceable in relation to each other,
 - an upper section of at least one baluster (5) being attached to a banister (7), said banister (7) extending from a proximate end (6A) of the stairway to a distant end (6B) of the stairway,
 - said at least one second type of step (3) and said at least one baluster (5) being pivotally joined at first swivel joints (8) to two sidepieces (6) of the stairway in the proximity of the lower end of said baluster (5), said at least two sidepieces (6) extending from the proximate end (6A) of the stairway to the distant end (6B) of the stairway, and
 - said at least one baluster (5) being pivotally joined to the banister (7) at second swivel joints (15) in the proximity of the upper end of said at least one baluster (5), and
 - each of said two sidepieces (6) being pivotally hinged to said lifting means (4) at third swivel joints (11) in the proximity of distant ends (6B) of said two sidepieces (6), and
 - wherein the at least one step of the first type (2) is fixed to at least one lifting means (4) for raising and lowering the at least one first type of step (2) and the at least one second type of step (3), and the at least one step of the second type (3) is fixed to a lower end of at least one substantially vertically extending baluster (5), and activating said lifting means (4) provides a raising or a lowering of said at least one first type of step and hereby a raising or lowering of said at least one second type of step.

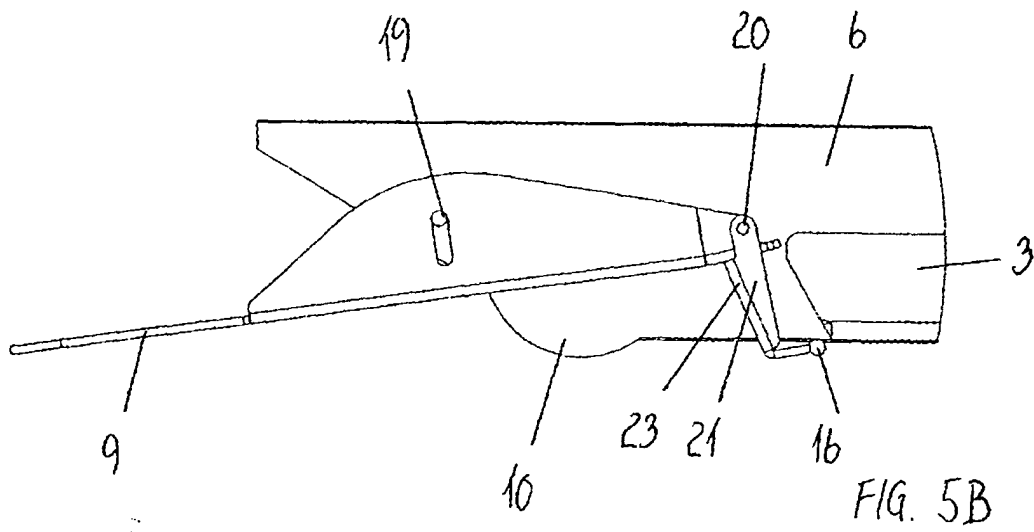
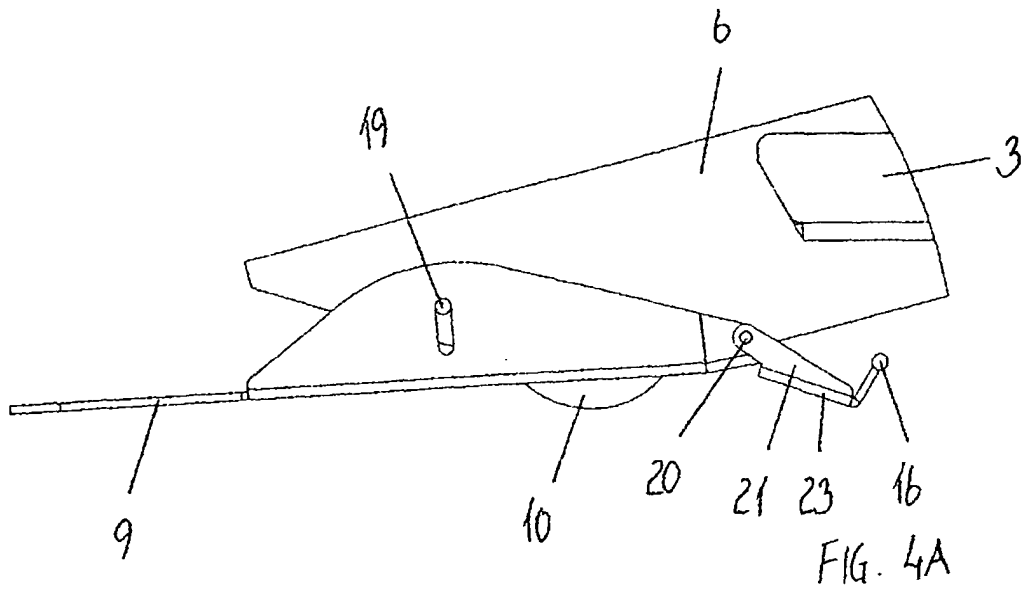
2. A lifting system according to claim 1, wherein one of the first type of steps (2) is attached to a platform (12) or is forming a platform, said platform being intended for being raised or lowered by the lifting means (4) by the attachment of the first type of step (2) to the lifting means (4), and said lifting means (4) being adapted for providing a force on said first type of step (2), which is substantially in the direction of gravity, and said sidepieces (6) in a proximate end being provided with means (10) for allowing a lateral displacement of the sidepieces (6). 5
3. A lifting system according to claim 1, wherein one of the first type of step (2) is provided in each end of the sidepieces (18) and the lifting means (4) is hinged to the sidepieces in both ends, and at least one of the second type of steps (3) is further provided along the sidepieces so as to provide a platform formed by the steps, when said lifting means in both ends of the sidepieces is raised or lowered to a level being equal in both of said ends. 10 15 20
4. A lifting system according to any of the preceding claims, wherein a first step of the second type of step (3) is provided with a ramp (9) for enabling a walking-impaired person and/or an aid for a walking-impaired person to enter or exit the first step, when said first step is in a lowermost position. 25
5. A lifting system according to any of the preceding claims, wherein the steps (2,3) are rigidly attached to the lower end of the balusters (5) by a first attachment means (13), said first attachment means (13) also being provided with means for attaching said first attachment means (13) to the first swivel joints (8) of the sidepieces (6), said first attachment means (13) thus interconnecting the steps (3) with the sidepieces by means of the first swivel joints (8). 30 35
6. A lifting system according to any of the preceding claims, wherein the upper end of the baluster (5) is being pivotally attached to the banister (7) by rigidly attaching the upper end of the baluster to a second attachment means (14), said second attachment means (14) also being provided with means for forming the second swivel joint (15) with the banister (7), said second attachment means (14) thus interconnecting the baluster (5) with the banister (7) by means of the second swivel joints (15). 40 45 50
7. A lifting system according to any of the preceding claims, wherein at least one of the first type of steps (2) or second type of steps (3) comprises a first detection means at an underside of the step for detection of any objects obstructing the steps (2,3) from being lowered. 55
8. A lifting system according to any of the preceding claims, wherein at least one of the first type of steps (2) or second type of steps (3) comprises a second detection means for detection of any objects present on the step(s).
9. A lifting system according to claim 7, said lifting system further comprising a control means being provided for receiving an input by a user and being connected to the lifting means (4) and to the first detection means, said control means being capable of activating the lifting means (4) according to user input and at the same time controlling the lifting means (4) to be lowered only when clear signals are received from the first detection means.
10. A lifting system according to claim 8, said lifting system further comprising a control means being provided for receiving an input by a user and being connected to the lifting means (4) and to the first and second detection means, said control means being capable of activating the lifting means (4) according to user input and at the same time controlling the lifting means (4) to be lowered only when clear signals are received from the first and second detection means.

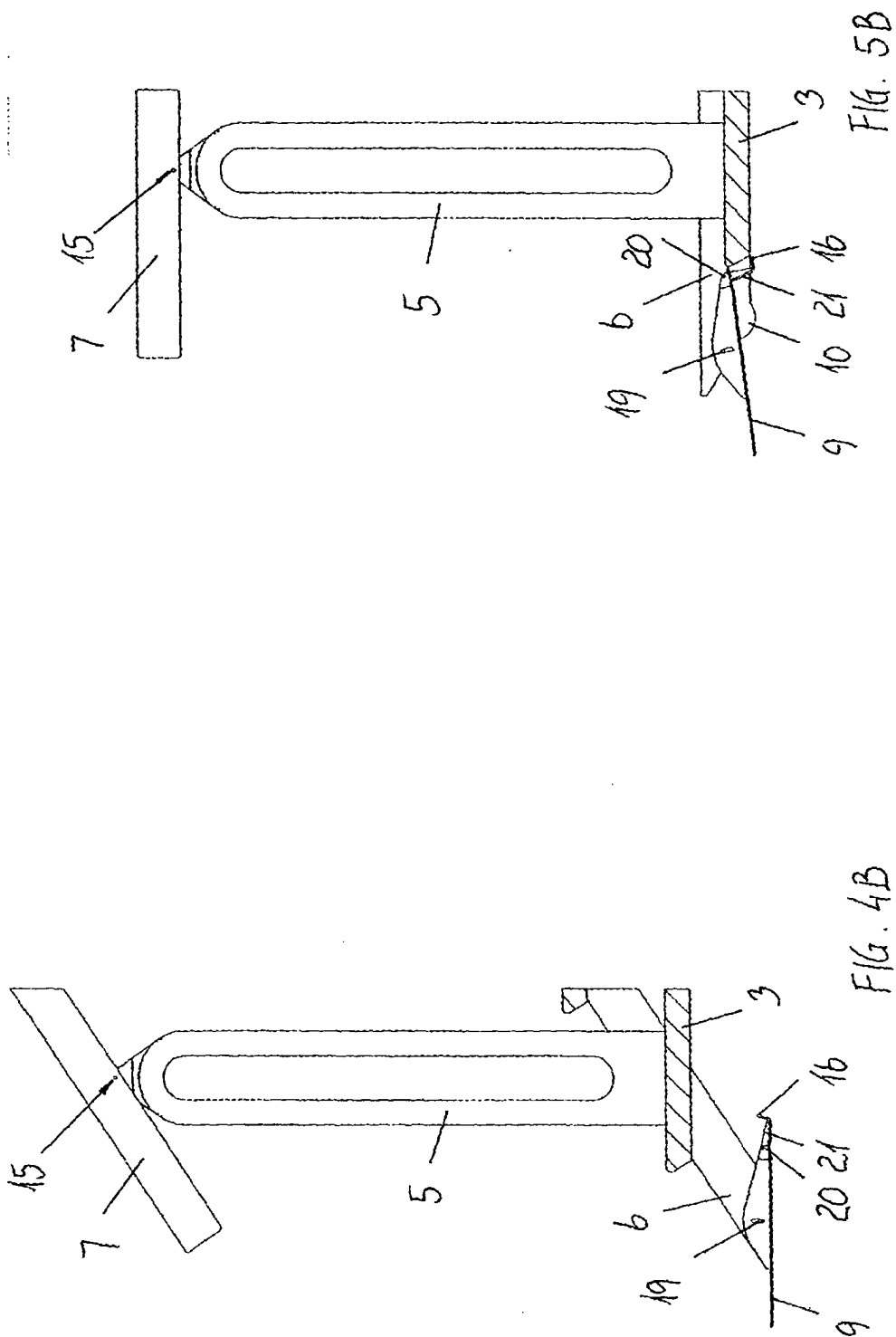














European Patent
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