



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
04.01.2017 Bulletin 2017/01

(51) Int Cl.:
E06C 7/08 (2006.01)

(21) Application number: **15174463.8**

(22) Date of filing: **30.06.2015**

(84) Designated Contracting States:
**AL AT BE BG CH CY CZ DE DK EE ES FI FR GB
GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO
PL PT RO RS SE SI SK SM TR**
Designated Extension States:
BA ME
Designated Validation States:
MA

(71) Applicant: **Hultafors Group AB**
517 21 Bollebygd (SE)

(72) Inventor: **ANDERSSON, Göran**
504 57 BORÅS (SE)

(74) Representative: **Awapatent AB**
P.O. Box 11394
404 28 Göteborg (SE)

(54) **A LADDER**

(57) The invention relates to ladder (1) comprising two side members (2) and steps (3) arranged between said two side members (2), said two side members (2) each comprises a front surface (4), which faces a user when climbing the ladder, and at least one of said steps (3) comprises a stepping portion (5) and a leg supporting portion (6), wherein said leg supporting portion (6) is at least partly overlapping one of said front surfaces (4) of at least one of said side members (2) with an overlapping portion (7), said ladder (1) further comprises

- at least one spacer (8) arranged between said overlapping portion (7) of said leg supporting portion (6) and said front surface (4) in order to create a space (9) between said front surface (4) and said overlapping portion (7), and
- a side step protection (10) comprising a leg support covering portion (11) and at least one holding portion (12), wherein said leg support covering portion (11) being at least partly arranged around said overlapping portion (7) of said leg supporting portion (6) and said at least one holding portion (12) being arranged in said space (9).

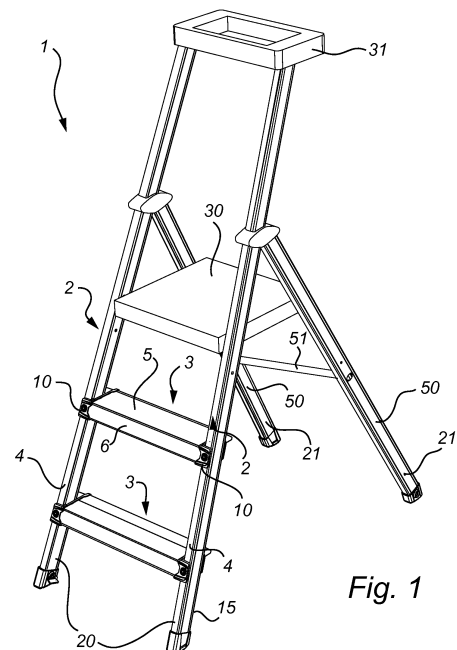


Fig. 1

Description

Field of the Invention

[0001] The present invention relates to a ladder comprising two side members and steps arranged between said two side members.

Technical Background

[0002] A ladder is usually provided with at least with two side members with rungs or steps connected there between. The user stands on the rungs, but may also use a rung or a step, which is positioned above the step or rung the user is standing on too support himself by resting a leg thereon. The ends of the rungs if they protrude over the side members may be provided with a plastic or rubber cap in order to cover sharp edges of the rungs. The cap prevents a user from hurting himself on the rungs, and they may also protect the surroundings from being unnecessary scratched when, for example, carrying the ladder around. The caps are usually arranged on the ends of the rungs, and the cap is arranged and pressed between the rung and one of the side members, since the rungs are attached to the side member in the longitudinal direction of the rung.

[0003] EP1052366 discloses a stepladder or ladder comprising an end cap for fastening a step and adapted in particular to be fastened on uprights for step surface uprights of the stepladder or ladder

[0004] Since these caps are pressed between the rung and a side member by the rung/side member connection, for example a screw, the connection may overtime get loose, if for the material of the cap breaks or relaxes.

[0005] Hence, there is a need for a ladder having a cap which does not influence the connection between the step and the side member.

Summary of the Invention

[0006] The object of the present invention is to provide a ladder that overcomes the above issues.

[0007] The invention is based on the insight that by providing a space between a leg supporting portion of the step and the side members a side step protection can be arranged to the ladder without being pressed between the two parts, in order to protect the user from portions of the step which protrudes over the side members.

[0008] The invention relates to a ladder comprising two side members and steps arranged between said two side members, said two side members each comprises a front surface, which faces a user when climbing the ladder, and at least one of said steps comprises a stepping portion and a leg supporting portion, wherein said leg supporting portion is at least partly overlapping one of said front surfaces of at least one of said side members with an over-

lapping portion, said ladder further comprises

- at least one spacer arranged between said overlapping portion of said leg supporting portion and said front surface in order to create a space between said front surface and said overlapping portion, and
- a side step protection comprising a leg support covering portion and at least one holding portion, wherein said leg support covering portion being at least partly arranged around said overlapping portion of said leg supporting portion and said at least one holding portion being arranged in said space.

By having a side step protection, which is arranged at least partly around the overlapping portion, the user may be protected from hurting herself/himself on the sharp edges of overlapping portion of the leg supporting portion. The overlapping portion may be used to attach the step to one of the side member in an easy way. The leg support covering portion and said holding portion can be used to hold the side step protection on the leg supporting portion, in an easy way before they together are mounted to the side member. The spacer creates a distance to said front portion, such that the holding portion can be arranged in the space between said front surface and said overlapping portion.

[0009] According to at least one exemplary embodiment said leg supporting portion comprises an essentially flat outer surface, which faces the user when climbing the ladder, which flat outer surface extends partially along said side members. The leg supporting portion preferably has a width which is 10 ± 2 cm, more preferably 4 ± 2 cm. The larger the width of the leg supporting portion is the more comfortable the leg supporting portion may be for the user, since the user may support his leg on the leg supporting portion, when standing on a step arranged below, during use.

[0010] According to at least one exemplary embodiment said spacer is a protrusion protruding from said overlapping of said leg supporting portion. By having the spacer being a protrusion it can be made in the same manufacturing step as the leg supporting portion. The protrusion may extend over the whole length of the leg supporting portion or only in the area of the overlapping portion of the leg supporting portion.

[0011] According to at least one exemplary embodiment the distance of the space between said front surface and said overlapping portion is larger than the thickness of said holding portion, which is being arranged in said space. This way, the holding portion is not pressed between the front surface and the overlapping portion. If the side step protection is made of plastic and the material is being pressed, the material relaxes over time due to the relaxation behaviour of the material. Relaxation being the phenomena that a strain on a body held constant, results in the stresses acting on the same body decreasing with time.

[0012] According to at least one exemplary embodi-

ment said at least one holding portion is a tongue protruding from said leg support covering portion.

[0013] According to at least one exemplary embodiment said side step protection is made of plastic or rubber.

[0014] According to at least one exemplary embodiment said side step protection further comprises a step covering portion, which surrounds at least a part of said stepping portion. By having a step covering portion the end of the stepping portion may be covered. A possible gap between the stepping portion and the side member may be prevented by the step covering portion.

[0015] According to at least one exemplary embodiment said at least one step, which comprises a stepping portion and a leg supporting portion, further comprises a rear portion with at least one overlapping portion, which at least partly overlaps a rear surface of said side member, said rear surface being essentially opposite arranged to said front surface. By having a rear portion, the step itself gets be more stable. The rear portion may be arranged in an angle to the stepping portion opposite the leg supporting portion. The overlapping portion may connect the rear portion to the side member, in order to secure the step further to the side members.

[0016] According to at least one exemplary embodiment said ladder further comprises at least a second spacer arranged between said overlapping portion of said rear portion and said rear surface in order to create a space between said rear surface and said overlapping portion, and said side step protection further comprises a rear covering portion and at least one second holding portion, wherein said rear covering portion being at least partly arranged around said overlapping portion of said rear portion and said at least one second holding portion being arranged in said space between said rear surface and said overlapping portion. By having a rear covering portion, which is arranged at least partly around the overlapping portion, the user may be protected from hurting herself/himself on the sharp edges of overlapping portion of the rear covering portion. The overlapping portion may be used to attach the step to one of the side member in an easy way. The rear covering portion and said holding portion can be used to hold the side step protection on the step, in an easy way before they together are mounted to the side member. The spacer creates a distance to said rear portion of the side member, such that the holding portion can be arranged in the space between said rear surface and said overlapping portion. The spacer may be a protrusion protruding from said overlapping portion of said rear portion. The protrusion may extend over the whole length of the rear portion or only in the area of the overlapping portion of the rear portion.

[0017] According to at least one exemplary embodiment said ladder further comprises at least one fastening element, which connects said overlapping portion of said leg supporting portion with said side member. The overlapping portions of the leg supporting portion can be used in order to fasten the step on the side members. This is

a more simple way to connect the step to the side members than connecting the step to the side members through the side member in the longitudinal direction of the step as disclosed in prior art.

[0018] According to at least one exemplary embodiment said ladder further comprises at least one fastening element, which connects said overlapping portion of said rear portion with said side member. This way the step is further secured to the side member in an easy way.

[0019] According to at least one exemplary embodiment said fastening element is a screw which is screwed into said side member. The screw may be a self-drilling or self-tapping screw, for example a FDS screw from EJOT. Alternatively, the side members may comprise a hole or holes, threaded or without a thread into which a screw may be fixed.

[0020] According to at least one exemplary embodiment wherein said fastening element is a rivet.

[0021] According to at least one exemplary embodiment said side step protection comprises at least one opening, which at least partly surrounds said at least one fastening element, such that said side step protection is out of contact with said fastening element. The opening prevents the side step protection to be in contact with the fastening element. If the side step protection is out of contact with the fastening element it cannot be pressed between the fastening element and the leg supporting portion.

[0022] If the side step protection is made of plastic and the material is being pressed, the material relaxes over time due to the relaxation behaviour of the material. Relaxation being the phenomena that a strain on a body held constant, results in the stresses acting on the same body decreasing with time. The connection between the step and the side member would loosen after a time. The same applies if the side step protection would be made of rubber.

[0023] According to at least one exemplary embodiment the distance of the space between said rear surface of said side member and said overlapping portion of said rear portion is larger than the thickness of said second holding portion, which is being arranged in said space. This way, the holding portions are not pressed between the rear surface and the overlapping portion. If the side step protection is made of plastic and the material is being pressed, the material relaxes over time due to the relaxation behaviour of the material. Relaxation being the phenomena that a strain on a body held constant, results in the stresses acting on the same body decreasing with time.

[0024] According to at least one exemplary embodiment said second holding portion of said rear portion covering portion is a tongue protruding from said rear covering portion.

[0025] The function of the second spacer is the same as for the first spacer, i.e. to provide a space between said rear surface and said overlapping portion, into which a second holding portion may be arranged.

[0026] According to at least one exemplary embodiment wherein said two side members are a side member pair and said ladder further comprises a second side member pair, said first and second side member pairs are articulated arranged to each other.

[0027] According to at least one exemplary embodiment said ladder is in particular a folding ladder, a step-ladder or a stand-alone ladder.

[0028] Generally, all terms used in the claims are to be interpreted according to their ordinary meaning in the technical field, unless explicitly defined otherwise herein. All references to "a/an/the [element, device, component, means, step, etc]" are to be interpreted openly as referring to at least one instance of said element, device, component, means, step, etc., unless explicitly stated otherwise.

[0029] Other objectives, features and advantages of the present invention will appear from the following detailed disclosure, as well as from the drawings.

Brief Description of the Drawings

[0030] The above, as well as additional objects, features and advantages of the present invention, will be better understood through the following illustrative and non-limiting detailed description of exemplary embodiments of the present invention, with reference to the appended drawings, where the same reference numerals will be used for similar elements, wherein:

Fig. 1 shows a ladder comprising side step protections in perspective and according to an embodiment of the invention, said ladder comprises a first and a second side member pair.

Fig. 2 shows an exploded view of the first side member pair in Fig. 1.

Fig. 3 shows a part of the first side member pair in Fig. 2 from behind and in perspective with the side step protection arranged on the step.

Fig. 4 shows a part of the first side member pair in Fig. 2 from the front and in perspective seen from a direction towards the step, with the side step protection arranged on the step.

Fig. 5 shows a part of the first side member pair in Fig. 2 from the side with the step arranged on one of the side members and with the side step protection exploded from the rest.

Fig. 6 shows a part of the first side member pair in Fig. 2 from the front and in perspective seen from a direction towards the side member and with the side step protection in a second view.

[0031] All the figures are highly schematic, not necessarily to scale, and they show only parts which are necessary in order to elucidate the invention, other parts being omitted or merely suggested.

Detailed Description of Exemplary Embodiments

[0032] An embodiment of the invention will be described in more detail in the following with reference to the accompanying drawings.

[0033] Fig. 1 shows a folding ladder 1 comprising two side member pairs 20, 21, which are pivotably connected to each other. This can be made in different ways, which are known for the person skilled in the art. The ladder 1 further comprises a pivotable step platform 30 to stand on, and a handle 31 for the user to hold on or to rest his body on when standing on the step platform 30. The second side member pair 21 comprises two rear side members 50, which are supported by a support member 51. The first side member pair 20 comprises two front side members 2, which will be referred to as side members 2, and two steps 3 arranged between said two side members 2. On each side of each step is a side step protection 10 arranged, which surrounds the edges of the step in order to prevent the user from hurting himself on the edge. The two side members 2 each comprises a front surface 4, which faces a user when climbing the ladder. Each two side member 2 also comprises a back surface 15, which faces away from the user when climbing the ladder. The front surface 4 and the back surface 15 are arranged opposite each other. The two side members 2 are exemplified as elongated rectangular shaped tubes. The two side members 2 may however have a U-shaped, rounded or any other suitable shape.

[0034] Figs. 2 - 6 shows a portion of the first side member pair 20 in Fig. 1 from different directions and with different parts removed from the other parts in order to see how the ladder is designed and assembled, hence Figs. 1-6 will be described together. Each step 3 comprises a stepping portion 5, a leg supporting portion 6 and a rear portion 14. The steps 3 may be made by a metal plate bent and cut out to the desired shape, or several pieces connected together or it may be extruded. The stepping portion 5 is the part of the step which the user will place his foot on when climbing the ladder. The stepping portion 5 is exemplified as being a flat surface, may however have a curved shape or any other suitable shape which accomplish a surface for the user to stand on. The stepping portion 5 extends between the two side members 2 and it has a width, which is larger than the distance between the front surface 4 and the back surface 15 of the side members, i.e. it extends beyond the side member 2, away from the user when climbing the ladder. This is in order to get a larger stepping surface for the user. The width of the stepping portion is not limited to be wider than the side member 2, it may be shorter or essentially the same. The stepping portion 5 is preferably arranged to the side members 2 such that it is essentially parallel with the surface the ladder 1 is adapted to stand on during use, for example a floor.

[0035] The leg supporting portion 6 extends along the stepping portion 5 and it comprises two side portions, i.e. two overlapping portions 7, on each side (see Fig. 2,

where the side step protections 10 and the side members 2 are removed from the step 3). The overlapping portions 7 overlap the front surface 4 of the side members 2. The surface of the leg supporting portion 6, which is facing the front surface 4 of the side members 2 are provided with protrusions 8. The protrusions extend along the longitudinal direction of the leg supporting portion 6. Alternatively, the protrusions may only be in the area of the overlapping portion 7, which also is a connecting portion 7. The protrusions 8 are spacers 8, which create a space 9 between the front surface 4 and the overlapping portion 7 (see Fig. 5). Alternatively, a separate spacer or several separate spacers (not shown) may be arranged between the front surface 4 and the overlapping portion 7.

[0036] The leg supporting portion 6 is essentially flat and it extends from the stepping portion 5 at an angle, such that the leg supporting portion 6 extends parallel with the front surface 4 of the side members 2. The leg supporting portion 6 preferably has a width D3, which preferably is 10+/-2, more preferably 4+/-2cm. The larger the width of the leg supporting portion 6 is the more comfortable the leg supporting portion is for the user, since the user may support his leg on the leg supporting portion 6, when standing on a step arranged below.

[0037] The rear portion 14 is facing away from the user when climbing the ladder. The rear portion 14 extends along the stepping portion 3 and it comprises two overlapping portion 16 on each side of the step (see Fig. 2, where the side step protections 10 and the side members 2 are exploded from the step 3). The overlapping portion 16 of the rear portion 14 overlaps the rear surface 15 of the side members 2.

[0038] The surface of the rear portion 14, which is facing the rear surface 15 of the side members 2 are provided with protrusions 26, which extends along the extension of the rear portion 14. Alternatively, the protrusions 26 may only be in the area of the overlapping portions 16 of the rear portion 14. The protrusions 26 are spacers 26 which create a space 17 between the rear surface 15 and the overlapping portion 16 of the rear portion 14 (see Fig. 5). Alternatively, a separate spacer (not shown) may be arranged between the rear surface 15 and the overlapping portion 16 of the rear portion 14. The step 3 is secured to the side members 2 by fasteners 27a, 27b. The fasteners 27a, 27b are here exemplified as screws, may however be any other suitable fastener, such as rivets, clips etc. Each screw 27a, 27b may be a self-drilling or self-tapping screw, for example a FDS screw from EJOT. Alternatively, the side members 2 may comprise a threaded hole into which the screw can engage (not shown). The leg supporting portion 6 comprises an opening 22 in each overlapping portion 7 (see Fig. 2), through which the screw 27a is inserted before it threadedly engages with the side member 2. If a self-drilling screw or self-tapping screw is used, the screw can make the hole instead of having an opening 22 in the overlapping portion 7. The screw 27a, 27b is here exemplified as a self-drilling screw comprising a screw

head 28a, 28b. The rear portion 14 is also connected to the side members 2 in the same way, however with two screws 27b.

[0039] The side step protection 10 comprises a leg support covering portion 11, a step covering portion 13 and a rear covering portion 18. The side step protection 10 is made of a plastic. Alternatively, it may be made of rubber.

[0040] The leg support covering portion 11 comprises a front portion 30, which covers the area of the overlapping portion 7, which faces the user when climbing the ladder. A side portion 31 is arranged to the front portion 30 and from the side portion 31 two holding portions 12 protrude. The holding portions 12 are tongues. The holding portions 12 overlap the front portion 30 at a distance, which allows the leg supporting portion 6 to be arranged between the front portion 30 and the holding portions 12. The distance may be such that the overlapping portion 7 of the leg supporting portion 6 is pressed between the front portion 30 and the holding portions 12. The thickness D2 (see Fig. 6) of the holding portions 12, i.e. the tongues are thinner than the distance D1 (see Fig. 5) between the overlapping portion 7 and the front surface 4 of the side member 2. When the step and the side step protection 10 are arranged on the side member 2 the holding portions 12 are arranged in the area where no protrusions, i.e. spacers are arranged. The holding portions 12 are also so arranged that they are out of contact with the fastener 27a. The front portion 30 of the leg support covering portion 11 further comprises an opening 32. The screw head 28a is placed within the opening 32, so that the screw head 28a abuts the leg supporting portion 6 and presses the protrusions 8 against the front portion 4 of the side member 2, without being in contact with the side step protection 10. Hence, the leg support covering portion 11 is arranged on the leg supporting portion 6, without being pressed between the screw head and the side member 2.

[0041] The step covering portion 13 is connected to the leg support covering portion 11 and follows the outer contour of the end of the stepping portion 5. That is, it covers the outer edge of the end of the stepping portion 5. The step covering portion 13 also comprises tongues 38 (see Fig. 6), which overlaps the step covering portion 13. The stepping portion 5 is arranged between the step covering portion 13 and the tongues 38. Opposite arranged to the leg support covering portion 11 and connected to the step covering portion 13 is the rear covering portion 18. The leg support covering portion 11, the step covering portion 13 and the rear covering portion 18 are further connected to each other by a wall 29. The wall 29 protrudes from the step covering portion 13, which connects the leg support covering portion 11 and the rear covering portion 18. The rear covering portion 18, comprises a back portion 33, which covers the area of the overlapping portion 16 which faces away from the user when climbing the ladder. The wall 29 further connects the leg support covering portion 11 and the rear covering

portion 18 underneath the step 3. The wall 29 comprises an opening 39 in order to reduce the material, however the opening 39 is not necessary for the function. A side portion 34 is arranged to the back portion 33 of the rear covering portion 18. From the side portion 34 two holding portions 19 protrudes. The holding portions 19 are tongues. The holding portions 19 overlap the back portion 33 of the rear covering portion 18 at a distance, which allows the rear portion 14 of the step 3 to be arranged between the back portion 33 and the holding portions 19. The distance may be such that the overlapping portion 16 of the rear portion 14 is pressed between the back portion 33 and the holding portions 19 of the rear covering portion. The thickness of the holding portions D2' (see Fig. 6), i.e. the tongues, are thinner than the distance D1' (see Fig. 5) between the overlapping portion 16 and the rear surface 15 of the side member 2. When the step 3 and the side step protection 10 are arranged on the side member 2 the holding portions 19 are arranged in the area where no protrusions are arranged, i.e. where no spacers are arranged.

[0042] The holding portions 19 of the rear covering portion 18 are also so arranged that they are out of contact with the fasteners 27b which protrudes through openings 22 in the overlapping portion 16 of the rear portion 14. The back portion 33 of the rear covering portion 18 further comprises two openings 35. The screw heads 28b are placed within each opening 35, so that the screw heads 28b abuts the rear portion 14 and presses the protrusions 26 against the side members 2, without being in contact with the side step protection 10.

[0043] The ladder described above is a folding ladder. However, the invention is not limited to a folding ladder. Any other stepladder, stand-alone ladder or leaning ladder may have same design as the first side member pair 20, i.e. two side members 2 and two steps 3 arranged between said two side members 2 and side step protections as described in connection with the Figs. 1-6.

[0044] The invention has mainly been described above with reference to a few embodiments. However, as is readily appreciated by a person skilled in the art, other embodiments than the ones disclosed above are equally possible within the scope of the invention, as defined by the appended claims.

Claims

1. A ladder (1) comprising two side members (2) and steps (3) arranged between said two side members (2),
said two side members (2) each comprises a front surface (4), which faces a user when climbing the ladder, and
at least one of said steps (3) comprises a stepping portion (5) and a leg supporting portion (6), wherein said leg supporting portion (6) is at least partly overlapping one of said front surfaces (4) of at least one

of said side members (2) with an overlapping portion (7),

said ladder (1) further comprises

- 5 - at least one spacer (8) arranged between said overlapping portion (7) of said leg supporting portion (6) and said front surface (4) in order to create a space (9) between said front surface (4) and said overlapping portion (7), and
- 10 - a side step protection (10) comprising a leg support covering portion (11) and at least one holding portion (12), wherein said leg support covering portion (11) being at least partly arranged around said overlapping portion (7) of said leg supporting portion (6) and said at least one holding portion (12) being arranged in said space (9).
2. A ladder (1) according to claim 1, wherein said leg supporting portion (6) comprises an essentially flat outer surface, which faces the user when climbing the ladder, said flat outer surface extends partially along said side members (2).
- 25 3. A ladder (1) according to claim 1 or claim 2, wherein said spacer (8) is a protrusion (8) protruding from said overlapping portion (7) of said leg supporting portion (6).
- 30 4. A ladder (1) according to any one of the preceding claims, wherein the distance (D1) of said space (9) between said front surface (4) and said overlapping portion (7) is larger than the thickness (D2) of said holding portion (12), which is being arranged in said space (9).
- 35 5. A ladder (1) according to any one of the preceding claims, wherein said at least one holding portion (12) is a tongue protruding from said leg support covering portion (11).
- 40 6. A ladder (1) according to any one of the preceding claims, wherein said side step protection (10) is made of plastic.
- 45 7. A ladder (1) according to any one of the preceding claims, wherein said side step protection (10) further comprises a step covering portion (13), which surrounds at least a part of said stepping portion (5).
- 50 8. A ladder (1) according to any one of the preceding claims, wherein said at least one step (3) which comprises a stepping portion (5) and a leg supporting portion (6), further comprises a rear portion (14) with at least one overlapping portion (16) which at least partly overlaps an rear surface (15) of said side member (2), said rear surface (15) being essentially opposite arranged to said front surface (4).
- 55

9. A ladder (1) according to claim 8, wherein said ladder (1) further comprises
- at least a second spacer (26) arranged between said overlapping portion (16) of said rear portion (14) and said rear surface (15) in order to create a space (17) between said rear surface (15) and said overlapping portion (16), and
 - said side step protection (10) further comprises a rear covering portion (18) and at least one second holding portion (19), wherein said rear covering portion (18) being at least partly arranged around said overlapping portion (16) of said rear portion (14) and said at least one second holding portion (19) being arranged in said space (17) between said rear surface (15) and said overlapping portion (16).
10. A ladder (1) according to any one of the preceding claims, wherein said ladder (1) further comprises at least one fastening element (27a), which connects said overlapping portion (7) of said leg supporting portion (6) with said side member (2)
11. A ladder (1) according to any one of the preceding claims in combination with claim 8, said ladder (1) comprises at least one fastening element (27b), which connects said overlapping portion (16) of said rear portion (14) with said side member (2).
12. A ladder (1) according to claim 11 and/or claim 10, wherein said fastening element (27a, 27b) is a screw which is screwed into said side member (2).
13. A ladder (1) according to any one of the claims 10-12, wherein said side step protection (10) comprises at least one opening (32), which at least partly surrounds said at least one fastening elements (27a, 27b), such that said side step protection (10) is out of contact with said fastening element (27a).
14. A ladder (1) according to any one of the preceding claims, wherein said two side members (2) are a side member pair (20) and said ladder further comprises a second side member pair (21), said first and second side member pairs (20, 21) are articulated arranged to each other.
15. A ladder (1) according to any one of the preceding claims, wherein said ladder is in particular a folding ladder, a stepladder or a leaning ladder.

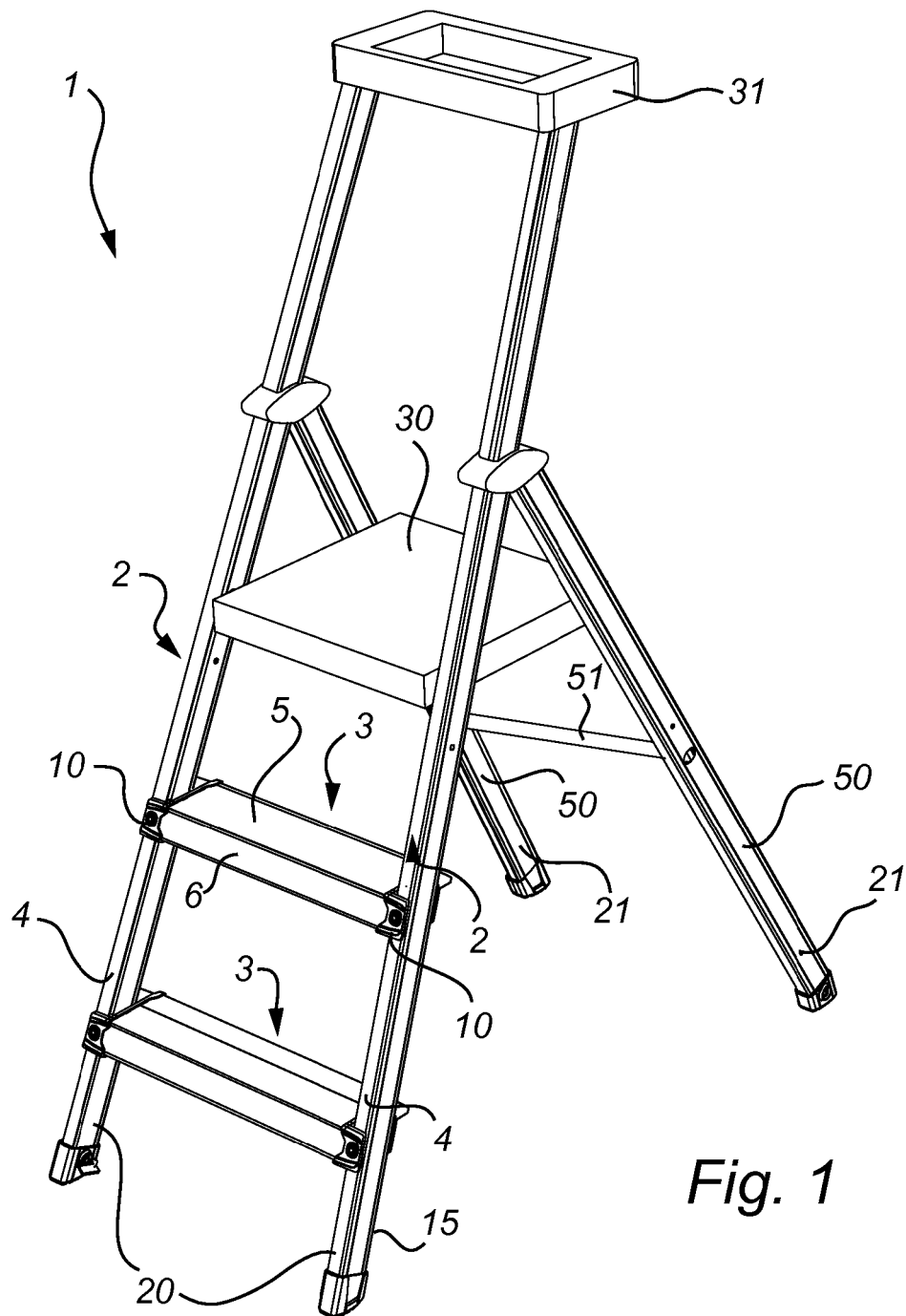


Fig. 1

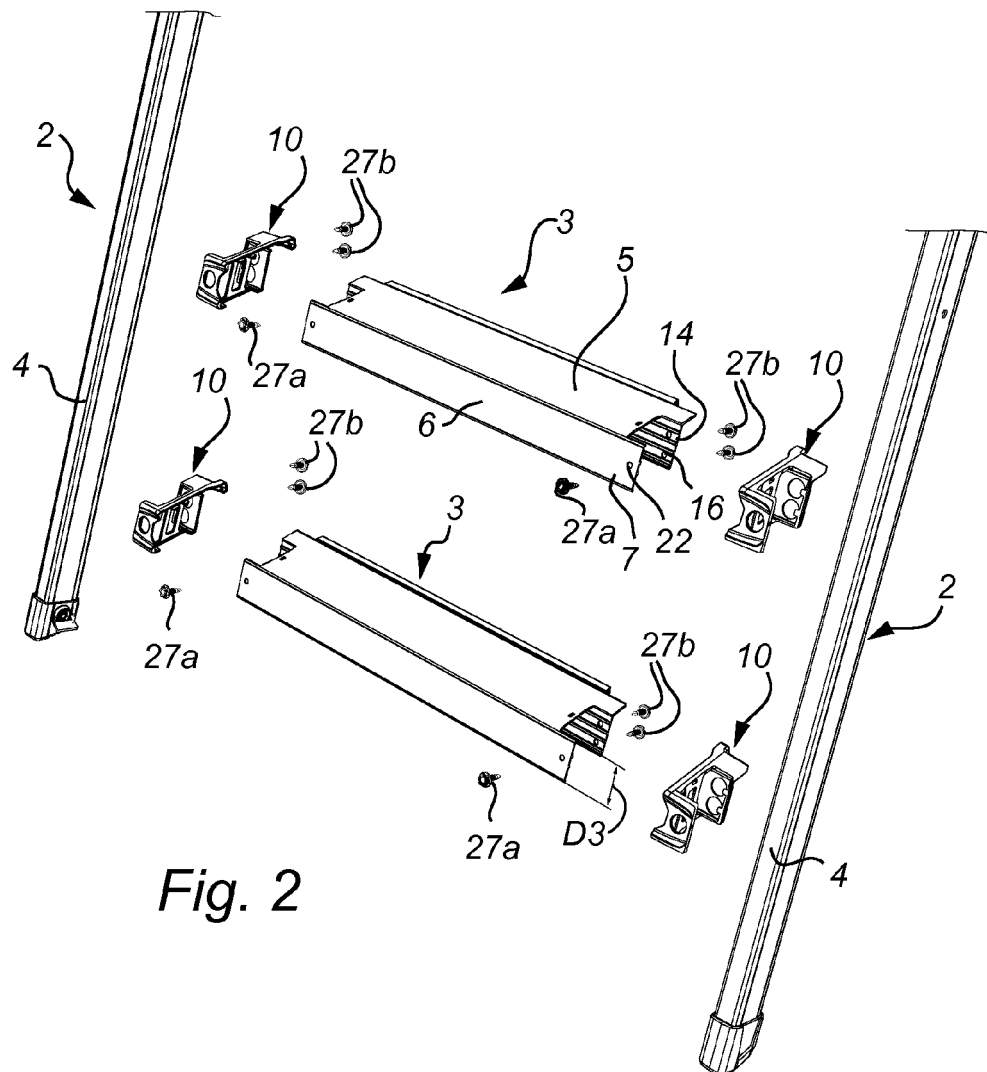
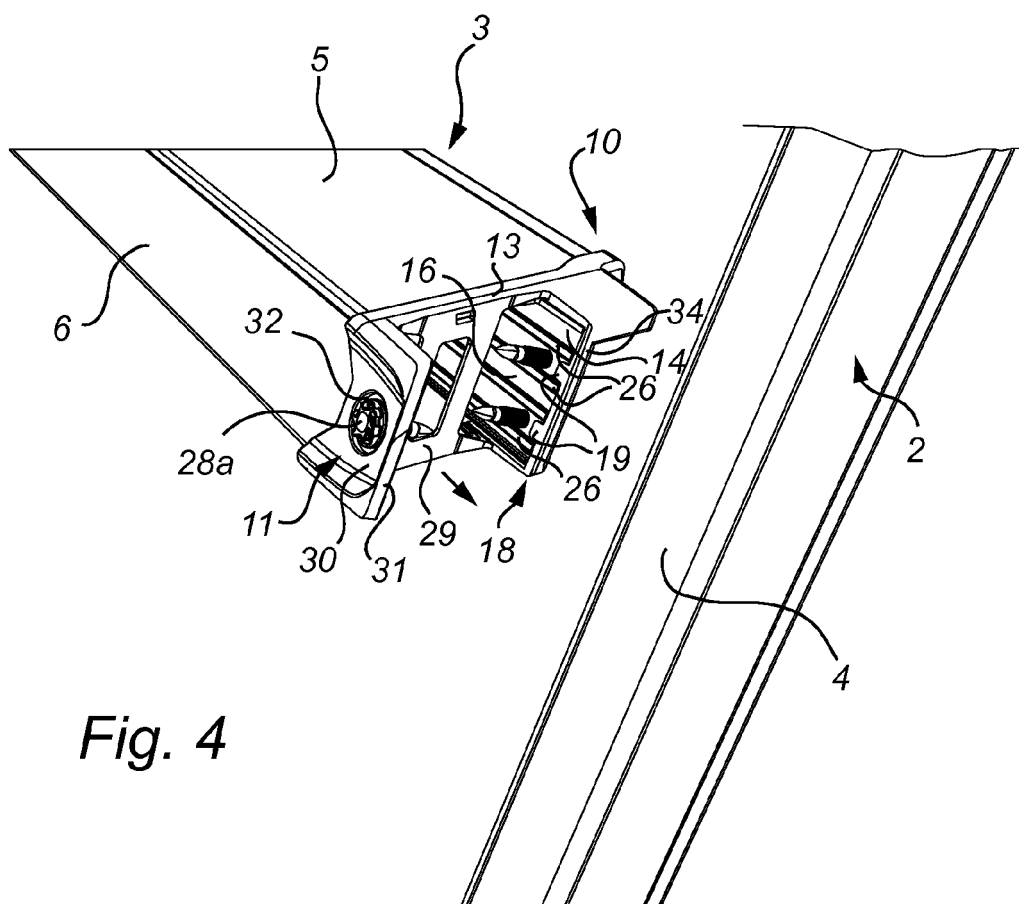
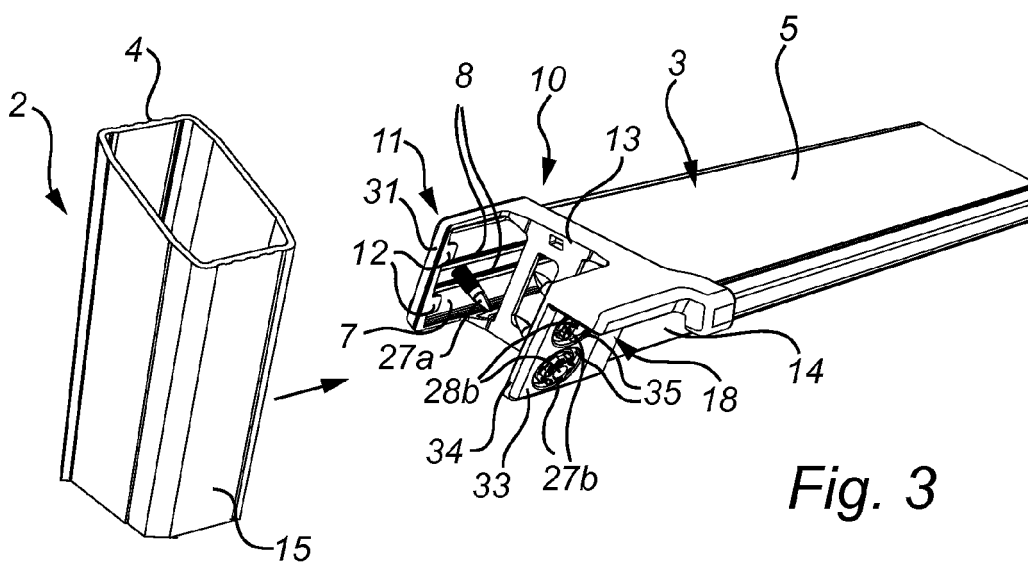
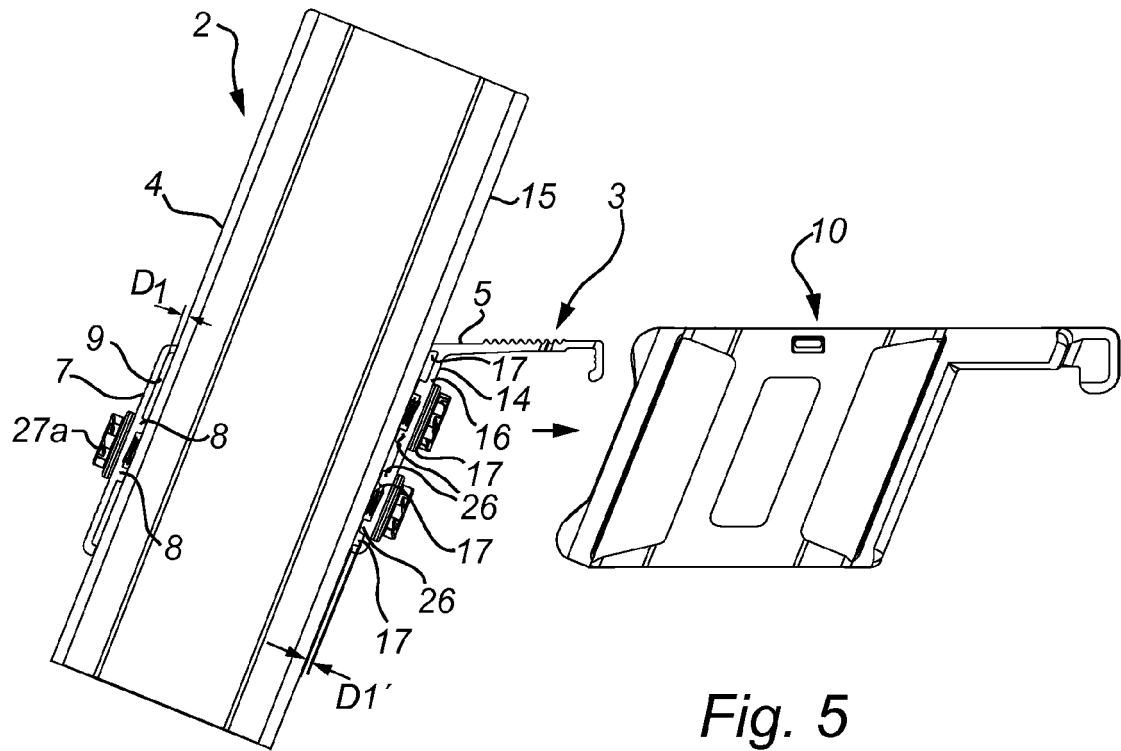
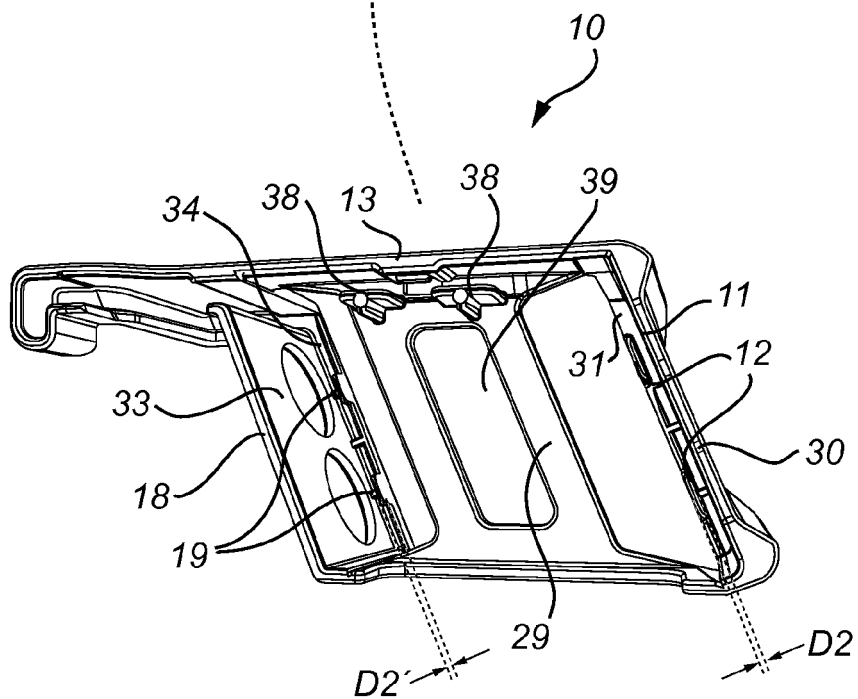
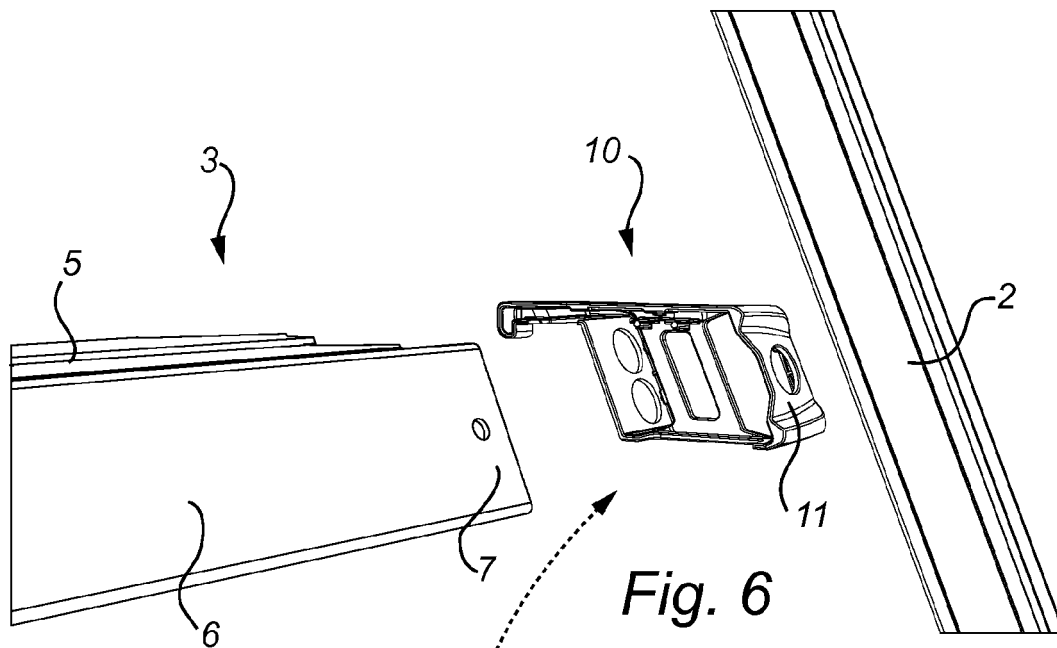


Fig. 2









EUROPEAN SEARCH REPORT

 Application Number
 EP 15 17 4463

5

10

15

20

25

30

35

40

45

50

55

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 4 193 477 A (BROYLES WAYNE R [US]) 18 March 1980 (1980-03-18) * figures 1,2,6,7 * * column 2, line 11 - line 13 * * column 2, line 59 - line 60 *	1-12,14,15	INV. E06C7/08
X	US 3 077 241 A (KLAGES JOHN W) 12 February 1963 (1963-02-12) * figures 1,2,3 * * column 1, line 21 *	1-4,6-13,15	
X	DE 298 09 972 U1 (ABART NIKOLAUS ANJA [IT]) 1 October 1998 (1998-10-01) * figures 1,2,3 *	1-5,7,10,12,15	
X	DE 94 03 820 U1 (MUELLER HANS [DE]) 5 May 1994 (1994-05-05) * figures 1,4 *	1-4,10,12,15	
			TECHNICAL FIELDS SEARCHED (IPC)
			E06C
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 2 October 2015	Examiner Petrinja, Etjel
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

 1
 EPO FORM 1503 03/82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 15 17 4463

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

02-10-2015

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 4193477 A	18-03-1980	CA 1113055 A1 US 4193477 A	24-11-1981 18-03-1980
US 3077241 A	12-02-1963	NONE	
DE 29809972 U1	01-10-1998	DE 29809972 U1 DE 29820038 U1	01-10-1998 01-04-1999
DE 9403820 U1	05-05-1994	NONE	

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- EP 1052366 A [0003]