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Octrooihouder(s):  
**Lampe Holding B.V. te Luchthaven Schiphol.**

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Uitvinder(s):  
**Caspar Bernard Lampe te Luchthaven  
Schiphol.**

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Gemachtigde:  
**ir. H.V. Mertens c.s. te Rijswijk.**

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**A telescopic ladder assembly.**

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The invention relates to a telescopically extendable and collapsible ladder assembly having at a top ladder section, a bottom ladder section, and one or more intermediate ladder sections. According to the invention, the top rung of the bottom ladder section is provided with a centrally arranged grip element that forms a housing for manually operable release actuators provided at the bottom side of the rung. The manually operable release actuators are each movable, parallel to the front wall and the back wall of the grip element and along the bottom wall of the rung, between a rest position and an actuated position, to allow for manually operating the latch mechanisms and unlocking the stile members of the adjacent higher ladder section by pushing the manually operable release actuators towards each other and into the grip element.

## A TELESCOPIC LADDER ASSEMBLY

5           The present invention relates to a telescopically extendable and collapsible ladder assembly having a top ladder section, a bottom ladder section, and one or more intermediate ladder sections. The top ladder section and each of the one or more intermediate ladder sections have two tubular stile members arranged parallel to each other and interconnected at a top end by a ladder rung to form a U-shaped ladder section. The  
10 bottom ladder section has two tubular stile members arranged parallel to each other and interconnected by a top ladder rung and a bottom ladder rung.

The ladder rungs are made from an aluminium tubular profile, for example an extruded aluminium profile, the profile including a top wall, a bottom wall, as well as a front and a rear  
15 wall extending between the top wall and the bottom wall.

The stile members of the top ladder section and the one or more intermediate ladder sections are telescopically inserted into the stile members of an adjacent lower ladder section, so that the one or more intermediate ladder sections and the top ladder section can  
20 be collapsed in a collapsing direction towards the bottom ladder section.

The top rung of the bottom ladder section and the rung of each of the one or more intermediate ladder sections are provided at each end with an automatic latch mechanism, said automatic latch mechanisms being adapted for automatically locking the stile members  
25 of the adjacent higher ladder section in a fully extended position of said adjacent higher ladder section.

The automatic latch mechanisms of the intermediate ladder sections are each associated with a release actuator for unlocking the stile members of an adjacent higher ladder section  
30 in order to allow for, preferably automatic, release and collapsing of the ladder assembly.

The automatic latch mechanisms of the bottom ladder section are each associated with a manually operable release actuator for unlocking of the stile members of the adjacent higher ladder section by a user in order to allow for a manually release and collapsing of the ladder  
35 assembly.

Telescopic ladder assemblies have become quite popular as portable ladders, such as a straight telescopic ladder or a step ladder, but also for stationary mounting, such as a loft ladder providing access to a loft. The tubular stile members are commonly made of extruded aluminium profiles, e.g. of circular, oval, square, or other cross-sectional shape.

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Prior art designs of telescopic ladder assemblies have already been disclosed as early as 1929 in the US patent 1712942 (Smith) and 1940 in the US patent 2194856. A more recent design is for example disclosed in WO2009057995 (Lampe).

10 US1712942 and US2194856 each disclose a telescopic ladder with the actuators in the form of pin shaped finger pieces. In US1712942 the actuators extend through a slot in the bottom wall of the rung. In US2194856 the actuators are provided in the bottom side recess of a U-shaped rung. In both designs, the finger pieces only extend a slight distance below the rungs, which impedes the ease of engaging and manipulating the finger pieces, more in  
15 particular impedes operating them with a a single hand, e.g. by thumb and index finger.

WO2009057995 discloses a telescopic ladder in which in that the actuators are arranged centrally on the front side of the rung so as to be operable simultaneously with a single hand. The front wall of the rung has an elongated recessed portion over the length thereof  
20 and the actuators are arranged in said recessed portion. Arranging the actuators in the elongated recessed portion has the advantage that the actuators are generally protected from the feet of a person on the ladder, yet can have a suitable thickness to be operated by a single hand, e.g. by thumb and index finger.

25 The present invention aims to provide an improved ladder assembly, or at least a useful alternative, that facilitates user actuation of the manually operable release actuators for the purpose of operating the latch mechanisms and preferably allows for better handling of a ladder assembly in the collapsed state.

30 According to the invention, this feature is achieved by a telescopically extendable and collapsible ladder assembly of the type described in the preamble of claim 1, which is characterized in that the top rung of the bottom ladder section is at its bottom side provided with a centrally arranged grip element, the grip element including a front wall, a back wall, as well as a bottom wall extending between a bottom end of the front wall and a bottom end of  
35 the back wall,

wherein the bottom wall of the grip element extends substantially parallel to the bottom wall of the top rung and provides a grip surface at a distance from the bottom wall of the top rung, which grip surface allows for engaging the collapsed ladder by hand using said grip surface;

5

wherein the grip element forms a housing for the manually operable release actuators of the bottom ladder section, which manually operable release actuators are accessible at lateral sides of the grip element, preferably such that the two manually operable release actuators are operable simultaneously with a single hand of the user, which manually operable release  
10 actuators extend through a slot in the bottom wall of the rung into the interior of the rung, each of said release actuators being connected to a linkage member, e.g. a linkage rod, which extends inside the rung to a latch mechanism at the outer end of the rung, and which manually operable release actuators are each movable, parallel to the front wall and the back wall of the grip element and along the bottom wall of the rung, between a rest position  
15 and an actuated position, to allow for manually operating the latch mechanisms and unlocking the stile members of the adjacent higher ladder section by pushing the manually operable release actuators towards each other and into the grip element.

Integrating the actuators in a grip element located below the rung has the advantage that  
20 the actuators are generally protected from the feet of a person mounting the ladder, yet can have freely accessible grip surface of a suitable height to be operated by a single hand, e.g. by thumb and index finger, and allow for engaging the rung at the bottom side by hand to carry the ladder when in a collapsed state without pinching the fingers and/or risk multiple fingers getting clamped between the two actuators.

25

It has furthermore been found that providing a grip element that increases the cross section of the rung is especially comfortable when engaging the rung by hand to carry the collapsed ladder assembly. To carry the ladder, rung of the ladder is typically engaged such that the bottom side of the rung rests in the hand, more in particular the inside of the fingers which is  
30 a particular delicate area of the hand. Providing a grip element according to the invention, which protrudes relative to the bottom surface of the rung, allows for supporting the ladder with the fingers of the hand while resting the grip element and/or the rung against the palm of the hand. This provides additional stability which in turn enhances the feeling of comfort with the person carrying the ladder.

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Thus, the present invention provides an improved ladder assembly, or at least a useful alternative, that facilitates user actuation of the manually operable release actuators for the

purpose of operating the latch mechanisms and allows for better handling of a ladder assembly in the collapsed state.

In an embodiment according to the invention the manually operable release actuators  
5 preferably are bar-shaped, having a longitudinal axis extending parallel to a longitudinal axis  
of the rung, and have a grip surface at an actuating end for pushing the actuator into the  
grip element, and a grip surface at their bottom side that essentially forms an extension of  
the grip surface of the grip element. Due to their bar shape, the release actuators essentially  
form an extension of the grip element.

10 Furthermore, when in their rest position, the manually operable release actuators are  
accessible at lateral sides of the housing, in an embodiment extend at opposite sides out of  
the grip element, and are to be pushed into the housing to unlock the stile members of the  
adjacent higher ladder section. One end of the bar shaped actuator is the actuating end, i.e.  
the end to be engaged by a user when pushing the actuator into the grip element. The other  
15 end of the bar shaped actuator is located inside the housing, even when the actuator is in its  
rest position. In a further embodiment, the manually operable release actuators are bar  
shaped, and have, between the actuating end and the other end, a substantially continuous  
cross section with a shape complementary to the shape of the openings in the grip element.  
Thus, when the actuator is pushed into the housing, there is no risk of elements, for  
20 example a finger, getting stuck between a part of the actuator and the grip element.

In an embodiment, the top bar shaped release actuators are located adjacent the bottom  
wall of the rung, such that when engaged by hand when the collapsed ladder assembly is  
carried, they contact the bottom wall of the rung and thus enable direct force transfer,  
25 caused by the weight of the ladder assembly, from release actuator to rung.

In a further preferred embodiment, the bottom side of the bar shaped release actuators has  
a shape similar to the shape of the bottom side of the grip element, both can for example be  
barrel shaped, to further complement the grip surface of the grip element.

30 In an embodiment, the actuating end of the manually operable release actuators, i.e. the  
end providing the grip surface to be engaged by a user when pushing the actuator into the  
grip element, has, when seen in a bottom view, a curved surface. In such an embodiment,  
the grip surface of the manually operable release actuators is curved towards the front and  
the back of the grip element, such that, when seen in bottom view, the actuating end for  
35 pushing the actuator has a semi circular or semi oval shape. Thus, there is no sharp angled  
transition between the grip surface and the front surface of the bar shaped actuator. This  
facilitates engagement with a single hand, in particular when engaging the respective

contact surfaces with thumb and index finger, and reduced peak pressures in those fingers at the transition area between contact surface and front surface of the manually operable release actuators.

- 5 The grip surfaces of the release actuators and the grip element are preferably provided with a grip enhancement in the form of, for example, a web of rib shaped protrusions, recesses, providing a flexible and/or rough surface layer, etc..

In an embodiment the grip element is mounted against the bottom wall of the top rung. In  
10 such an embodiment the top end of the front wall and the back wall of the grip element abut the bottom wall of the top rung.

In an alternative embodiment, the front wall and the back wall of the grip element overlap with the front wall and the back wall of the rung, such that the grip area provided by the grip element overlaps with the front and back of the rung. Thus there is no risk of a slid between  
15 the grip surface defined by the grip element and the bottom wall of the top rung, in which skin or fabric met get pinched when lifting the ladder assembly by hand.

In a further embodiment, the manually operable release actuators are bar shaped and have a width in a direction perpendicular to the front wall and the back wall of the grip element, and wherein the width of the bar shaped release actuator is substantially similar to the width  
20 of the rung to which the grip element is mounted.

In an embodiment, the Grip element comprises a U-shaped profile that forms the front wall, back wall, and bottom wall of the grip element. The U-shaped profile can be mounted directly onto the rung, for example using nuts and bolts, rivets, or click fingers engaging  
25 openings provided in the rung, etc. In a further embodiment, the U-shaped profile is combined with other elements, for example a base element that is to be mounted on the rung and in turn forms a mount for the U-shaped profile.

Preferably, the grip element is made out of plastic using the injection moulding technique. In an embodiment, the grip element is made out of a plastic material using the injection  
30 moulding technique, preferably the grip element is an injection moulded essentially U-shaped element, which U-shaped element comprises the front wall, the back wall and the bottom wall of the grip element. In an alternative embodiment, the grip element comprises a U-shaped profile, preferably an extruded aluminium U-shaped profile, the profile including the front and wall and the back wall and the bottom wall of the grip element. Thus a  
35 substantially U-shaped element can be provided which is to be mounted to the rung, for example by way of click fingers that engage openings in the rung, and/or screws, bolts or rivets.

The manually operable release actuators are preferably made out of plastic using the injection moulding technique. In an embodiment, the actuators are box shaped, having a bottom, four walls and an open top, and are mounted in the grip element with the open top facing the bottom wall of the rung.

5

The grip element, more in particular the front wall, the back wall and the bottom wall of the grip element, define a housing volume for receiving the manually operated actuators when pushed into their actuated position. In an embodiment, the slot or slots, through which the manually operable release actuators extend into the interior of the rung are located in the  
10 central area of the rung that is covered by the grip element and the actuators when in their actuated position. Thus, the slots are covered independent of the position of the manually operable release actuators, and therefore protected from the surrounding environment, more in particular from foreign elements from entering the slots and hampering the movement of the actuators and/or the functioning of the latch mechanisms located in the rung.

15

In an embodiment, the manually operable release actuators each have an extension for coupling the actuator with the linkage member, for example includes a snap provision adapted to snap around a rod-shaped linkage member. Preferably, the extensions and the slots are dimensioned such that, during assembly, the extensions can be inserted into the  
20 slots to be coupled with the linkage members.

In an embodiment, the latch mechanisms and/or the actuators are provided with one or more spring elements, such as helical springs, that bias the release actuators towards their rest positions. Thus, a release actuator is moved back into its extend position by the spring  
25 elements, after it has been pushed into the grip element by the user to unlock the stile members of the adjacent higher ladder section. In a further embodiment, the latch mechanisms provided in the top rung each include a spring biased locking element, for example a locking pin, which spring element also functions as the spring element that biases the release actuator into its rest position.

30

In an embodiment, the grip element extends at least 8 mm below the bottom wall of the top rung, preferably between 10 mm and 25 mm below the bottom wall of the top rung, for example 20 mm below the bottom wall of the top rung.

35 In an embodiment, the grip element, more in particular the grip surface provided by the grip element, has a length parallel to a longitudinal direction of the rung, which length is at least 40 mm, is preferably between 50 mm and 80 mm, preferably is 75 mm.

In an embodiment, the manually operable release actuators have a height of at least 6 mm, preferably have a height between 10mm and 25mm, for example have a height of 17mm.

In an embodiment, the manually operable release actuators have a width in a direction  
5 perpendicular to the front wall and the back wall of the grip element, and wherein the width of the bar shaped release actuator is at least 5 mm, preferably at least 10 mm, more preferably is between 15 mm and 40 mm, for example is 35 mm.

In an embodiment, the manually operable release actuators, at the end facing the rung,  
10 have a grip surface for engagement by a user, and wherein the distance between those grip surfaces, when the release actuators are in a rest position, is at least 80mm preferably is between 90 mm and 140mm, for example is 110mm.

In an embodiment, the manually operable release actuators, when the release actuators are  
15 each in their rest position, protrude at opposite sides of the grip element at least 5 mm from the grip, preferably at least 10 mm, more preferably between 12 and 20 millimetres, for example 17mm.

In an embodiment, all the latch mechanisms provided at each end of the rungs of the  
20 intermediate ladder sections are automatic latch mechanisms, of which the release actuators are arranged for cooperating with an actuator pin provided on the rung of an adjacent lower ladder section for automatically unlocking the automatic latch mechanism when the ladder section is moved in a collapsing direction towards the adjacent lower ladder section. In such an embodiment, only manual operation of the manual operably release actuators is need for  
25 collapsing the ladder assembly. Especially in combination with single hand use, this allows for easy handling of the ladder assembly.

In an embodiment, the rung of each intermediate ladder section is provided with one or more manually operable release actuators connected to the latch mechanisms of the rung to allow  
30 for manual unlocking of the stile members of said adjacent higher ladder section by a user in order to allow for a section-by-section manually release and collapsing of the ladder assembly. In a further embodiment, the rungs are provided with both automatic latch mechanisms of which the release actuators are arranged for cooperating with an actuator pin provided on the rung of an adjacent lower ladder section, as described above, and  
35 manually operable release actuators.



In an embodiment each ladder rung is connected at each end thereof to the stile member via a connector member, the locking pin being reciprocally supported in the connector member, e.g. with a spring between the locking pin and the connector member to bias the pin toward its locking position, and each connector member being provided with an actuator connected  
5 to the locking pin, e.g. to allow actuation thereof by a thumb of a user or to allow for actuation by contact with a lower positioned ladder section.

The invention furthermore provides a loft ladder including a ladder assembly according to the invention.

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The invention furthermore provides a stepladder having a first stepladder assembly and a second stepladders assembly hinged to one another so as to be in a storage position folded against one another and an operative position similar to an inverted V at least one of the stepladder assemblies being a ladder assembly according to the invention.

15

The invention furthermore provides a work platform including a ladder assembly according to the invention.

Advantageous embodiments of the ladder assembly according to the invention are disclosed  
20 in the subclaims and in the description, in which the invention is further illustrated and elucidated on the basis of a number of exemplary embodiments, of which some are shown in the schematic drawing.

In the drawing

25 Fig. 1 shows a frontal view of a telescopic extendable and collapsible ladder assembly according to the invention, in an extended condition;

Fig. 2 shows a perspective view in close up of a top rung of a bottom ladder section of the ladder assembly of Fig. 1;

Fig. 3 shows partial frontal view in cross section of the top rung of fig. 2;

30 Fig. 4 shows frontal view in cross section of the top rung of fig. 2; and

Fig. 5 shows a frontal view in cross section of the top rung of fig. 2 with manual operable actuators in an actuated position.

Fig. 1 shows a frontal view of a telescopically extendable and collapsible ladder assembly 1  
35 according to the invention, in an extended condition. The ladder assembly 1 comprises at a top ladder section 2, a bottom ladder section 3, and multiple intermediate ladder sections 4.

The top ladder section 2 and each of the one or more intermediate ladder sections 4 each have two tubular stile members 5 arranged parallel to each other and interconnected at a top end by a ladder rung 6 to form a U-shaped ladder section. The bottom ladder section 3 has two tubular stile members 5 arranged parallel to each other and interconnected by a top ladder rung 6' and a bottom ladder rung 6''.

The bottom ladder section 3 is the ladder sections configured for, during use of the ladder, assembly, forming the base of the extended ladder 1. Typically, the bottom end of the tubular stile members 5 of the bottom ladder section 3 are provided with plastic or rubber "feet" that provide a non slippery contact with the support surface onto which the ladder has been mounted.

In the embodiment shown, the ladder rungs 6,6',6'' are each made from an extruded aluminium tubular profile, the profile including a top wall 7, a bottom wall 8, as well as a front wall 9 and a back wall 10 extending between the top wall and the bottom wall

The stile members 5 of the top ladder section 2 and the intermediate ladder sections 4 are telescopically inserted into the stile members of an adjacent lower ladder section, so that the one or more intermediate ladder sections and the top ladder section can be collapsed in a collapsing direction towards the bottom ladder section 2.

The top rung 06' of the bottom ladder section 3 and the ladder rung 6 of each of the multiple intermediate ladder sections 4 are provided at each end with an automatic latch mechanism 11. The latch mechanisms are provided inside the ladder rungs, and are therefore not visible in Fig. 1 but is depicted in the cross sectional views of Fig. 3 and 4. The automatic latch mechanism 11 is adapted for automatically locking the stile members 5 of the adjacent higher ladder section in a fully extended position of the adjacent higher ladder section. It is observed that these types of latch mechanisms are as such known in the prior art, and therefore are not discussed in great detail herein.

The automatic latch mechanisms 11 of the multiple intermediate ladder sections 4 are each associated with a release actuator 12 for unlocking the stile members 5 of an adjacent higher ladder section in order to allow for automatic release and collapsing of the ladder assembly 1.

The automatic latch mechanisms 11 of the bottom ladder section 3 are each connected with a manually operable release actuator 13 for unlocking of the stile members 5 of the adjacent

higher ladder section, i.e. an intermediate ladder section 4, by a user in order to allow for a manually release and collapsing of the ladder assembly 1

According to the invention, the top rung 6' of the bottom ladder section 3 is at its bottom side provided with a centrally arranged grip element 14. The grip element 14 including a front wall 15, a back wall 16, as well as a bottom wall 17 extending between a bottom end of the front wall and a bottom end of the back wall of the grip element.

The bottom wall 17 of the grip element 14 extends substantially parallel to the bottom wall 8 of the top rung 6' and provides a grip surface 18 at a distance from the bottom wall 8 of the top rung 6', which grip surface 18 allows for engaging the collapsed ladder assembly 1 by hand using said grip surface. The grip element 14 furthermore forms a housing for the manually operable release actuators 13 of the bottom ladder section 3.

The manually operable release actuators 13 extend at opposite sides out of the grip element 14. The manually operable release actuators 13 are each movable, parallel to the front wall 15 and the back wall 16 of the grip element 14 and along the bottom wall 8 of the rung 6', between an rest position, shown in figs. 3 and 4, and an actuated position. At the end facing the rung, the manually operable release actuators 13 have a grip surface 20 for engagement by a user. The grip surface, at least at a central area thereof, extends substantially perpendicular to a longitudinal axis of the rung of the ladder. In the embodiment shown, the two manually operable release actuators 13 are operable simultaneously with a single hand of the user.

The manually operable release actuators 13 extend through a slot in the bottom wall 8 of the ladder rung 6' into the interior of the rung. Each of the actuators 13 is connected to a linkage member, in the embodiment shown a linkage rod 19, which extends inside the ladder rung 6' to a latch mechanism 11 at the outer end of the rung. Thus, by pushing the manually operable release actuators 13 towards each other and into the grip element 14, the latch mechanisms 11 are operated and the stile members 5 of the adjacent higher ladder section 4 are unlocked.

In the embodiment shown, the latch mechanisms 11 provided in the top rung 6' each include a spring biased locking element, in particular a locking pin 21, which is configured for locking the tubular stile members relative to each other and thus secure the ladder assembly 1 in its extended position. Since the latch mechanisms 11, more in particular the locking pin 21 of the latch mechanisms, are coupled to the manually operable actuators 13 via a linkage

member, in the embodiment shown linkage rod s19, the spring elements 22 also biases the release actuators 13 into their rest positions. Thus, a release actuator 13 is moved back into its extend position by the spring elements 22, after it has been pushed into the grip element 14 by the user to unlock the stile members 5 of the adjacent higher ladder section.

5 In an alternative embodiment, the actuators are provided with one or more spring elements, instead of or in addition to spring elements provided in the latch mechanisms, to bias the release actuators towards their respective rest positions. For example, a biased spring element can be provided in the grip element, with its opposite ends contacting the respective manually operable release actuators, to push them out of the housing into their rest  
10 positions.

The invention provides manually operable actuating means with a contact surface that extends substantially perpendicular to the movement of the actuator, which provides optimal grip. In practice, the manually operable release actuators thus function as push buttons  
15 provided at opposite ends of the grip element.

The invention furthermore allows for providing the actuators with a large contact area, which reduces the peak pressures in the fingers when pushing the actuators in their actuating direction. This is possible because the actuators are provided below the rung, instead of at  
20 the front of the rung, and are integrated in the grip element. The protruding actuators thus do not obstruct movement of a person climbing the ladder and are at the same time protected against accidental contact with the feet of a user.

In an embodiment each ladder rung is connected at each end thereof to the stile member via  
25 a connector member, the locking pin being reciprocally supported in the connector member, e.g. with a spring between the locking pin and the connector member to bias the pin toward its locking position.

The skilled person will appreciate that the body of the connector can be provided with a passage for a locking pin (which can form an extension of or be connected to the mentioned  
30 rod attached to the slide actuators) and allows to accommodate a spring for biasing said locking pin towards a locked position (commonly the stile member having an associated locking pin opening to receive said locking pin in extended state of the ladder section).

In an embodiment the one or more actuators are arranged on the front side of the rungs of  
35 the intermediate ladder sections, e.g. two actuators, each connected to a corresponding locking pin, arranged centrally on the front side of the rung so as to be operable simultaneously with a single hand.

The tubular stile members may have a circular cross-section, but other cross-sectional shapes, e.g. square, rectangular (rounded), triangular, delta shaped, oval, elliptical, etc. are also possible.

5 In the particular embodiment shown, the manually operable release actuators 13 are bar-shaped, having a longitudinal axis extending parallel to a longitudinal axis of the top rung 6, the bar shaped manually operable release actuators 13 have a grip surface 20 at an actuating end for pushing the release actuator into the grip element 14.

10 In the particular embodiment shown, the grip surface 20 of the manually operable release actuators 13 is curved towards the front and the back of the grip element 14, such that, when seen in bottom view, the actuating end for pushing the actuator has a semi circular or semi oval shape.

15 in the embodiment shown, see figs. 2 and 4, the front wall and a the back wall of the grip element overlap with the front wall and the back wall of the rung, such that the grip area provided by the grip element overlaps with the front and back of the rung.

In the embodiment shown, the manually operable release actuators 13 extend though slots 20 into the interior of the rung 6,6', which slots are located in the central area of the rung. The slots and the grip element, including the manually operable release actuators are dimensioned such that the slots are covered by the grip element and the release actuators when in their actuated position, see for example Fig. 3 and fig. 5.

25 In the exemplary embodiment shown, the manually operable release actuators 13 each have a an extension 23 for coupling the actuator with the linkage member, for example includes a snap provision adapted to snap around a rod-shaped linkage member.

9. Ladder assembly according to one or more of the preceding claims, wherein the latch 30 mechanisms and/or the actuators are provided with one or more spring elements, such as helical springs, that bias the release actuators towards their respective rest positions.

## REFERENCE SIGNS

- 01 ladder assembly
- 02 top ladder sections
- 5 03 bottom ladder section
- 04 intermediate ladder sections
- 05 tubular stile members
- 06 ladder rung
- 06' top ladder rung bottom section
- 10 06'' bottom ladder rung bottom section
- 07 top wall ladder rung
- 08 bottom wall ladder rung
- 09 front wall ladder rung
- 10 back wall ladder rung
- 15 11 latch mechanism
- 12 release actuator
- 13 manually operable release actuator
- 14 grip element
- 15 front wall grip element
- 20 16 back wall grip element
- 17 bottom wall grip element
- 18 grip surface grip element
- 19 linkage rod
- 20 grip surface manually operable release actuator
- 25 21 locking pin
- 22 spring element latch mechanism
- 23 extension

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## C O N C L U S I E S

1. Een telescopisch uitschuifbaar en inschuifbaar laddersamenstel met een bovenste laddersectie, een onderste laddersectie, en een of meer tussenliggende laddersecties,

5 waarbij de bovenste laddersectie en elk van de een of meer tussenliggende laddersecties twee buisvormige stijlelementen hebben die evenwijdig aan elkaar zijn opgesteld en onderling zijn verbonden aan een bovineinde door een laddersport om zo een U-vormige ladder sectie te vormen, en waarbij de onderste laddersectie twee buisvormige stijlelementen heeft die evenwijdig aan elkaar zijn opgesteld en onderling zijn verbonden door een bovenste laddersport en een onderste laddersport,

10

waarbij de laddersporten zijn vervaardigd uit aluminium buisprofiel, het profiel omvattende een bovenwand, een onderwand, evenals een voorwand en een achterwand die zich uitstrekken tussen de bovenwand en de onderwand,

15 waarbij de stijlelementen van de bovenste laddersectie en van de een of meer tussenliggende laddersecties telescopisch zijn opgenomen in de stijlelementen van een naburige lagere laddersectie, zodanig dat de een of meer tussenliggende laddersecties en de bovenste laddersectie in een inschuifrichting naar de onderste laddersectie toe in elkaar kunnen worden geschoven,

20

25 waarbij de bovenste sport van de onderste laddersectie en de sport van elk van de een of meer tussenliggende laddersecties aan elk einde zijn voorzien van een automatisch grendelmechanisme, waarbij het automatisch grendelmechanisme is ingericht voor het automatisch vergrendelen van de stijlelementen van de naburige hogere laddersectie in een volledig uitgeschoven positie van genoemde naburige hogere laddersectie,

30 waarbij de automatische grendelmechanismes van de tussenliggende laddersecties ieder zijn geassocieerd met een vrijgaveactuator voor het ontgrendelen van de stijlelementen van een naburige hogere laddersectie om zo een automatische vrijgave en ineenschuiven van het laddersamenstel mogelijk te maken,

waarbij de automatisch grendelmechanismes van de onderste laddersectie ieder zijn geassocieerd met een manueel bedienbare vrijgaveactuator voor het ontgrendelen van de

stijlelementen van de naburige hogere laddersectie door een gebruiker om zo een manuele vrijgave en ineenschuiven van het laddersamenstel mogelijk te maken, **met het kenmerk dat**

- 5 de bovenste sport van de onderste laddersectie aan zijn onderkant is voorzien van een centraal aangebracht gripelement, het gripelement omvattende een voorwand, een achterwand, evenals een onderwand die zich uitstrekt tussen een ondereinde van de voorwand en een ondereinde van de achterwand
  - 10 waarbij de onderwand van het gripelement zich in hoofdzaak uitstrekt parallel aan de bodemwand van de bovenste sport en voorziet in een gripoppervlak op een afstand van de onderwand van de bovenste sport, welk gripoppervlak met de hand aangrijpen van de ineengeschoven ladder met gebruik van het gripoppervlak mogelijk maakt,
  - 15 waarbij het gripelement een behuizing vormt voor de manueel bedienbare vrijgaveactuatoren van de onderste laddersectie,  
  
welke manueel bedienbare vrijgaveactuatoren toegankelijk zijn aan de laterale zijden van het grip element, bij voorkeur zodanig dat de twee manueel bedienbare vrijgaveactuatoren
  - 20 simultaan kunnen worden bediend met een enkele hand van de gebruiker,  
  
welke manueel bedienbare actuatoren zich uitstrekken naar het binnenste van de sport door een sleuf in de onderwand van de sport, elk van genoemde actuatoren zijnde verbonden met een verbindingselement, e.g. een verbindingstang, dat zich uitstrekt in het binnenste
  - 25 van de sport richting een grendelmechanisme aan het uiteinde van de sport, en  
  
welke manueel bedienbare vrijgaveactuatoren elk beweegbaar zijn, parallel aan de voorwand en de achterwand van het gripelement en langs de bodemwand van de sport, tussen een rustpositie en een bediende positie, om manuele bediening van de
  - 30 grendelmechanismes mogelijk te maken en ontgrendelen van de stijlelementen van de naburige hogere laddersectie door duwen van de manueel bedienbare vrijgaveactuatoren richting elkaar en het grip element in.
2. Laddersamenstel volgens conclusie 1, waarbij de manueel bedienbare vrijgaveactuatoren
- 35 balkvormig zijn, met een longitudinale as die zich uitstrekt parallel aan de longitudinal as van de bovenste sport, en een gripoppervlak hebben aan een actuatoreinde voor het het



gripelement induwen van de actuator, en bij voorkeur met een gripoppervlak aan hun onderkant dat in hoofdzaak een extensie vormt van het gripoppervlak van het grip element.

3. Laddersamenstel volgens conclusie 1, waarbij het gripoppervlak van de manueel  
5 bedienbare vrijgaveactuatoren gekromd is richting de voorkant en de achterkant van het gripelement, zodanig dat, wanneer gezien in onderaanzicht, het actuatoreinde voor het duwen van de actuatoren een semi-cirkelvormige of semi-ovale vorm heeft.

4. Laddersamenstel volgens een of meer van de voorgaande conclusies, waarbij de  
10 voorwand en de achterwand van het gripelement overlappen met de voorwand en de achterwand van de sport, zodanig dat het gripgebied verschaft door het gripelement overlapt met de voorkant en de achterkant van de sport.

5. Laddersamenstel volgens conclusie 4, waarbij de manueel bedienbare vrijgaveactuatoren  
15 balkvormig zijn en een breedte hebben in een richting loodrecht op de voorwand en de achterwand van het gripelement, en waarbij de breedte van de balkvormige vrijgaveactuatoren in hoofdzaak gelijk is aan de breedte van de sport waarop het gripelement is aangebracht.

20 6. Laddersamenstel volgens een of meer van de voorgaande conclusies, waarbij de connector is vervaardigd uit kunststof met toepassing van de spuitgiettechniek, bij voorkeur het gripelement een gespuitsgiet in hoofdzaak U-vormig element betreft.

7. Laddersamenstel volgens een of meer van de voorgaande conclusies, waarbij de sleuf, of  
25 sleuven, waardoor de manueel bedienbare vrijgaveactuatoren zich uitstrekken naar het binnenste van de sport zijn gelokaliseerd in het centrale gebied van de sport dat wordt afgedekt door het gripelement en de vrijgaveactuatoren wanneer in hun bediende positie.

8. Laddersamenstel volgens een of meer van de voorgaande conclusies, waarbij de  
30 manueel bedienbare vrijgaveactuatoren ieder zijn voorzien van een extensie voor het koppelen van de actuator met het verbindingselement, bij voorkeur een klikvoorziening hebben ingericht voor het klikken om een staafvormig verbindingselement.

9. Laddersamenstel volgens een of meer van de voorgaande conclusies, waarbij de  
35 grendelmechanismes en/of de actuatoren zijn voorzien van een of meer veerelementen, zoals een spiraalveer, dat/die de vrijgaveactuatoren voorspant/voorspannen richting hun respectievelijke rustposities.

10. Laddersamenstel volgens een of meer van de voorgaande conclusies, waarbij het grip element zich uitstrekt ten minste 8 mm onder de onderwand van de bovenste sport, bij voorkeur tussen de 10 en 25 mm onder de onderwand van de bovenste sport, bijvoorbeeld  
5 15 mm onder de bodemwand van de bovenste sport.

11. Laddersamenstel volgens een of meer van de voorgaande conclusies, waarbij het gripelement, meer in het bijzonder het gripoppervlak verschaft door het gripelement, een lengte heeft parallel aan de longitudinale richting van de sport, welke lengte ten minste 40  
10 mm bedraagt, bij voorkeur tussen de 50 mm en de 80 mm bedraagt, bij voorkeur 75 mm bedraagt.

12. Laddersamenstel volgens een of meer van de voorgaande conclusies, waarbij de manueel bedienbare vrijgaveactuatoren een hoogte hebben van ten minste 6 mm, bij  
15 voorkeur een hoogte hebben tussen de 10 mm en de 25 mm, bijvoorbeeld een hoogte hebben van 17 mm.

13. Laddersamenstel volgens een of meer van de voorgaande conclusies, waarbij de manueel bedienbare vrijgaveactuatoren een breedte hebben in de richting loodrecht op de  
20 voorwand en de achterwand van het gripelement, en waarbij de breedte van de balkvormige vrijgaveactuator ten minste 5 mm bedraagt, bij voorkeur ten minste 10 mm bedraagt, bij verdere voorkeur tussen de 15 mm en de 40 mm bedraagt, bijvoorbeeld 35 mm bedraagt.

14. Laddersamenstel volgens een of meer van de voorgaande conclusies, waarbij de manueel bedienbare vrijgaveactuatoren, aan het einde dat naar de sport gekeerd is, een  
25 gripoppervlak hebben voor aangrijpen door een gebruiker, en waarbij de afstand tussen de gripvlakken, wanneer de vrijgaveactuatoren zich in hun rustpositie bevinden, ten minste 80 mm bedraagt, bij voorkeur tussen de 90 mm en 140 mm bedraagt, bijvoorbeeld 110 mm bedraagt.

30

15. Laddersamenstel volgens een of meer van de voorgaande conclusies, waarbij de manueel bedienbare vrijgaveactuatoren, wanneer de vrijgaveactuatoren zich beide in hun rustpositie bevinden, uitsteken aan de laterale zijden van het grip element tot ten minste 5  
35 mm van het grip element, bij voorkeur tot ten minste 10 mm, bij verdere voorkeur tussen 12 en 20 mm, bijvoorbeeld tot 17 mm.

16. Laddersamenstel volgens een of meer van de voorgaande conclusies, waarbij al de grendelmechanismes voorzien aan iedere einde van de sporten van de tussenliggende laddersecties automatische grendelmechanismes zijn, waarvan de vrijgaveactuatoren zijn ingericht voor samenwerking met een actuatorpen voorzien op de sport van een naburige lagere laddersectie voor het automatisch ontgrendelen van het grendelmechanisme wanneer de laddersectie wordt bewogen in een ineenschuifrichting naar de naburig lagere laddersectie toe.
17. Laddersamenstel volgens een of meer van de voorgaande conclusies, waarbij de sport van iedere tussenliggende laddersectie is voorzien van een of meer manueel bedienbare vrijgaveactuatoren verbonden met de grendelmechanismes van de sport om manueel ontgrendelen van de stijlelementen van genoemde aangrenzende hogere laddersectie door een gebruiker mogelijk te maken om zo een sectie-per-sectie manuele vrijgave en ineenschuiven van het laddersamenstel mogelijk te maken.
18. Een vlieringladder omvattende een laddersamenstel volgens een of meer van de voorgaande conclusies.
19. Een trapladder met een eerste trapladdersamenstel en een tweede trapladdersamenstel zijnde scharnierend met elkaar verbonden zodanig dat ze in een opslagstand tegen elkaar gevouwen zijn en in een werkstand gelijk zijn aan een omgekeerde V, waarbij ten minste een van de trapladdersamenstellen een laddersamenstel volgens een of meer van de conclusies 1-17 betreft.
20. Een werkplatform omvattende een laddersamenstel volgens een of meer van de conclusies 1-17.

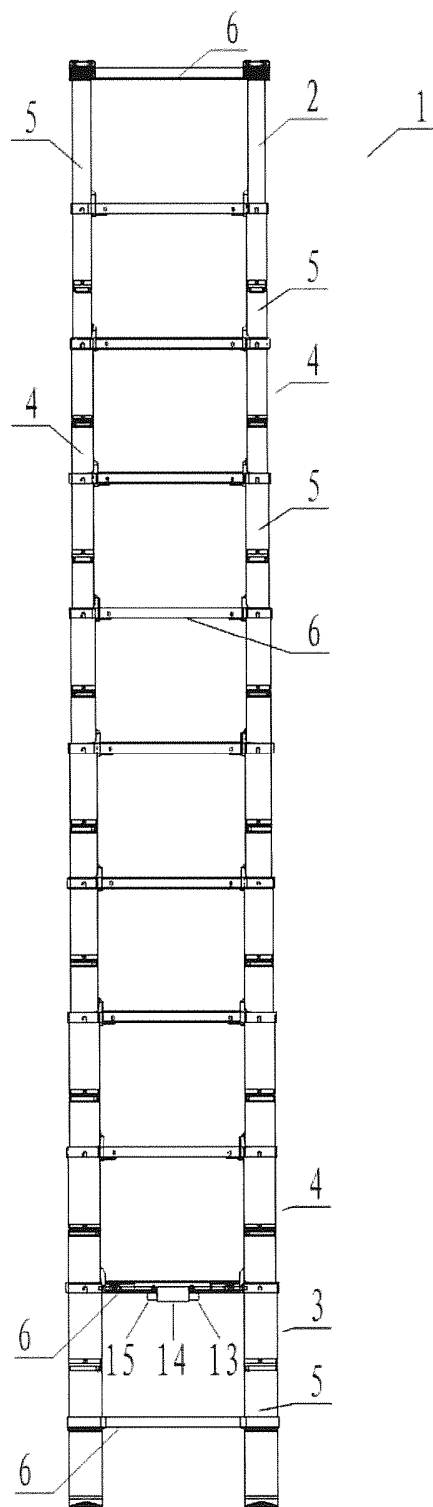


Fig. 1

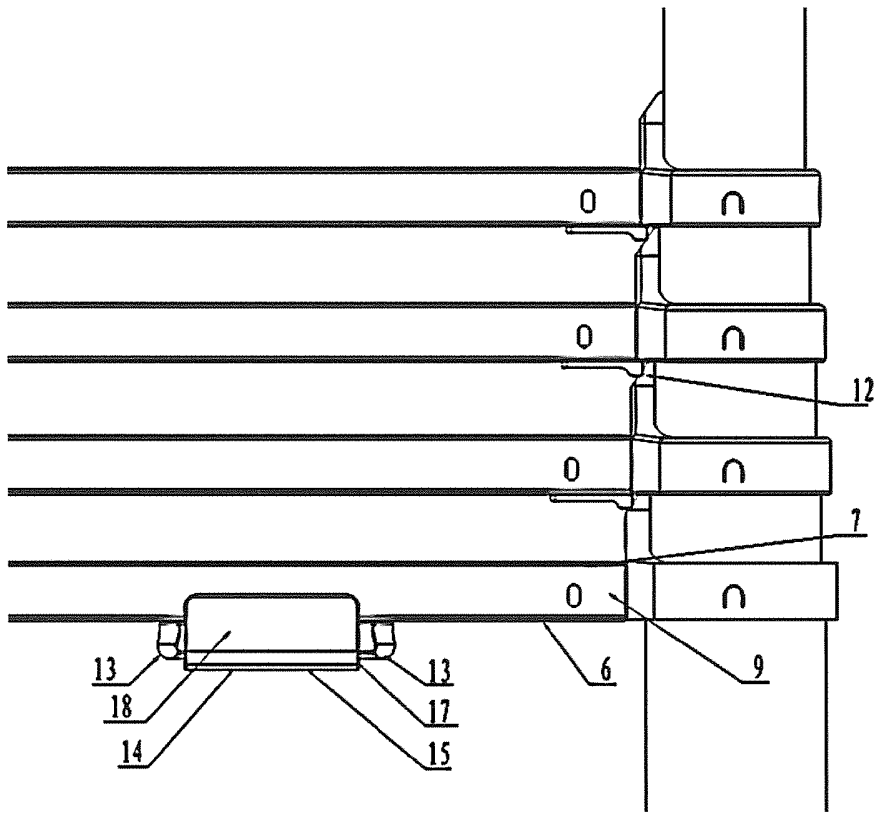


Fig. 2

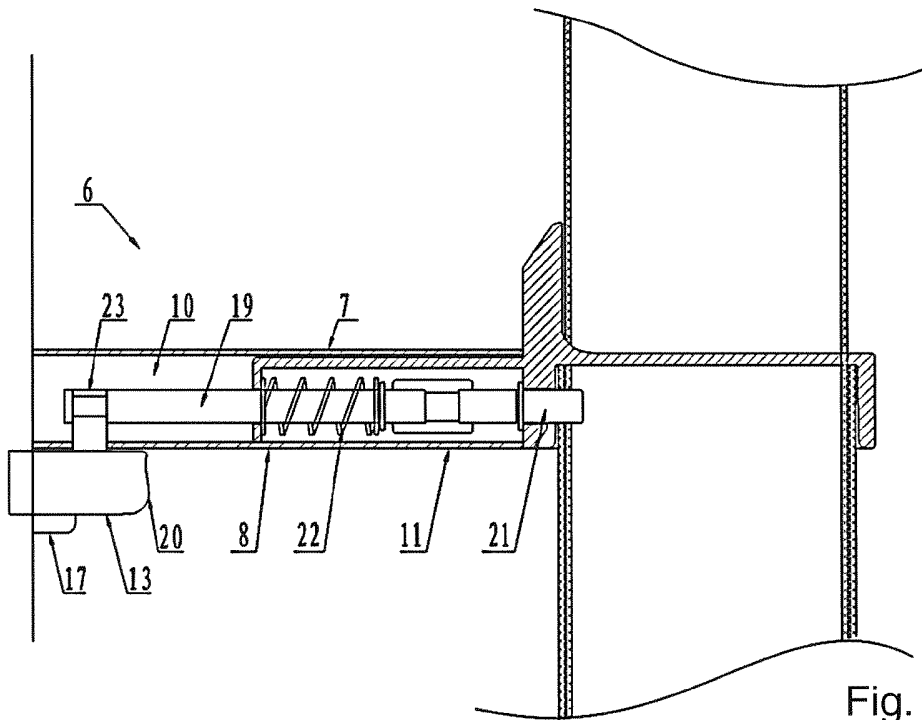


Fig. 3

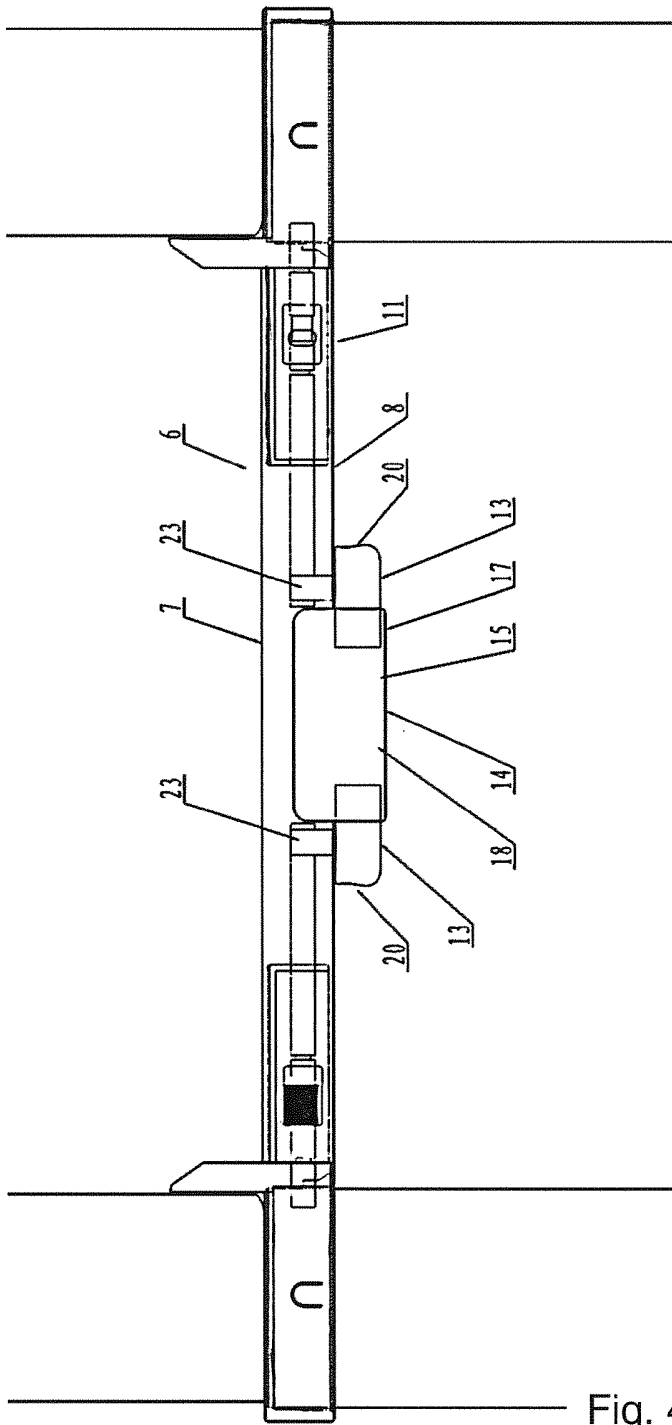


Fig. 4

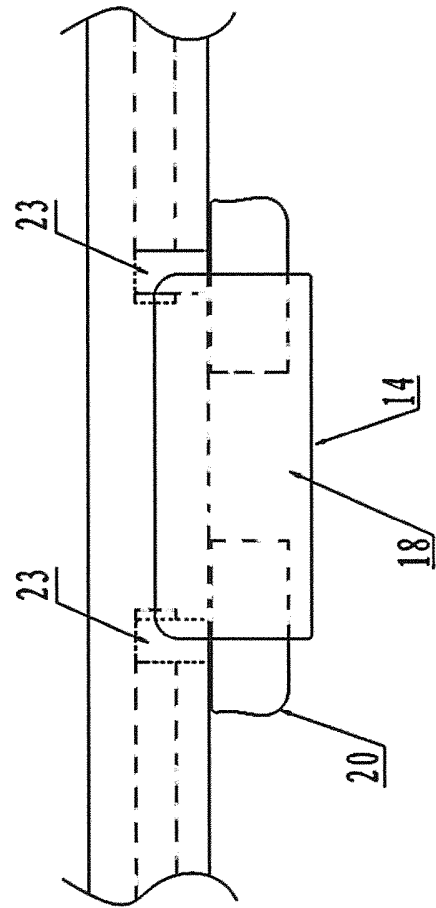


Fig. 5

## ABSTRACT

The invention relates to a telescopically extendable and collapsible ladder assembly having at a top ladder section, a bottom ladder section, and one or more intermediate ladder sections. According to the invention, the top rung of the bottom ladder section is provided with a centrally arranged grip element that forms a housing for manually operable release  
5 actuators provided at the bottom side of the rung. The manually operable release actuators are each movable, parallel to the front wall and the back wall of the grip element and along the bottom wall of the rung, between a rest position and an actuated position, to allow for manually operating the latch mechanisms and unlocking the stile members of the adjacent  
10 other and into the grip element.

# SAMENWERKINGSVERDRAG (PCT)

## RAPPORT BETREFFENDE NIEUWHEIDSONDERZOEK VAN INTERNATIONAAL TYPE

IDENTIFICATIE VAN DE NATIONALE AANVRAGE	KENMERK VAN DE AANVRAGER OF VAN DE GEMACHTIGDE  <b>P32098NL00/MHO</b>
Nederlands aanvraag nr.  <b>2013339</b>	Indieningsdatum  <b>18-08-2014</b>
	Ingeroepen voorrangsdatum
Aanvrager (Naam)  <b>Lampe Holding B.V.</b>	
Datum van het verzoek voor een onderzoek van internationaal type  <b>25-10-2014</b>	Door de Instantie voor Internationaal Onderzoek aan het verzoek voor een onderzoek van internationaal type toegekend nr.  <b>SN 62983</b>
<b>I. CLASSIFICATIE VAN HET ONDERWERP</b> (bij toepassing van verschillende classificaties, alle classificatiesymbolen opgeven)	
Volgens de internationale classificatie (IPC)  <b>E06C1/12</b>	
<b>II. ONDERZOCHE GEBIEDEN VAN DE TECHNIEK</b>	
Onderzochte minimumdocumentatie	
Classificatiesysteem	Classificatiesymbolen
<b>IPC</b>	<b>E06C</b>
Onderzochte andere documentatie dan de minimum documentatie, voor zover dergelijke documenten in de onderzochte gebieden zijn opgenomen	
III. <input type="checkbox"/>	<b>GEEN ONDERZOEK MOGELIJK VOOR BEPAALDE CONCLUSIES</b> (opmerkingen op aanvullingsblad)
IV. <input type="checkbox"/>	<b>GEBREK AAN EENHEID VAN UITVINDING</b> (opmerkingen op aanvullingsblad)



**ONDERZOEKSRAPPORT BETREFFENDE HET  
RESULTAAT VAN HET ONDERZOEK NAAR DE STAND  
VAN DE TECHNIEK VAN HET INTERNATIONALE TYPE**

Nummer van het verzoek om een onderzoek naar  
de stand van de techniek  
NL 2013339

<p>A. CLASSIFICATIE VAN HET ONDERWERP INV. E06C1/12 ADD.</p> <p>Volgens de Internationale Classificatie van octrooien (IPC) of zowel volgens de nationale classificatie als volgens de IPC.</p>														
<p>B. ONDERZOCHE GEBIEDEN VAN DE TECHNIEK</p> <p>Onderzochte minimum documentatie (classificatie gevolgd door classificatiesymbolen) E06C</p> <p>Onderzochte andere documentatie dan de minimum documentatie, voor dergelijke documenten, voor zover dergelijke documenten in de onderzochte gebieden zijn opgenomen</p> <p>Tijdens het onderzoek geraadpleegde elektronische gegevensbestanden (naam van de gegevensbestanden en, waar uitvoerbaar, gebruikte trefwoorden) EPO-Internal</p>														
<p>C. VAN BELANG GEACHTE DOCUMENTEN</p> <table border="1"> <thead> <tr> <th>Categorie °</th> <th>Geciteerde documenten, eventueel met aanduiding van speciaal van belang zijnde passages</th> <th>Van belang voor conclusie nr.</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>CN 201 273 132 Y (ZHENGJIANG HU [CN]) 15 juli 2009 (2009-07-15) * figuren 7, 10 ,14 *</td> <td>1</td> </tr> <tr> <td>A</td> <td>CN 202 194 553 U (XIAOQIU SHEN) 18 april 2012 (2012-04-18) * figuur 4 *</td> <td>1</td> </tr> <tr> <td>A</td> <td>US 5 738 186 A (JONES RONALD BARRY THOMAS [GB]) 14 april 1998 (1998-04-14) * figuur 6 *</td> <td>1</td> </tr> </tbody> </table>			Categorie °	Geciteerde documenten, eventueel met aanduiding van speciaal van belang zijnde passages	Van belang voor conclusie nr.	A	CN 201 273 132 Y (ZHENGJIANG HU [CN]) 15 juli 2009 (2009-07-15) * figuren 7, 10 ,14 *	1	A	CN 202 194 553 U (XIAOQIU SHEN) 18 april 2012 (2012-04-18) * figuur 4 *	1	A	US 5 738 186 A (JONES RONALD BARRY THOMAS [GB]) 14 april 1998 (1998-04-14) * figuur 6 *	1
Categorie °	Geciteerde documenten, eventueel met aanduiding van speciaal van belang zijnde passages	Van belang voor conclusie nr.												
A	CN 201 273 132 Y (ZHENGJIANG HU [CN]) 15 juli 2009 (2009-07-15) * figuren 7, 10 ,14 *	1												
A	CN 202 194 553 U (XIAOQIU SHEN) 18 april 2012 (2012-04-18) * figuur 4 *	1												
A	US 5 738 186 A (JONES RONALD BARRY THOMAS [GB]) 14 april 1998 (1998-04-14) * figuur 6 *	1												
<p><input type="checkbox"/> Verdere documenten worden vermeld in het vervolg van vak C.      <input checked="" type="checkbox"/> Leden van dezelfde octroofamilie zijn vermeld in een bijlage</p>														
<p>° Speciale categorieën van aangehaalde documenten</p> <p>"A" niet tot de categorie X of Y behorende literatuur die de stand van de techniek beschrijft</p> <p>"D" in de octrooiaanvraag vermeld</p> <p>"E" eerdere octrooi(aanvraag), gepubliceerd op of na de indieningsdatum, waarin dezelfde uitvinding wordt beschreven</p> <p>"L" om andere redenen vermelde literatuur</p> <p>"O" niet-schriftelijke stand van de techniek</p> <p>"P" tussen de voorrangsdatum en de indieningsdatum gepubliceerde literatuur</p> <p>"T" na de indieningsdatum of de voorrangsdatum gepubliceerde literatuur die niet bezwarend is voor de octrooiaanvraag, maar wordt vermeld ter verheldering van de theorie of het principe dat ten grondslag ligt aan de uitvinding</p> <p>"X" de conclusie wordt als niet nieuw of niet inventief beschouwd ten opzichte van deze literatuur</p> <p>"Y" de conclusie wordt als niet inventief beschouwd ten opzichte van de combinatie van deze literatuur met andere geciteerde literatuur van dezelfde categorie, waarbij de combinatie voor de vakman voor de hand liggend wordt geacht</p> <p>"&amp;" lid van dezelfde octroofamilie of overeenkomstige octrooipublicatie</p>														
<p>Datum waarop het onderzoek naar de stand van de techniek van internationaal type werd voltooid</p> <p>14 april 2015</p>		<p>Verzenddatum van het rapport van het onderzoek naar de stand van de techniek van internationaal type</p>												
<p>Naam en adres van de instantie</p> <p>European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016</p>		<p>De bevoegde ambtenaar</p> <p>Demeester, Jan</p>												

**ONDERZOEKSRAPPORT BETREFFENDE HET  
 RESULTAAT VAN HET ONDERZOEK NAAR DE STAND  
 VAN DE TECHNIEK VAN HET INTERNATIONALE TYPE**

Informatie over leden van dezelfde octrooifamilie

Nummer van het verzoek om een onderzoek naar  
 de stand van de techniek  
**NL 2013339**

In het rapport genoemd octrooigeeschrift	Datum van publicatie	Overeenkomend(e) geschrift(en)	Datum van publicatie
CN 201273132	Y	15-07-2009	GEEN
-----			
CN 202194553	U	18-04-2012	GEEN
-----			
US 5738186	A	14-04-1998	AU 1817995 A 18-09-1995
			DE 69502590 D1 25-06-1998
			DE 69502590 T2 07-01-1999
			EP 0746663 A1 11-12-1996
			US 5738186 A 14-04-1998
			WO 9523907 A1 08-09-1995
-----			

## WRITTEN OPINION

File No. <b>SN62983</b>	Filing date ( <i>day/month/year</i> ) <b>18.08.2014</b>	Priority date ( <i>day/month/year</i> )	Application No. <b>NL2013339</b>
International Patent Classification (IPC) <b>INV. E06C1/12</b>			
Applicant <b>Lampe Holding B.V.</b>			

This opinion contains indications relating to the following items:

- Box No. I     Basis of the opinion
- Box No. II    Priority
- Box No. III   Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- Box No. IV    Lack of unity of invention
- Box No. V     Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- Box No. VI    Certain documents cited
- Box No. VII   Certain defects in the application
- Box No. VIII  Certain observations on the application

	Examiner <b>Demeester, Jan</b>
--	-----------------------------------

## WRITTEN OPINION

Application number

NL2013339

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### Box No. I Basis of this opinion

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1. This opinion has been established on the basis of the latest set of claims filed before the start of the search.
2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the application and necessary to the claimed invention, this opinion has been established on the basis of:
  - a. type of material:
    - a sequence listing
    - table(s) related to the sequence listing
  - b. format of material:
    - on paper
    - in electronic form
  - c. time of filing/furnishing:
    - contained in the application as filed.
    - filed together with the application in electronic form.
    - furnished subsequently for the purposes of search.
3.  In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
4. Additional comments:

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### Box No. V Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

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#### 1. Statement

Novelty	Yes: Claims	1-20
	No: Claims	
Inventive step	Yes: Claims	1-20
	No: Claims	
Industrial applicability	Yes: Claims	1-20
	No: Claims	

#### 2. Citations and explanations

**see separate sheet**

Re Item V

**Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1 Reference is made to the following documents:

D1 CN 201 273 132 Y (ZHENGJIANG HU [CN]) 15 juli 2009  
(2009-07-15)

D2 CN 202 194 553 U (XIAOQIU SHEN) 18 april 2012 (2012-04-18)

2 Document D1 is regarded as being the prior art closest to the subject-matter of claim 1. Document D1 discloses:

2.1 *a telescopic ladder comprising several sections (see fig. 2) each comprising two stile members (110) interconnected at the top by a rung (150). The stile members (110) of each ladder section are inserted in the stile members (110) of the lower adjacent ladder section (see fig. 1). The top rung (150) of the bottom and intermediate ladder sections is provided at each end with an automatic latch mechanism (130, see fig. 3) for automatically locking the stiles (110). Each automatic latch mechanism (130) comprises an automatic release actuator (133) for unlocking the stile members. The automatic latch mechanism (130) of the bottom ladder section is associated with a manually operable release actuator (162, see fig. 10) for unlocking the stile members (110). The top rung (150) of the bottom ladder section (see fig. 10) is provided with a grip element (163) with a front, back and bottom wall (see fig. 10) forming a housing for the manually operable release actuators (162, see fig. 10), which extend through a slot (see fig. 10: central slot) in the bottom wall of the top rung (150) into the interior of the rung (150). Each of said manually operable release actuators (162, see fig. 10) is movable parallel to the longitudinal direction of the grip element (163) in order to unlock the stile members by pushing said manually operable release actuators (162) towards each other.*

2.2 The subject-matter of claim 1 therefore differs from this known telescopic ladder in that *said manually operable release actuators are accessible at the lateral sides of the grip element and can be pushed into the grip element.* Claim 1 is therefore new.

- 2.3 The problem to be solved by the present invention may be regarded as providing a more user-friendly alternative. The advantages are described in the application (page 3, line 29-34). The configuration according the invention is more compact and provides a ladder wherein the release actuators are hidden and protected from the feet of a user.
- 2.4 The solution to this problem proposed in claim 1 of the present application is considered as involving an inventive step for the following reasons:  
None of the prior art documents suggest such a configuration wherein the *release actuators are accessible at lateral sides of the grip element and can be pushed into the grip element.*  
The manually operable release actuators 162 of D1 (fig. 10) are moved parallel along the grip element 163. The same applies for the actuators 42 and the grip element 44 of D2 (fig. 4).
- 3 Claims 2-20 are dependent on claim 1 and as such also meet the requirements of novelty and inventive step.

\*\*\*\*

(J. Demeester)