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(54) **TELESCOPIC LADDERS**

(57) The present invention relates to a telescopic ladder comprising a at least a top section, a bottom section, and at least one intermediate section, each section comprising a pair of parallel, laterally spaced stiles and a single tier of rungs extending between and interconnecting stiles, wherein the stiles of the top and intermediate sections being telescopically received in the stiles of the bottom section, with the tiers of rungs of the top and intermediate sections being arranged in parallel with each other and with the tier of rungs of the bottom section, wherein the bottom section comprises at least two rungs connected to stiles, wherein the rungs are horizontally spaced apart with a distance X from each other when in extended stage; the at least one intermediate section comprising stiles having a length Y and at least one rung that positioned at the upper end of the stiles; and a third section having a length Z and at least one rung positioned at the upper end of the stiles that area telescopically connected to the stiles of the at least one intermediate section, wherein length y is at least 600 mm, measured from the last rung of the bottom section to the first rung of the intermediate section when fully extended.

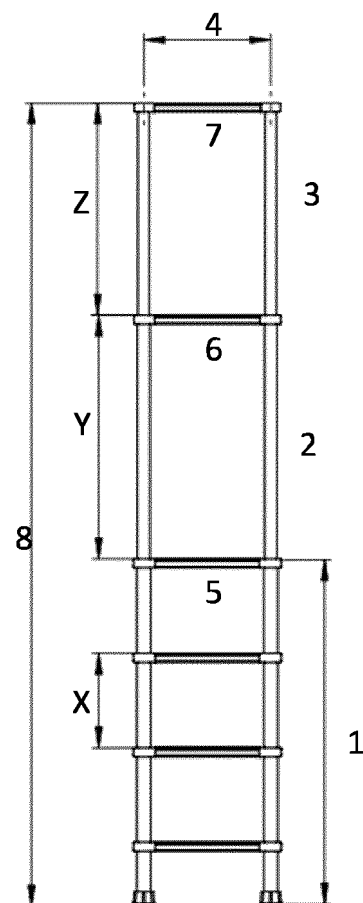


Figure 1

Description

[0001] The present invention relates to telescopic ladders, more particular to telescopic ladders comprising a built-in safety feature, such as ladders for vans and vehicles equipped with roof top carriers.

[0002] Telescopic ladders are compact and easy to carry, transport and store and take up comparatively little space. They can be used to allow easy access to the rooftop carrier of a van, by hanging it on one side or the other side and can be folded and stored inside the van. Telescopic ladders have typically stiles of circular or rectangular cross sections, though this invention is not limited to such.

[0003] Telescopic ladders generally include several rungs connected to two telescopic stiles, rails or tubes that are movable between an extended position and a shrunk or collapsed position. The extension ladder allows a user to reach a high place when the telescopic rails are in the extended position. The telescopic ladder can easily be carried or stored when the telescopic rails are in a collapsed position. The ladder normally further includes a button operable to allow the telescopic rails to move to the collapsed position from the extended position by gravity. As with all ladders, using a telescopic ladder can present various risks to the user. Often, the risks are amplified when a user utilizes the ladder in a non-recommended manner. There is a continuing desire in industry to provide ladders that reduce the risk of accidents and provide improved safety and stability to the user thereof.

[0004] Such ladders are known for instance from GB-A-2549317, which gives an example of a telescopic ladder with stabilizers as an additional feature or EP-A-3246508, which discloses a telescopic ladder with air cushions.

[0005] An objective of this invention is to provide telescopic ladders that improve the safety and security in use and provide convenience for storage, carrying and transportation when not in use, while also showing high conformational stability when in use.

[0006] It is a further object of this invention to provide an improved ladder which may serve as a stepladder, leaning ladder, 1 or 2 part combination ladder or an extension ladder, which is capable of being easily converted from one type of ladder to the other, with a minimum of effort, and which functions efficiently in either capacity.

[0007] Another object of this invention is to provide a ladder of the above-described character which is constructed to withstand a relatively heavy loading, but which at the same time is relatively light in weight and can be easily handled.

[0008] A still further object of this invention is to provide a ladder of the above-described type which is relatively simple in construction and can be economically manufactured.

[0009] These and other features and characteristics of extension and stepladders according to the present invention will be apparent from the following description

and accompanying illustration of typical embodiments thereof.

[0010] The present invention relates to a telescopic ladder comprising at least a top section, a bottom section, and at least one intermediate section, each section comprising a pair of parallel, laterally spaced stiles and at least a single tier of rungs extending between and interconnecting stiles, wherein the stiles of the top and intermediate sections being telescopically received in the stiles of the bottom section, with the tiers of rungs of the top and intermediate sections being arranged in parallel with each other and with the tier of rungs of the bottom section, wherein the bottom section comprises at least two rungs connected to stiles, wherein the rungs are horizontally spaced apart with a distance X from each other when in extended stage; the at least one intermediate section comprising stiles having a length Y and at least one rung positioned at the upper end of the stiles; and the top section comprising stiles having a length Z and at least one rung positioned at the upper end of the stiles that are telescopically connected to the stiles of the at least one intermediate section, wherein length Y is at least 60 cm, when fully extended.

[0011] Advantageously, there is a single intermediate section, resulting in a telescopic ladder comprising 3 sections in total, a bottom section with rungs spaced apart with distance X in extended position, an intermediate section with stiles of length Y and a top section with stiles of length Z.

[0012] Advantageously, the intermediate section comprising stiles is having a length Y of at least 65 cm, more advantageously at least 70 cm, even more advantageously at least 75 cm. Preferably, the intermediate section comprising stiles is having a length Y of at most 200 cm, more preferably at most 150 cm. It is preferred that the maximum height of the intermediate section Y is less than the height of the bottom section, as this enhances maximum collapsibility of the telescopic ladder. The intermediate section with the stiles of length Y is preferably connected to the top section with the stiles having length Z, and to the bottom section.

[0013] Advantageously, the top section comprising stiles is having a length Z of at least 50 cm, more advantageously at least 60 cm and most advantageously at least 65 cm. Advantageously, the top section comprising stiles is having a length Z of at most 150 cm, more advantageously at most 100 cm. It is preferred that the maximum height of the top section Y is less than the height of the bottom section, as this enhances maximum collapsibility of the telescopic ladder. The top section with the stiles of length Z is preferably connected to the intermediate section with the stiles having length Y.

[0014] Preferably, the at least one intermediate section comprises one rung positioned at the upper end of the stiles.

[0015] Preferably, the top section comprises one rung positioned at the upper end of the stiles.

[0016] Preferably, both the intermediate section and

the upper section have one rung at the upper end of the stiles. This configuration results in an optimum collapsed ladder when not in use. It furthermore provides the ladder with additional torsional stability. With 2 sliding parts and no rung present in between the two stiles, the stiles turn more easily resulting in a lower torsional stability. An unexpected increase in stability of about 30% was measured by having the extra rung.

[0017] The upper sections with the distances Y and Z are dimensioned to guarantee that a person cannot scale the entire ladder, to avoid climbing onto a too high position that may endanger the user of the ladder.

[0018] Advantageously, the distance between the rungs in the bottom section X is at least 25 cm, more advantageously at least 28 cm, and even more advantageously at least 30 cm. Advantageously, the distance between the rungs in the bottom section X is at most 45 cm, more advantageously at most 40 cm, and even more advantageously at most 35 cm. Advantageously, the rungs in the bottom section are fixed, thus always at the most extended form and not collapsible. The distance between the rungs is measured from the top of the rung to the top of the next rung.

[0019] Advantageously, the stiles are of a circular or rectangular diameter. Each subsequent stile fits into the interior of a previous stile to attain a telescopic movement, and each section comprises means for securing the interior and/or exterior stiles. More advantageously, the stiles are of a circular diameter. Stiles of a circular diameter can be produced more precise and less complex. Furthermore, ergonomically the round shape is preferred

[0020] Advantageously, the centres of two parallel stiles are spaced apart from each other in a distance in the range of from 25 cm to 50 cm, more advantageously from 28 to 40 cm (heart-to-heart). This will result in a stiff ladder which is not too heavy, with a high strength.

[0021] Advantageously, the ratio of the stiles of the intermediate section Y and the stiles of the top section Z is in the range of 1:1 to 1:2.

[0022] Preferably, the stiles of at least the top section of the ladder are coated in a signal colour, more preferably red.

[0023] The ladder is advantageously used for attaching to a rail or vehicle rooftop fixture.

[0024] The ladder advantageously comprises rungs with a depth between 55 and 80 mm, preferably between 65 and 80 mm, more preferably between 70 and 80 mm. Such a size of the rungs makes it more user friendly as it is easier and more comfortable to step on.

[0025] Embodiments of the invention are further described hereinafter with reference to the accompanying drawings, wherein like letters and numerals refer to like parts, wherein the figures are approximately to scale, and wherein:

Fig. 1 illustrates an example of a telescopic ladder, extended;

Fig. 2 illustrates an example of a telescopic ladder, collapsed;

Fig. 3 illustrates an example of different heights of the bottom section;

[0026] Figure 1 illustrates a telescopic ladder with 4 rungs (5) in the first sub-ladder section (1), in an extended configuration. Rung (6) is located at the top end of sub-ladder (2) and rung (7) is located at the end of sub-ladder (3). The distance (4) represents how far the heart of the tubes are spaced apart from each other. In extended configuration, the maximum height of the ladder (8) is the sum of the 3 sub-ladder (1), (2) and (3).

[0027] Figure 2 illustrates the telescopic ladder of figure 1 in collapsed configuration. The minimum height of the collapsed ladder is the height of sub-ladder (1) plus the height of the rungs (6) and (7). The maximum heights of Y and Z respectively are preferably less than the height of the bottom section (1).

[0028] Figure 3 illustrates that the bottom section of the ladder can have a different number of rungs and with that different number a different total height of both the extended and collapsed ladder. In the figure the first ladder has 4 rungs in the bottom section (9), the second one is depicted with 5 rungs in the bottom section (10), the third ladder with 6 rungs in the bottom section (11) and the 4th one with 7 rungs in the bottom section (12). The heights of the intermediate section Y and the top section Z are preferably less than the total height of the bottom section (1). The total height of the bottom section (1) preferably varies with the total number of rungs of the bottom section. Preferably the total number of rungs in the bottom section is at least 3, more preferably at least 4. Preferably the total number of rungs in the bottom section is at most 10, more preferably at most 8 rungs, even more preferably at most 7 rungs.

[0029] A principal object of the present invention is to provide a multisectional extension ladder in which the stiles or side members of the intermediate and top sections are successively telescopically movable into a substantially wholly contained position within the stiles or side members of the bottom section, such that the retracted thickness of the ladder substantially equals the depth of the stiles of the bottom section.

[0030] The stiles of ladders according to the present invention are of a circular or rectangular cross-section, or of inwardly opening channel configuration, but preferably of a circular cross-section, resulting in tubular stiles. When the ladder is retracted, the portions of each stile extend in juxtaposition with similar portions of the adjacent stile of the adjoining ladder section.

[0031] Referring more specifically to the drawing, Figures 1-3 relate to a typical extension ladder constructed according to the present invention. Herein, each ladder section comprises a laterally spaced pair of stiles or upright tubes, and a single tier of rungs interconnecting between them. The stiles of at least the bottom and intermediate sections comprise inwardly open channels.

Commencing at the top, the stiles of each ladder section are telescopically received in the stiles of the section immediately below it. When the ladder is retracted, the stiles of the intermediate and top ladder sections are substantially wholly contained in, or nested in the stiles of the bottom ladder section.

[0032] The ladder sections will now be individually described.

[0033] The rungs of the top section substantially abut at their ends the upper ends of the stiles of such section to which the rungs are perpendicularly positioned.

[0034] As clearly shown by Figure 2, the retracted ladder makes a compact package and may be easily carried or stored in the trunk space or on the roof of a vehicle, such as a van or truck.

[0035] Preferably, a member or mechanism is present at the top of the bottom section and each intermediate section for securing and locking the sections when extended such that the ladder may be mounted. This may be done by any suitable means, such as a fastening brace.

[0036] When configured for use with a van or truck, the ladder may advantageously comprise a fastening member that allows to hook or otherwise removably fasten the top of the ladder to a structure on top of the van or truck, such as a rail or otherwise, giving the ladder better than a point support at its upper end, by attaching to a rail or vehicle rooftop fixture.

[0037] A preferred mechanism for locking the ladder sections together in an extended position comprises a hand-releasable mechanism for locking together the ladder sections when the ladder is extended, such as a locking plug or detent engaging with openings in the stiles and forming a part of the locking mechanisms. Every section of the ladder, with exception of the highest segment, preferably comprises such a mechanism located in the upper extension of each ladder section, preferably in the upper extension of the stiles.

[0038] The ladder may be extended by pulling each relatively upper section out from its nested position within the section below it, and locking it, and the action may be applied with respect to each adjoining pair of ladder sections below the uppermost ladder section.

[0039] Preferably all parts of the ladders constructed according to the invention, except for the locking mechanism and the fasteners, pivot pins, etc., are preferably constructed from a light weight, preferably aluminium composition. The stiles may be brake formed, extruded or cast, whereby extrusion is preferred. Of course, it is to be understood that materials other than aluminium may be used, and the invention is not to be limited to a particular material, or to a particular mode of manufacture, unless a claim is so limited.

[0040] The ends of the rungs of each top section are secured to the sections stiles, whereas the outer ends of the rungs of intermediate and bottom sections are secured to the rung mounting flanges of the stiles of these sections.

[0041] Furthermore, the intermediate and top section are dimensioned to guarantee that a person cannot scale the entire ladder, to avoid climbing onto a too high position that may endanger the user of the ladder. Preferably, the intermediate and/or top section sections of the ladder that cannot be scaled are coated in a signal colour, e.g. a red coating, to indicate that these sections are not for scaling.

[0042] The present invention is furthermore directed to a kit of parts comprising a vehicle carrying a roof top carrier, further comprising the telescopic ladder previously described suitable for being mounted or affixed to the vehicle, and used to reach the roof top carrier without allowing direct access thereto.

[0043] From the foregoing, further variations, adaptations and modifications with respect to telescopic extension and stepladders according to the present invention can be evolved by those skilled in the art to which the invention is addressed, within the scope of the following claims.

Claims

1. A telescopic ladder comprising a at least a top section, a bottom section, and at least one intermediate section, each section comprising a pair of parallel, laterally spaced stiles and at least a single tier of rungs extending between and interconnecting stiles, wherein the stiles of the top and intermediate sections being telescopically received in the stiles of the respective lower section, with the tiers of rungs of the top and intermediate sections being arranged in parallel with each other and with the tier of rungs of the bottom section, wherein the bottom section comprises at least two rungs connected to stiles, wherein the rungs are horizontally spaced apart with a distance X from each other when in extended stage; the at least one intermediate section comprising stiles having a length Y and at least one rung positioned at the upper end of the stiles; and the top section comprising stiles having a length Z and at least one rung positioned at the upper end of the stiles that are telescopically connected to the stiles of the at least one intermediate section, wherein length Y is at least 60 cm, when fully extended.
2. The ladder according to claim 1, wherein the length Y is at least 65 cm, more preferably at least 70 cm, more preferably at least 75 cm.
3. The ladder according to anyone of claims 1-2, wherein the length Z is at least 50 cm, more preferably at least 60 cm and most preferably at least 65 cm.
4. The ladder according to anyone of claims 1-3, wherein the at least one intermediate section comprises one rung positioned at the upper end of the stiles.

5. The ladder according to anyone of claims 1-4, where-
in the upper section comprises one rung positioned
at the upper end of the stiles.
6. The ladder according to anyone of claims 1-5, where- 5
in X is at least 25 cm, more preferably at least 28
cm, most preferably at least 30 cm.
7. The ladder according to anyone of claims 1-6, where- 10
in the stiles are of a circular or rectangular diameter,
and wherein each subsequent stile fits into the inter-
ior of a previous stile to attain a telescopic move-
ment, and wherein each section comprises means
for securing the interior and/or exterior stiles. 15
8. The ladder according to anyone of claims 1-7, where-
in the centres of two parallel stiles are spaced apart
from each other in a distance in the range of from 30
cm to 50 cm (heart-to-heart). 20
9. The ladder according to anyone of claims 1-8, where-
in the ratio of y:z is in the range of 1:1 to 1:2.
10. The ladder according to anyone of claims 1-9, where- 25
in the rungs have a width / depth between 55 and 90
mm, preferably between 65 and 80 mm, more pref-
erably between 70 and 75 mm.
11. The ladder according to anyone of claims 1-10, 30
wherein the stiles of at least the top section are coat-
ed in a signal colour, preferably red.
12. Use of a ladder according to anyone of claims 1-11 35
for attaching to a rail or vehicle rooftop fixture.
13. A kit of parts comprising a vehicle carrying a roof top 40
carrier, further comprising a telescopic ladder ac-
cording to any one of claims 1 to 11 suitable for being
mounted or affixed to the vehicle, and used to reach
the roof top carrier without allowing direct access
thereto.

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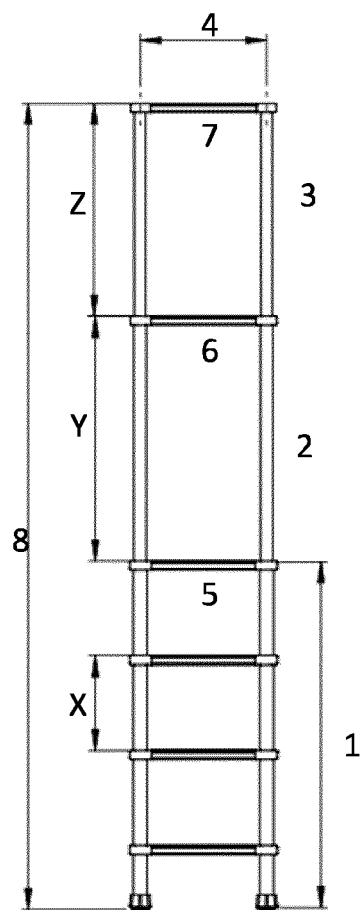


Figure 1

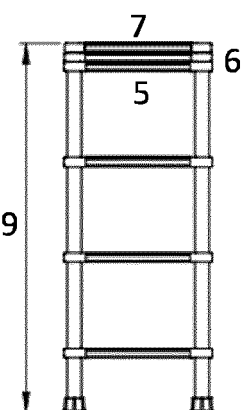


Figure 2

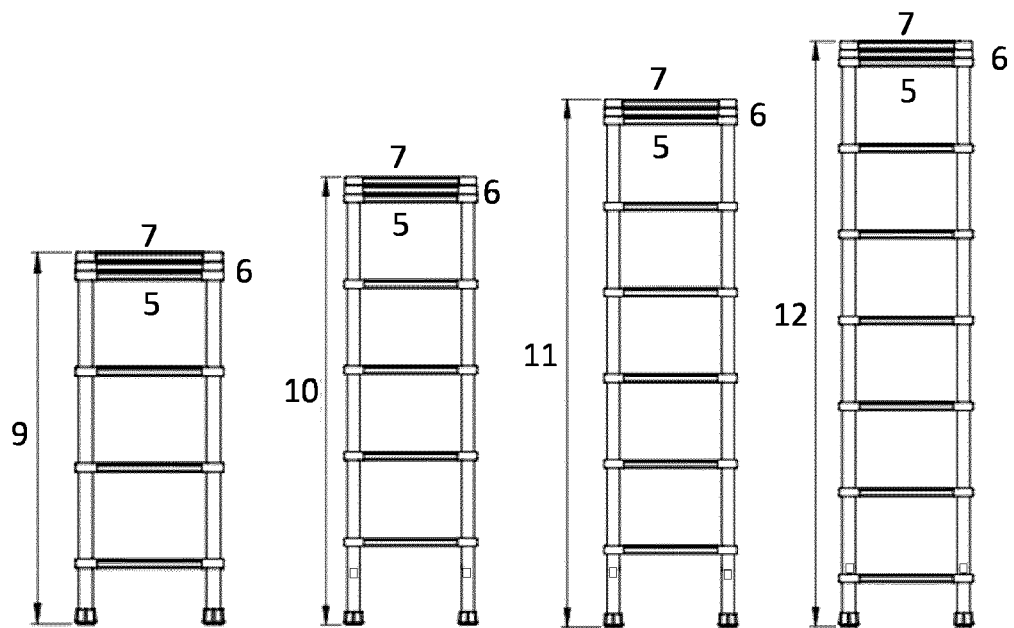


Figure 3



EUROPEAN SEARCH REPORT

 Application Number
 EP 19 19 3763

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EPO FORM 1503 03.02 (P04C01)

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Y	DE 20 2009 009710 U1 (BRANDMANN FRANK HENNO [DE]) 1 October 2009 (2009-10-01) * figures 1, 2 *	12,13	
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (IPC)
			E06C
Place of search		Date of completion of the search	Examiner
The Hague		13 January 2020	Bauer, Josef
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**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 19 19 3763

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

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