

(19)



(11)

EP 2 995 766 A1

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:
16.03.2016 Bulletin 2016/11

(51) Int Cl.:
E06C 7/42 (2006.01) *E06C 7/46 (2006.01)*

(21) Application number: **15020156.4**

(22) Date of filing: **10.09.2015**

(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

(30) Priority: **11.09.2014 NL 1040946**
21.07.2015 NL 1041405

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(54) GRIP LADDER

(57) The invention consists of a ladder (1) provided with a special form of ladder feet (3) or a special form of lower horizontal element (2) for ladders with or without a horizontal element on the underside, which ensure that the contact point of the ladder with the ground surface is displaced to the rear, so that the ladder is much less likely to slip, and the invention can also be applied on a sloping

roof wherein the protruding ladder feet can rest on a horizontal portion, for instance a tile batten.

The same effect is obtained by making the lower horizontal element of the ladder pivotable relative to the main plane of the ladder, whereby the support points also come to lie at a distance from the main plane of the ladder.

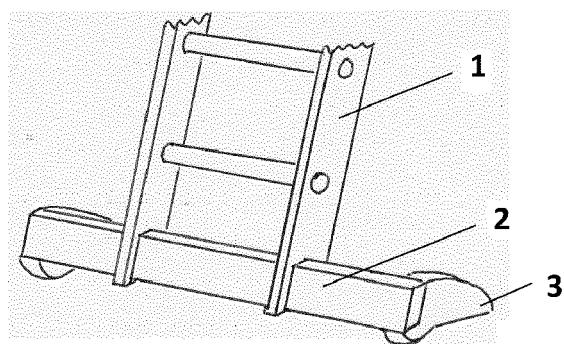


fig. 1a

Description**Product description**

[0001] The invention relates to a ladder which is set obliquely against a wall or other object.

[0002] The invention also relates to the use of a ladder on a sloping roof or other object.

Problem

[0003] There is a danger of a ladder slipping relative to a ground surface because the ladder is at too much of an incline or because of a slippery ground surface, whereby many accidents are caused annually.

[0004] It is also difficult and dangerous to work on a sloping roof (e.g. a tile roof) with an ordinary ladder without using special additional accessories to secure the ladder.

Existing solutions

[0005] Described in patent EP1669538 of Anthony Teel is a solution whereby additional auxiliary supports and struts with gas springs are mounted so as to prevent a ladder from sliding outward.

[0006] Also devised in other inventions are hooks which engage the ground only when the ladder is already slipping (see BE1018435 and GB632311).

[0007] Also commercially available are rubber mats on which the ladder can be placed (see GB2216168 of Barry Weatherall).

[0008] For use of a ladder on a roof there are special ridge hooks which can be mounted on the ladder and with which it can be attached to the ridge of the roof (see GB2489328 of Baglin Neil Ernest).

Drawbacks of existing solutions

[0009] Inventions wherein a scaffold or additional auxiliary supports are mounted behind the ladder are effective, but are often very cumbersome and inconvenient to use and to transport.

[0010] The invention often also still has to be adjusted or mounted on site when the ladder is used.

[0011] The ladder also has to be placed exactly at the correct angle, which can be difficult in practice.

[0012] Solutions which function only when the ladder is already slipping away offer less security and safety and do not work properly, for instance when the ground surface is very slippery.

[0013] The rubber mat is effective, but is also rather inconvenient to use.

[0014] When a ladder is used on a sloping roof, it is also inconvenient that special hooks first have to be mounted in order to secure the ladder.

Solution according the invention

[0015] The invention described hereinbelow consists of a ladder (1) with two extra-long elements (referred to below as ladder feet) with which the ladder rests on the ground and which, instead of being located directly under the ladder, are attached asymmetrically at the bottom of the ladder, wherein these ladder feet (3) are located with the support surface substantially transversely of the main plane of the ladder on the side of the ladder with which the ladder is placed against an object, i.e. they protrude on the side where the ladder normally speaking makes the smallest angle with the ground surface (see fig. 1 a).

[0016] Support surface (2) is thus situated here at a distance (x) from the main plane (1) of the ladder (see fig. 1 b).

[0017] By thus displacing the point of contact of the ladder with the ground surface to the support surfaces in the direction of the object against which the ladder supports, the ladder is less likely to slide outward.

[0018] Even if it has a tendency to slip somewhat, for instance on smooth surfaces, the ladder will not easily slide any further; it will then in fact have to be elevated slightly counter to its own weight because of the position of the feet.

[0019] The feet may be secured to the lower horizontal element of the ladder which runs parallel to the rungs (fig. 1, 2 and 4) or, in the case of other ladders, secured to the two stiles. (fig. 3).

[0020] The advantage is a simple and reliable construction integrated into the ladder, wherein the ladder can be placed immediately with no additional supplementary support surfaces as is the case in known ladders, and wherein the ladder is immediately safeguarded in any position of the ladder because, in contrast to known ladders with supplementary support surfaces, the whole weight of the ladder and a possible load, say at least 80% of the weight, is wholly supported from the start by the support surfaces of said ladder feet which form part of the ladder itself.

[0021] It is not therefore a case here of an additional support surface adjacently of or behind the ladder, but of the support surface (2 in fig. 1 b) of the ladder itself which is located at a distance from the main plane and on which all the weight rests.

[0022] The invention can also be embodied by applying for instance a U-shaped lower horizontal element of the ladder, wherein the outer ends protrude further to the rear (object side) and to which outer ends ladder feet are attached, wherein the ladder feet are thus disposed at said distance from the main plane of the ladder so that the same effect is also obtained (see fig. 4).

[0023] An embodiment is also possible wherein the ladder base can also be widened by partially sliding two additional parts (1 and 2) out of the lower horizontal element, which parts are also provided with said ladder feet and can be secured by locks (3) (see fig. 5).

[0024] These parts can also be removed completely

and optionally pushed back in again with the ladder feet pointing in the opposite direction for the purpose of transport or storage of the ladder.

[0025] When used on a roof, said ladder feet can also serve as a safeguard by having them rest on a horizontal element of the roof, for instance on a tile lath, after the tiles have been pushed slightly upward, or in a gutter (see fig. 6).

[0026] The part resting on the horizontal part of the roof must here lie substantially transversely of the main plane of the ladder and be of sufficient length; in the prototype the outer ends of the ladder feet were located 15 cm from the centre of the ladder, although another dimension is also possible.

[0027] The advantage here is again that the ladder feet are integrated into the ladder, and no special ridge hooks need be mounted or adjusted on site.

[0028] The ladder feet themselves can also be made pivotable, whereby they protrude less during transport and storage.

[0029] Also possible is an embodiment of the ladder according to the invention according to fig. 7 wherein the lower horizontal element of the ladder, optionally provided with ladder feet, is connected pivotally to the ladder (1) so that it can be located at a distance from the main plane of the ladder (fig. 7a), but can also pivot back into the main plane of the ladder (fig. 7b).

[0030] The advantage hereof is that when it is folded in line with the ladder, there are no protruding parts at all on the ladder.

[0031] This is achieved by making the existing lower horizontal element (2) of the ladder (1) pivotable, which element rests on the ground with a determined support surface by means of two ladder feet by being pivoted to the rear around the lower rung or other rung of the ladder.

[0032] The full weight of the ladder again rests right from the start only on these support surfaces of the ladder itself, without additional support surfaces being required which are not a part of the ladder itself, and it is again immediately effective.

[0033] The effect here is basically that the lower part of the ladder folds backwards.

[0034] Because in the new position of the underside the support surface is located on the side of the object outside the main plane of the ladder, slipping of the ladder is prevented or made almost impossible.

[0035] The angle (y) through which the lower horizontal element can pivot may vary, wherein the most ideal angle seems to be about 20 or 25 degrees so that the ladder does not tend to tilt toward the user when he/she sets foot on the lowest rung.

[0036] The hinge piece (3) of the invention can for instance be embodied as a bent piece of sheet with a thickness of 2 to 3 mm.

[0037] This hinge piece is attached to the lower rung for instance by means of a long bolt M12 (5) therethrough.

[0038] This is possible by placing bushes tightly into both sides of the lower rung, for instance of plastic or die-

cast aluminum with a hole therein through which the bolt of 12 mm can pass and be secured with a lock nut.

[0039] The lower, already existing or new horizontal element (2) can be mounted on hinge piece (3) by means of two bolts, for instance M6 (6).

[0040] It can of course also be manufactured in integral form in the case of new ladders.

[0041] In order to secure the invention in both positions, strips (4) can for instance be used of 1.5 or 2 mm thickness, which can slide on the outer side through the stiles (in the case of I-profile stiles) or along the stiles of the ladder.

[0042] Both strips are pulled downward by a spring and bounded by a slotted hole through which the long bolt M12 passes.

[0043] The outer end of strips (4) comes to lie here against the front or rear side of the small bent parts (7) of part 3, whereby the hinge piece is blocked.

[0044] By pulling the strips slightly upward the pivoting part (3) is unlocked and can be moved into a different position.

[0045] The two parts 3 and 4 can be made of steel or aluminum sheet which only needs bending and no further welding work, which can be a great advantage in respect of production costs.

[0046] Part 3 is bounded when pivoting to the rear in that it comes up against the stiles of the ladder.

[0047] The ladder does in fact come a little off the ground here, so that the weight rests only on the horizontal element and so the ladder is immediately secured against slipping.

[0048] During transport, or when the ladder stands at a large angle relative to the ground surface, the support surface can be pivoted toward the main plane of the ladder so that the ladder can be used in normal position, wherein horizontal element 2 is pivoted to a position just below the ladder stiles and the invention is locked.

[0049] In this folded state the invention does not in fact take up any extra space because the other parts of the (extendable) ladder can slide in between both sides of the hinge part.

[0050] The invention can be made from steel, aluminum, plastic or other material. Owing to its simplicity the invention will not break easily and thus provides optimal safety.

[0051] The invention can be applied in all its embodiments to existing as well as new ladders.

[0052] The accompanying drawings of ladder feet are examples of how the invention can be embodied, although they could also take a different form.

Claims

1. Ladder, comprising two longitudinal end zones, wherein one end zone of the two end zones comprises a support surface configured to support on a ground surface, **characterized in that** the support

surface is disposed relative to a longitudinal main plane of the ladder at a distance therefrom in a direction substantially transversely of the main plane. 5

means of one or two elements which can slide along the two stiles or through the stiles and which can optionally be pulled downward by a spring for the purpose of locking and can be pulled upward so as to release the pivoting part.

2. Ladder as claimed in claim 1, wherein the one end zone is provided with ladder feet which are disposed on either side thereof and which each have a said support surface. 5

12. Ladder as claimed in claims 1 to 5, **characterized in that** the outer ends of the ladder feet are provided with material with a high friction resistance providing extra resistance to slipping.

3. Ladder as claimed in claim 2, wherein the ladder feet are arranged at said distance from the main plane. 10

13. Ladder as claimed in any of the foregoing claims, wherein the special long ladder feet are themselves foldable up or downward, or both outer ends of the special U-shaped lower horizontal element are foldable up or downward.

4. Ladder as claimed in claim 2, wherein the ladder feet have a length such that at least a part thereof is located at said distance from the main plane. 15

5. Ladder as claimed in any of the foregoing claims, wherein the support surface is connected pivotally to the ladder and is pivotable between a first state, in which the support surface is located substantially in the main plane, and a second state in which the support surface is located at said distance therefrom. 20

6. Ladder as claimed in any of the foregoing claims, wherein the support surface located a distance from the main plane at least substantially fully bears the weight of the ladder and a possible load thereon. 25

7. Ladder as claimed in any of the foregoing claims, wherein during use of the ladder the support surface is disposed in the direction of an object against which the ladder supports with another part thereof. 30

8. Ladder as claimed in any of the foregoing claims, wherein the lower horizontal element of the ladder is provided with two extendable, straight or L-shaped parts provided with said ladder feet, whereby the underside of the ladder with which contact is made with the ground surface is widened for extra stability of the ladder. 35

9. Ladder as claimed in any of the foregoing claims, wherein the ideal angle between the underside of the feet and the stiles is 70 to 75 degrees, so that in the recommended position of the ladder the ladder feet are in contact with the ground surface at both the front side and the rear side. 40

10. Ladder as claimed in any of the foregoing claims, wherein said ladder feet are of sufficient length, or the support surfaces are located at sufficient distance from the main plane of the ladder, so that they can be applied to support on a horizontal element of an inclining surface such as a roof, and the ladder can be used on the roof. 45

11. Ladder as claimed in claim 5, wherein the invention can be locked easily in the different positions by 50

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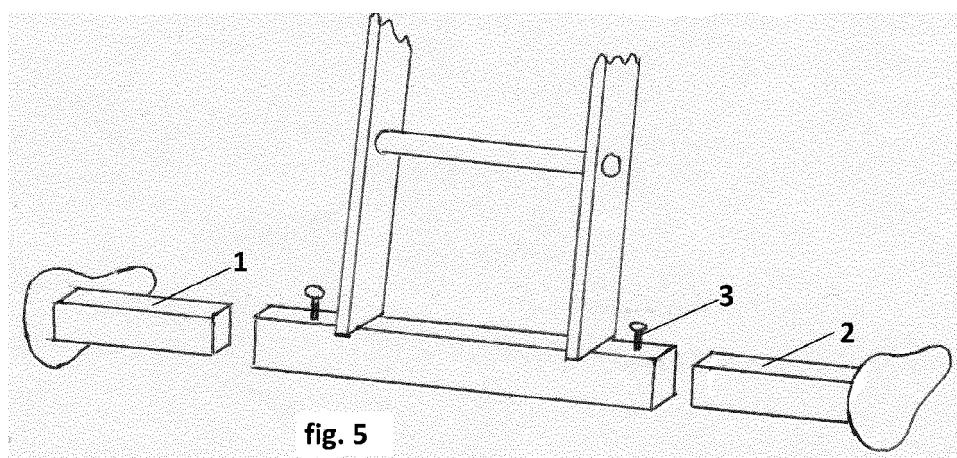
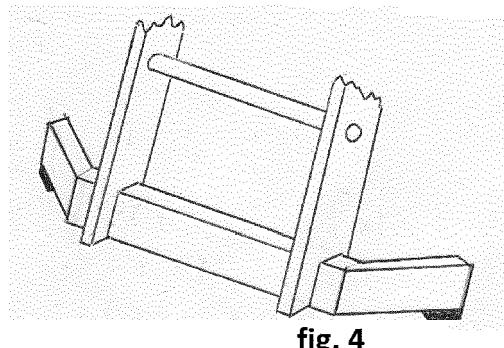
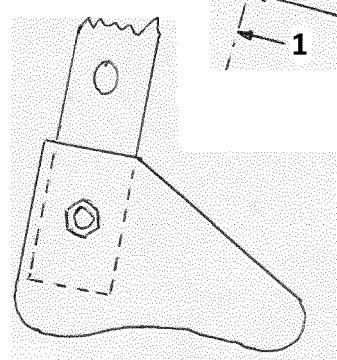
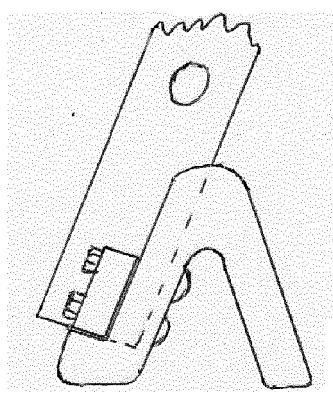
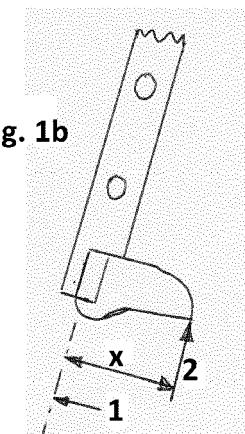
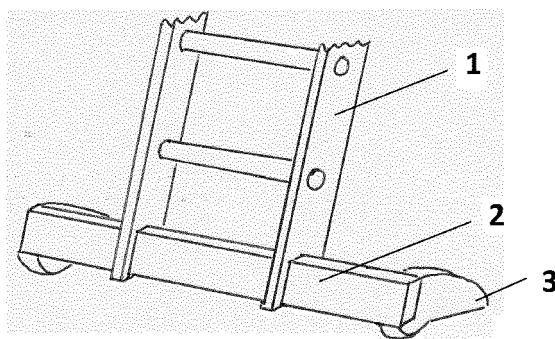
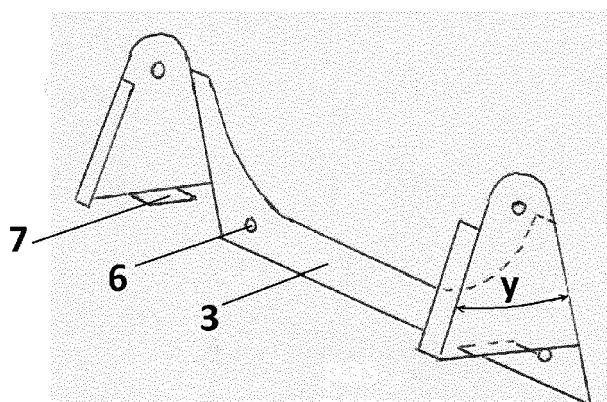
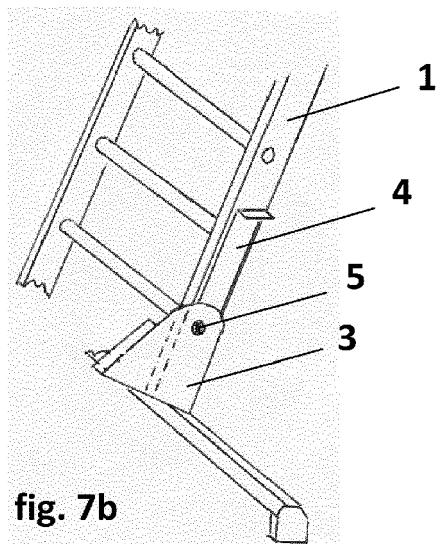
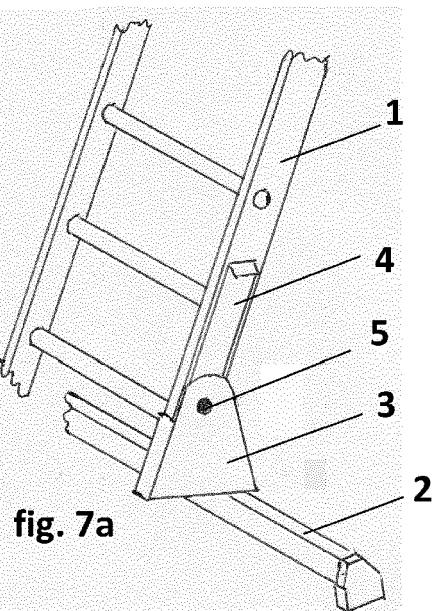
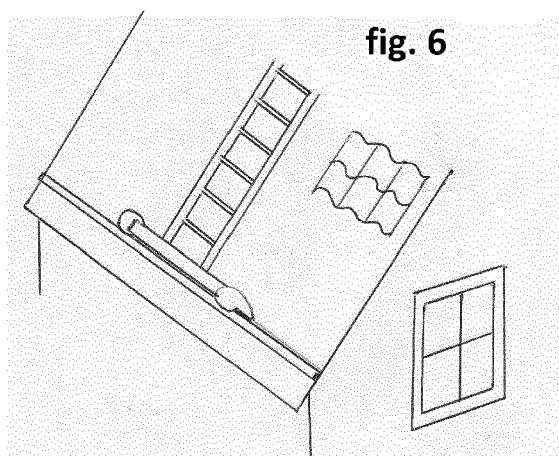
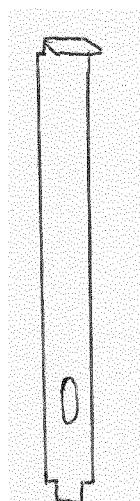


fig. 6



part 3 of fig. 7



part 4 of fig. 7



EUROPEAN SEARCH REPORT

Application Number
EP 15 02 0156

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2	Place of search The Hague	Date of completion of the search 29 January 2016	Examiner Lopes, Claudia
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EP 15 02 0156

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