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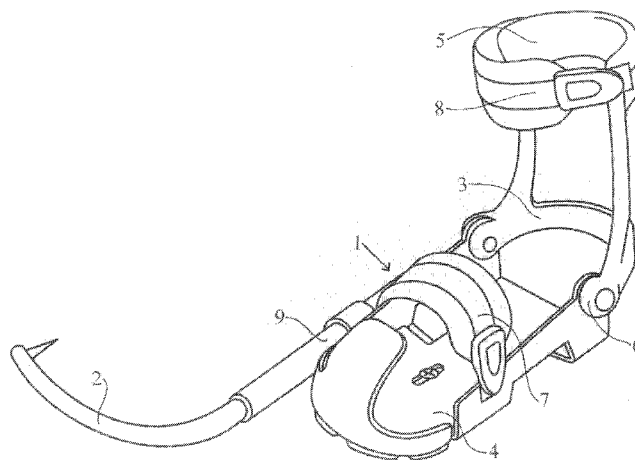
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(54) Title: PRESSURE TRANSFORMATION METHOD AND DEVICE FOR ITS IMPLEMENTATION



(57) Abstract: The invention relates to climbers which include a support (1) releasably fastenable in footwear which includes a bottom part (4) and a hook part (2) fastened in the bottom part for pole climbing. The climbers according to the invention include an ankle protector (3) fastened in the bottom part (4) and a support part (5) fastened in the ankle protector which is arranged to extend at the point of the hollow of the knee or in its vicinity.

PRESSURE TRANSFORMATION METHOD AND DEVICE FOR ITS IMPLEMENTATION

The invention relates to climbers, which include a support releasably fastenable in footwear, which includes a bottom part and a hook part fastened in the bottom part for pole climbing.

- 5 Climbers are used as an aid when climbing up wooden poles, such as e.g. telephone poles and power transmission line poles. Conventionally in climbers, supports are fastened in the user's footwear, which include metal, e.g. sickle-like climber hooks. The supports and the hooks in them are typically fastened in the footwear by means of leather straps going over the ball of the foot and round the
- 10 heel. When ascending and descending the pole, the sickle-like hooks extend to the other side of the pole and support themselves on the pole, whereby the user cannot fall easily. The user moves on the pole upwards and downwards by shifting his feet and the hook parts fastened in them alternately either upwards or downwards.
- 15 However, recent climbers are a work safety risk and they contain ergonomic defects. The climbers do not protect the ankles in case of an accident, but the ankles can be damaged when falling. The fastening straps of the climbers uncomfortably pinch the top of the foot and they have no cold-insulating layer against the iron bottom plate. Furthermore, the breaking resistance of the leather
- 20 straps is weak. The climbers are heavy, they conduct electricity and climbing with them is hard, which further increases the work safety risk. When walking or running, the climbers have to be taken off. The climber size cannot be adjusted, whereby poles of different thicknesses must have their own climbers. Additionally, the climber hook part is symmetrical, whereby the tips of the hook
- 25 parts fall against each other when the user stands on the pole his heels being on the same level.

- Patent US5853067 describes a climbing device, which is fastenable below the foot, above the ball of the foot and on the calf. It includes a support on the side of the leg and a hook for climbing is on the inner side of the leg. A disadvantage of
- 30 this known arrangement is also the work safety risk, because the hook supports itself on the pole only at one point, whereby using such an arrangement would be dangerous when climbing up slippery, e.g. wet, icy or snowy, poles.

An object of the invention is to provide climbers by means of which the above disadvantages are eliminated. Furthermore, an object of the invention is to

introduce climbers, which are ergonomic, improve work safety and are easy to transport. A particular object of the invention is to introduce climbers in which the feet and the ankles are supported such that it is improbable that the user of the climbers falls backwards and, if the user possibly has fallen, he can rise back to his work position. The object of the invention is achieved with climbers, which are characterised by what is presented in the claims.

The climbers according to the invention include an ankle protector fastened in the bottom part and a back part fastened in it which are arranged to extend at the point of the hollow of the knee or in its vicinity. Such climbers support the user's ankles and the user cannot easily fall backwards.

The climbers according to the invention and their ankle protectors advantageously include a joint part between the bottom part and the support part. The joint part is somewhat flexible forward and backward, whereby ascending and descending are easier. The joint part can also be made foldable for transport.

In an advantageous embodiment of the invention, the ankle protector includes fastening buckles for fastening the rear and the bottom part around the foot. By means of the fastening buckles, the climbers are easily fastenable on the footwear and unfastenable from it. In later embodiments, the footwear can be included as a fixed part of the climbers.

In an advantageous further embodiment of the invention, the bottom part is fastened with a bracket part in which the hook part is fastened.

In a next advantageous further embodiment of the invention, the bracket part is a bracket tube in which the hook part is fastened adjustably, rotatably and lockably. The tip and side spike or spikes of the hook part can be replaced, whereby the hook part is adjustable according to the pole size. Furthermore, the hook part can be turned to the vertical position to enable walking without unfastening the climbers from the feet.

In a next advantageous further embodiment of the invention, the bracket part includes an emergency release mechanism for the total unfastening of the hook part from the climbers, whereby the user is able to break free e.g. of a falling pole in case of an emergency.

The climbers according to the invention support themselves on the leg from the back and diminish the two most important safety problems: falling to the side and

falling backwards. Additionally, such a structure prevents serious fractures in ankles and legs. In case of swaying or slipping, it is most important that the hold of the climbers will not break off. In case of falling backwards, it is most important that the user will be able to return to the vertical position on his own.

- 5 The back part operating as the climber back support according to the invention prevents the bending of the ankle in case of an accident, which cushions the fall and helps to maintain the hold of the climbers on the pole. The sturdy ankle protector provides a better feel for the pole than previously and a better working position. The climber material according to the invention is plastic or composite.
- 10 In winter, this arrangement protects the feet from cold. Using plastic or composite material makes the climbers lighter, which decreases the burden of the work and diminishes the work safety risk. An advantage of the plastic and plastic composite material also is that it is durable and does not conduct electricity.

- The climbers are set in place by putting the foot in the footwear from the front, by passing the toe of the footwear in the head part and by fastening the adjustable fastening buckles around the ball of the foot and the leg.
- 15

The climber structure according to the invention is so rigid and sturdy that the user is not able to twist his ankle when using the climbers according to the invention.

- 20 Next, the invention will be described in more detail by referring to the enclosed drawing which shows an oblique front view of climbers according to the invention.

- The climbers according to the figure include a support 1 which includes a bottom part 4 on the side of which is fastened an adjustable sickle-like hook part 2 provided with spikes for pole climbing. The bottom part 4 is a mainly uniform bottom part 4 manufactured of plastic or composite material which can be adjusted suitable in accordance with the footwear and foot size in the width, height and depth directions. An adjustable head part of the climbers can be open or cover the toe of the footwear. Furthermore, the climbers include an ankle protector 3 fastened in the bottom part and a support part 5 fastened in it which is arranged to extend at the point of the hollow of the knee or in its vicinity. The climbers include a joint part 6 between the bottom part and the support part. The support 1 includes in the front part of the bottom part and in the top part of the support part fastening buckles 7, 8 for fastening it around the foot and the calf.
- 25
- 30
- 35 There can be one or more of the fastening buckles and they open totally. The foot

can be put in the footwear from its front the fastening buckles being open. In later embodiments, it is possible to put the footwear on in a different way.

5 The support part manufactured of plastic or composite material extends at the back of the foot or on the sides of the foot almost to the knee joint. The joint part 6 is somewhat flexible forward and backward to facilitate climbing. The joint part 6 can also be made rotatable such that the footwear fits in a small space to make transport and storage easier.

10 When using the climbers according to the invention, the bottom part is first adjusted in accordance with the footwear and foot size and the hook part is adjusted suitable for the pole size. The support part is opened from the front by opening the fastening buckles and unfolding the side parts open such that the foot and the footwear are able to fit in. Then, the foot is put inside the support part, the leg and the foot are supported against the support part and the bottom and the fastening buckles are tightened to suitable fitness.

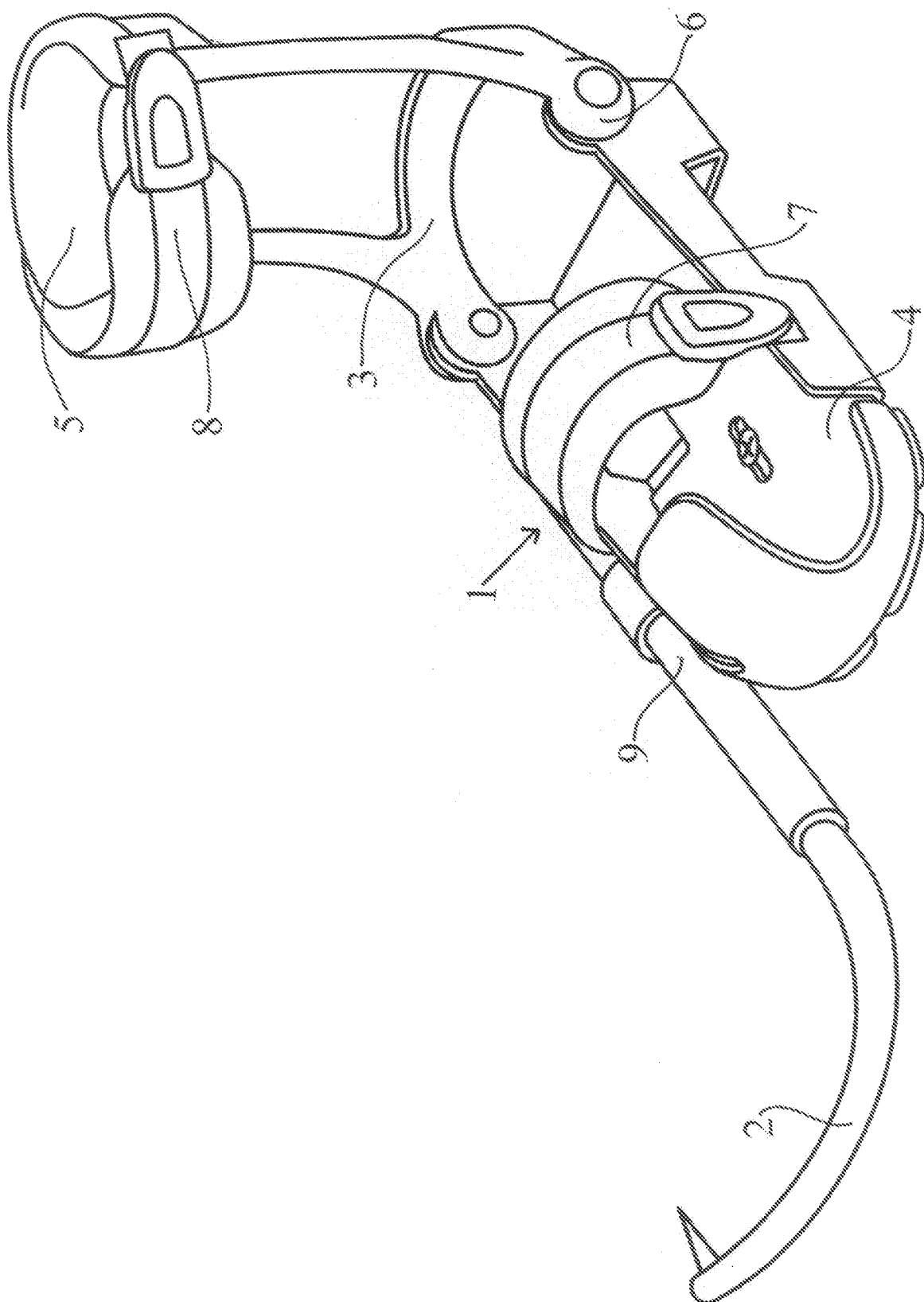
15 A quick-release fastening mechanism known as such can be arranged between the ankle protector and the hook part such that, in case of a pole falling or some other emergency, the user can unfasten the hook part from the footwear and drop down. The quick-release fastening mechanism also enables the replacement of the hook part when required. In other embodiments, it is also possible to unfasten
20 the quick-release fastenings such that the hook part can be turned to the vertical position to enable walking or to some other such position in which it does not impede walking.

The invention is not limited to the described advantageous embodiments, but it can vary within the scope of the inventive idea presented in the claims.

CLAIMS

1. Climbers which include a support (1) releasably fastenable in footwear which includes a bottom part (4) and a hook part (2) fastened in the bottom part for pole climbing, c h a r a c t e r i s e d in that the climbers include an ankle
5 protector (3) fastened in the bottom part (4) and a support part (5) fastened in it which is arranged to extend at the point of the hollow of the knee or in its vicinity.
2. Climbers according to claim 1, c h a r a c t e r i s e d in that the ankle
10 protector includes a joint part (6) between the bottom part (4) and the back part (5).
3. Climbers according to claim 1 or 2, c h a r a c t e r i s e d in that the ankle protector includes fastening buckles (7, 8) for fastening the back part and the bottom part (4) around the foot.
4. Climbers according to any one of claims 1–4, c h a r a c t e r i s e d in
15 that the bottom part is fastened with a bracket part (9) in which the hook part is fastened.
5. Climbers according to claim 4, c h a r a c t e r i s e d in that the bracket part (9) is a bracket tube in which the hook part (2) is fastened adjustably, rotatably and lockably.
- 20 6. Climbers according to claim 4 or 5, c h a r a c t e r i s e d in that the bracket part (9) includes an emergency release mechanism for the total unfastening of the hook part (2) from the climbers.

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/FI2010/050808

A. CLASSIFICATION OF SUBJECT MATTER

See extra sheet

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC: A63B, A43C, A61F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

FI, SE, NO, DK

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal, WPI

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	SU 1044297 A1 (PROIZV OB NALADKE) 30 September 1983 (30.09.1983) Figs. 1 and 2; abstract [online] EPOQUENET WPI	1-6
Y	CN 201283197 Y (GONG CHENG) 05 August 2009 (05.08.2009) Fig. 1; abstract [online] EPOQUENET WPI	1-6
A	RO 122399 B1 (NAKITA PRODCOMIMPEX S R L) 29 May 2009 (29.05.2009) abstract [online] EPOQUENET WPI	1, 4, 5
A	FI 1313 U (KESKI SUOMEN VALO OY) 19 April 1994 (19.04.1994) page 2, lines 9 – 25; Figs. 1 and 2	1, 4, 5
A	DE 3221429 A1 (SCHWARZWAELDER WERNER) 08 December 1983 (08.12.1983) Fig. 1; abstract [online] EPOQUENET WPI	1, 4, 5, 6

☐ Further documents are listed in the continuation of Box C.☒ See patent family annex.

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"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

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