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(54) **CUSHIONING SAFETY POST**

(57) The shock-absorbing belaying post consists of two coaxial upper (2) and lower (5) profile elements and a connecting rod (4) with a smaller circumference than the circumferences of the profile elements (2, 5), placed coaxially between them. The upper (2) and lower (5) profile elements are joined to the connecting rod (4) inseparably, and the length of the lower (5) profile element is not less than the length of the upper (2) profile element and not more than eight times the length of the upper (2) profile element. The connecting bar (4) is from 3 to 8 times shorter than the upper profile element (2), moreover, the upper profile element (2) is equipped in the top part with at least one handle (1) for connecting the belaying subassembly.

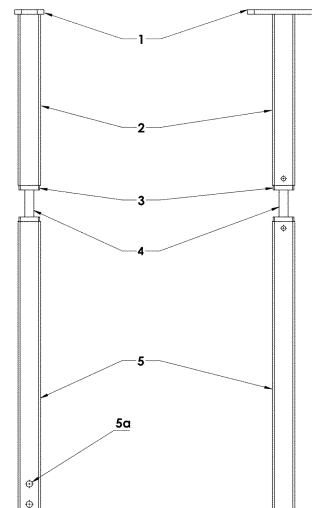


Fig. 1

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Description

[0001] The subject of the invention is a shock-absorbing belaying post that is part of a fall protection system.

[0002] Work at heights is carried out in a wide variety of conditions, so the systems that protect people performing activities on the roofs of buildings, containers, walls, scaffolding must be closely adapted to each of these conditions.

[0003] At present, there is a lack of comprehensive solutions that enable safe work at height, especially on construction sites. Moreover, the solutions used so far do not fully comply with current health and safety regulations. Workers use ladders for work without fall protection.

[0004] Among other things, vertical partitions attached to formwork panels via posts are used to ensure safety on construction sites. Thus, from the description of the invention WO2017178460A1 is known a safety railing for floor formwork, characterized in that it consists of: at least two support posts under one or more fall protection elements, where for each post the post support bracket is equipped with clamping means for reversible coupling to the side of the support beam or formwork slab, and the said clamping means have a locking arrangement acting on the wedge principle. From the description of the invention WO2022036445A1 also known a similar post for attaching a balustrade. On the other hand, from the description of the invention JP2018025000A, a main rope support in the form of a post, attached to the top of the formwork, is known. The support consists of a base of square cross-section with truncated vertices attached to the formwork structure and a support part inserted into the base.

[0005] The essence of the solution according to the invention is that the belaying post consists of two coaxial upper and lower profile elements and a connecting rod with a smaller circumference than the circumference of the profile elements placed coaxially between them, with the upper and lower profile elements fused to the connecting rod inseparably. The length of the lower profile element is not less than the length of the upper profile element and not more than eight times the length of the upper profile element, while the connecting rod is 4 to 10 times shorter than the upper profile element. In addition, the top profile element is equipped in the top part with at least one bracket for connecting the belaying subassembly.

[0006] In an advantageous design, the top and bottom profiles have a quadrangular outline.

[0007] Advantageously, the top and bottom profiles have a square-shaped outline. Advantageously, the top and bottom profiles have a rectangular outline,

[0008] In an advantageous embodiment, the connecting rod has a circular cross-section, and the ratio of the diameter of the connecting rod to the diagonal of the upper profile member is from 1:4 to 10:16.

[0009] Advantageously, the ratio of the diameter of the

connecting rod to its length is from 2:3 to 1:6.

[0010] In an advantageous execution, the bracket for connecting the belaying subassembly is in the form of a flat bar with two holes symmetrical with respect to the shorter axis of symmetry, attached to the upper plane of the upper profile element inseparably.

[0011] Advantageously, the holes in the flat bar have the shape of an oval, the edge section of which, close to the shorter side of the top bracket plate, is arched with the formation of an obtuse angle.

[0012] In an advantageous execution, the handle is in the form of a vertical post fixed on top of the top profile.

[0013] Advantageously, the post is provided with at least one mounting bracket having the form of a clamp with through mounting holes located opposite to each other and a U-shaped profile permanently fixed to the surface of the clamp, in the arms of which there are mounting holes.

[0014] Advantageously, the mounting brackets are attached to the belay post below the connecting rod.

[0015] In an advantageous design, the bottom profile has through mounting holes at the bottom.

[0016] Advantageously, the post is attached to a vertical pillar.

[0017] Advantageously, the post is seated on a base in the shape of a vertical profile fixed to the ground.

[0018] Advantageously, the post is attached to a horizontal sheet fixed to the ground.

[0019] Energy absorption of belaying posts, is mainly related to their deflection. As a result of exceeding the load allowed for the posts, especially the dynamic load, part of the energy is absorbed by the post during its bending. In special cases, including dynamic loading, significant amounts of heat are released at the point of greatest stress concentration and the formation of the so-called plastic joint. The strength of such a post is greater than the strength resulting from calculations for static loading. When analyzing the design of a post, it should be noted that the higher the load capacity of the post, that is, the lower the deflection under load, the lower the load-absorbing capacity such a post has. This means that in the extreme case when using posts with a very high load capacity, these posts may not have much energy absorption capacity. The main advantage of the post according to the invention is that, thanks to the use of a connecting rod with a much smaller circumference and a much smaller length than the circumferences and lengths of the top and bottom profiles, controlled bending of the post at the point of constriction while maintaining its belaying function is achieved with the appropriate choice of parameters and materials used.

[0020] The post according to the invention has a universal application and is part of the entire belaying system of people working at heights, including on formwork walls, containers, roofs or scaffolding.

[0021] The object of the invention is shown in examples of execution in the figure, where Fig. 1 are two side views of a post equipped with a flat bar, Fig. 2 - top view of a

flat bar, Fig. 3 - view of a post equipped with a collar mounted on a trapezoidal sheet, Fig. 4 - view of a post with mounting brackets installed on the formwork, Fig. 5 - view of post mounted on container, Fig. 6 - view of post embedded in base with vertical profile, Fig. 7 - view of post mounted against vertical wall, Fig. 8 - view of post mounted on starters and connected with belaying rope, Fig. 9 - cross section of post.

[0022] The post consists of two coaxial upper profile elements 2 and lower profile element 5 of quadrangular cross-section and a connecting rod 4, preferably of circular cross-section and smaller in circumference than the circumferences of profile elements 2 and 5, placed between them coaxially. The upper profile elements 2 and lower profile element 5 are welded to the connecting rod 4, with the lower end of the upper profile element 2 and the upper end of the lower profile element 5 being blanked with sheet metal 3 of 4 to 12 mm thickness. The upper profile member 2 can be the length of the lower profile member 5, but it is advantageous for it to be much shorter, up to eight times. The connecting rod 4 is from 3 to 8 times shorter than the upper profile element 2. Thus, in the example post, the length of the upper profile element 2 is 40 cm, the length of the connecting rod - 5 cm, and the length of the lower profile element - 2 m. The dimensions of the individual elements of the post, including their cross-section and wall thickness, were selected so that the post could meet the strict standards related to the effectiveness of the developed protections. For example, according to PN-EN 795, the maximum permanent deflection of the post when the anchor point is loaded with a force of 700N must be less than 10 mm. Therefore, the ratio of the diameter of the connecting rod 4 to its length is from 3:5 to 1:13, and the ratio of the thickness of the walls of the upper 2 and lower 5 profiles to the length of their sides is from 3 to 11 for a square section and from 3 to 17 for a rectangular section.

[0023] In addition, the upper profile element 2 is equipped in the top part with at least one bracket 1 for connecting a belaying component, for example, a rope equipped with carabiners. Such a rope is stretched between two adjacent posts as shown in Fig. 8. The holder 1 for connecting a belaying subassembly may be in the form of a flat bar with two holes 1a symmetrical with respect to the shorter axis of symmetry, attached to the upper plane of the top profile 2 inseparably, as shown in Fig. 1 and Fig. 2. The holes 1a in the flat bar have the shape of an oval, a portion of the edge of which, close to the shorter side of the top holder plate, is arched with the formation of an obtuse angle. The handle 1 can also be in the form of a vertical collar fixed on top of the top profile 2 as shown in Fig. 3.

[0024] The post may be provided with at least one, and preferably two, fixing brackets 6, having the form of a clamp 6a with through mounting holes 6b located opposite to each other and a U-shaped profile 6c permanently fixed to the surface of the clamp, in the arms of which there are through mounting holes 6d, as shown in Fig.

4. By means of the bracket 6, the post is fixed to formwork structures.

[0025] In addition, the bottom profile 5 has through mounting holes 5a in its lower part.

[0026] Fig. 5 - Fig. 9 show different ways of mounting the post according to the needs. Thus, the post can be attached to a vertical pillar, set on a base in the shape of a vertical profile fixed to the ground, or attached to a horizontal sheet fixed to the ground.

Claims

1. A shock-absorbing belaying post made of vertical metal profiles, **characterized by** the fact that it consists of two coaxial upper (2) and lower (5) profile elements and a connecting rod (4) with a smaller circumference than the circumferences of the profile elements (2, 5) placed coaxially between them, the upper (2) and lower (5) profile elements being joined to the connecting rod (4) inseparably, and the length of the bottom profile element (5) is not less than the length of the top profile element (2) and not more than eight times the length of the top profile element (2), while the connecting rod (4) is from 3 to 8 times shorter than the top profile element (2), in addition, the top profile element (2) is equipped in the top part with at least one handle (1) for connecting the belaying subassembly.
2. The post according to claim. 1 **characterized by** the fact that the upper (2) and lower (5) profiles have a quadrangular outline.
3. the post according to claim. 2 **characterized by** the fact that the upper (2) and lower (5) profiles have a square-shaped outline.
4. the post according to claim. 2 **characterized by** the fact that the upper (2) and lower (5) profiles have a rectangular-shaped outline.
5. the post according to claim. 1 **characterized by** the fact that the connecting rod (4) has a circular cross-section, and the ratio of the diameter of the connecting rod (4) to the diagonal of the upper profile element (2) is from 1:4 to 10:16.
6. post according to claim. 1 **characterized by** the fact that the ratio of the diameter of the connecting rod to its length is from 3:5 to 1:13.
7. the post according to claim 1, **characterized by** the fact that the bracket (connecting rod) is from 3:5 to 1:13. 1 **characterized by** the fact that the holder (1) for connecting the belaying subassembly is in the form of a flat bar with two holes (1a) symmetrical with respect to the shorter axis of symmetry, attached to

the upper plane of the upper profile (2) inseparably.

8. The post according to claim. 7, **characterized by** the fact that the holes (1a) in the flat bar have the shape of an oval, a fragment of the edge of which, close to the shorter side of the top bracket plate, is arched with the formation of an obtuse angle. 5
9. post according to claim. 1 **characterized by** the fact that the handle (1) is in the form of a vertical collar fixed on top of the upper profile (2). 10
10. the post according to claim. 1 **characterized by** the fact that it is provided with at least one fixing bracket (6), having the form of a clamp (6a) with through mounting holes (6b) located opposite to each other and a U-shaped profile (6c) permanently fixed to the surface of the clamp, in the arms of which there are through mounting holes (6d). 15
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11. post according to claim. 10 **characterized by** the fact that the mounting brackets (6) are attached to the belay post below the connecting rod (2).
12. the post according to claim. 1 **characterized by** the fact that the bottom profile (5) has through mounting holes (5a) in the lower part. 25
13. the post according to claim 1, **characterized by** the fact that the post is fixed in the lower part with mounting holes (5a). 1, **characterized by** the fact that it is attached to a vertical pillar. 30
14. the post according to claim 1 known in that it is embedded in a vertical pillar. 1 known in that it is seated on a base in the shape of a vertical profile fixed to the ground. 35
15. post according to claim 1 known by the fact that it is fixed to a vertical pillar. 1 known in that it is attached to a horizontal sheet fixed to the ground. 40

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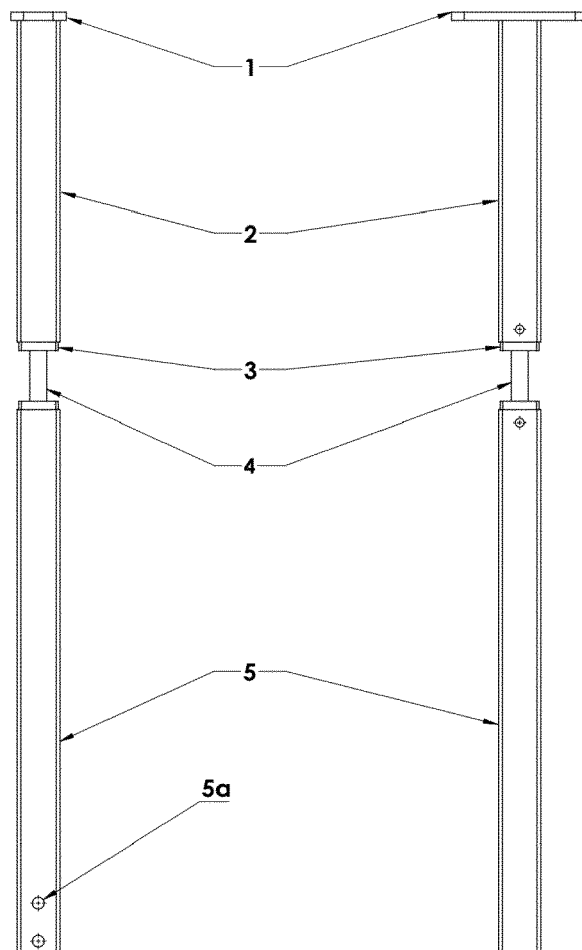


Fig. 1

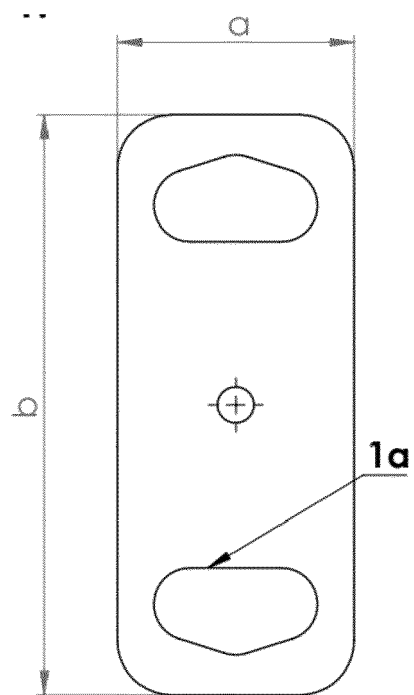


Fig. 2

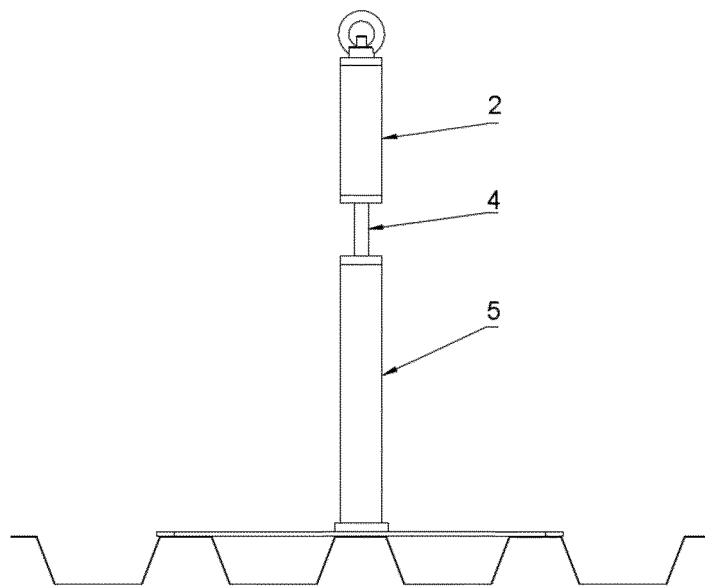


Fig. 3

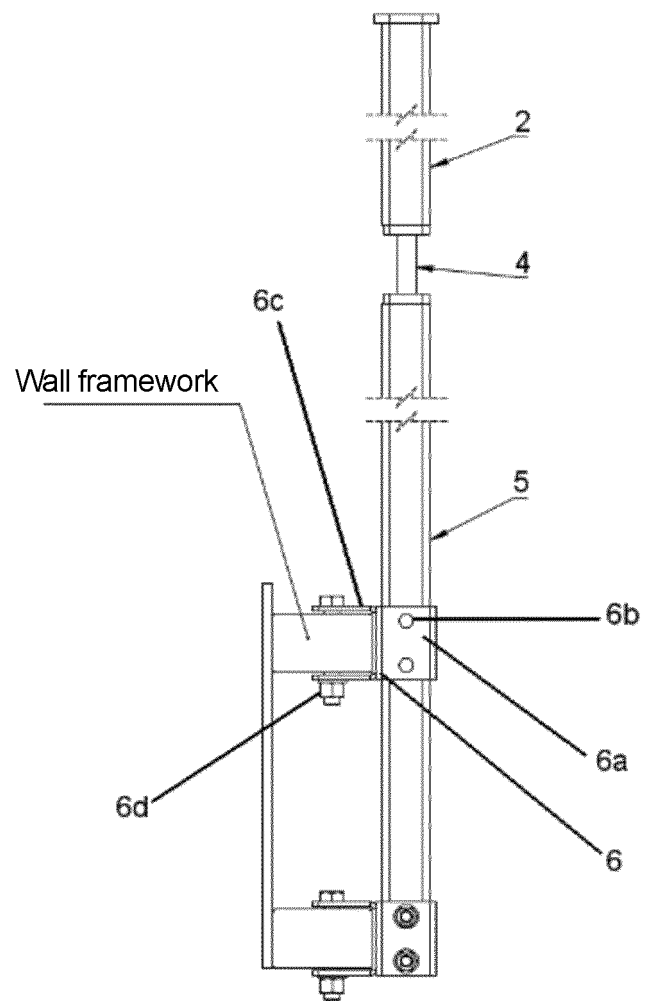


Fig. 4

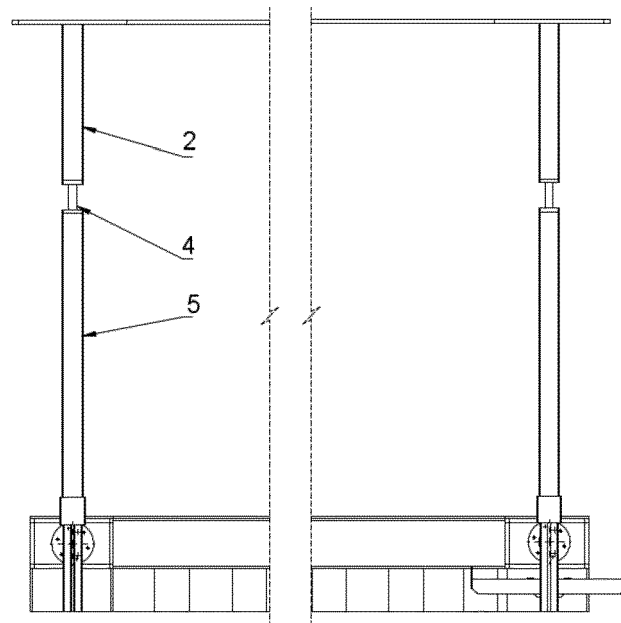


Fig. 5

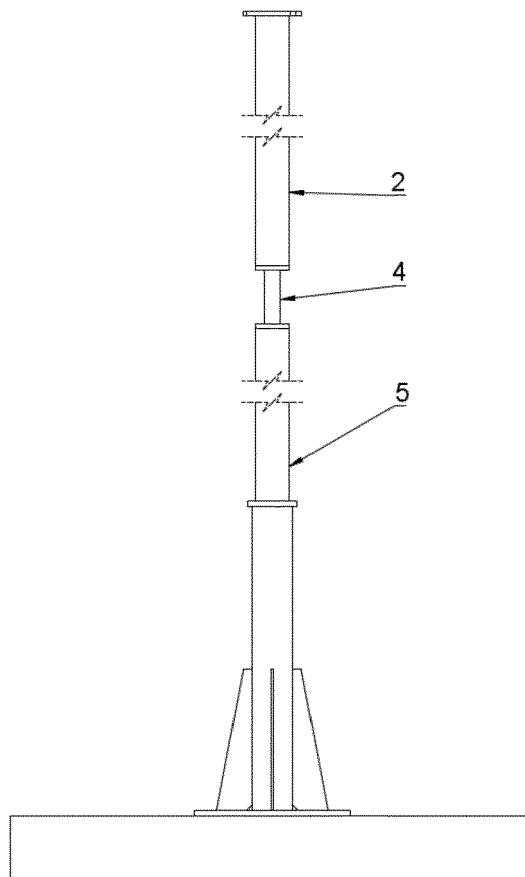


Fig. 6

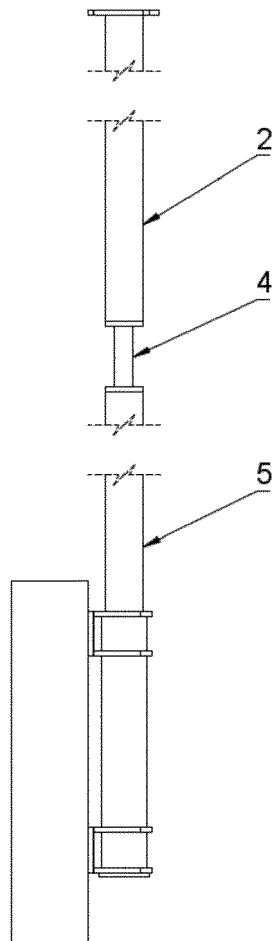


Fig. 7

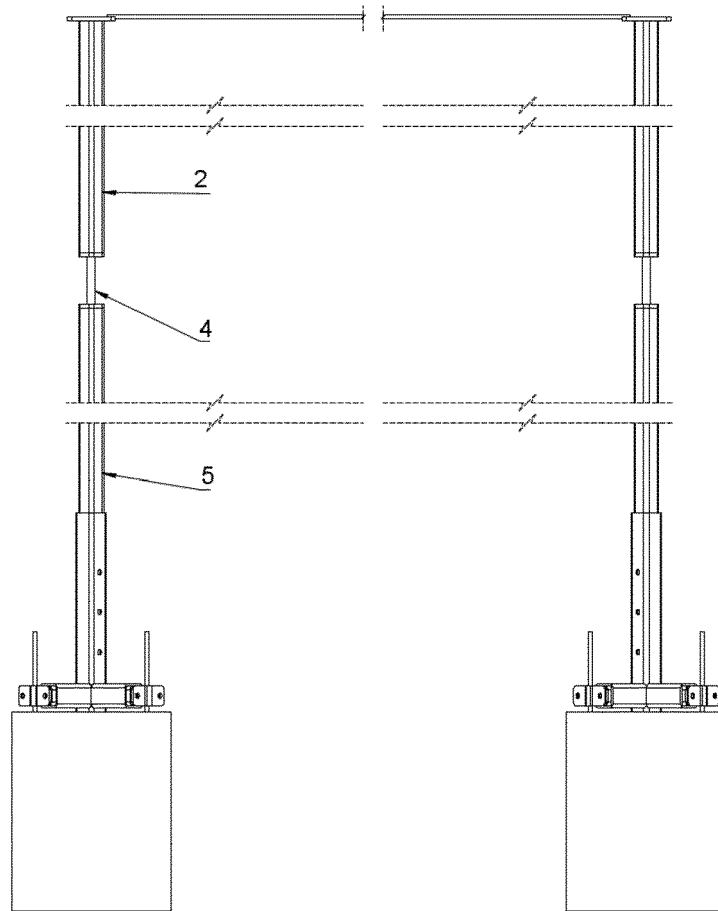


Fig. 8

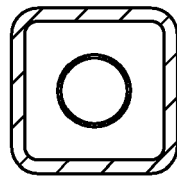


Fig. 9



EUROPEAN SEARCH REPORT

Application Number

EP 23 17 0217

DOCUMENTS CONSIDERED TO BE RELEVANT

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EPO FORM 1503 03.82 (P04C01)

Place of search	Date of completion of the search	Examiner
The Hague	11 January 2024	Baumgärtel, Tim
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