

SIDE PROTECTION SYSTEM

- 5 The invention relates to a side protection system for construction sites having securing elements fastened to a plurality of carriers. Side protection systems of this kind serve to counter falls of persons or the escape of construction material due to the influence of wind during the construction phase.
- 10 Side protection systems are known from the prior art, for example, in which guard rails, crossbars or gratings fastened at the floor side are attached. It is of disadvantage in these systems that the fastening of the guard rails usually effected by means of screws and dowels is complex
- 15 and/or expensive in design and that only rail-high side protection systems can be set up with a reasonable effort and/or expense. It is furthermore known to clamp vertical posts between the floor and the ceiling and then to fasten suitable securing elements to these vertical posts in order to set up a room-high side protection system. The vertical posts are in this
- 20 respect, however, only held between the floor and the ceiling by means of friction, which represents a safety risk. Finally, side protection systems are also known in which elements are fastened to wall elements or support elements by means of dowels and screws, which has the result in a disadvantageous manner, in addition to the required time effort, that
- 25 holes in the wall or support elements provided for this purpose have to be closed again for cosmetic reasons after removing the side protection system.

All known side protection systems additionally have the disadvantage that they can only be adapted to different sizes of the building openings to be closed by them in a complex and/or expensive manner, with in particular securing elements having to be kept available in different sizes.

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It is an object of the invention to provide an improved side protection system which can be set up in a simple manner while ensuring high security and which can be constructed in different sizes in an uncomplicated manner.

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This object is satisfied in accordance with the invention by the features of claim 1 and in particular in that the respective carrier comprising a flexible material are arranged under tension between two respective wall elements or side elements extending vertically, with grating-shaped
15 securing elements being releasably connected to at least two carriers spaced vertically apart from one another.

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Instead of the carriers which are known from the prior art and which are usually designed as vertically extending rigid posts, in accordance with the invention, flexible carriers are now used which as a rule extend in the horizontal direction between mutually spaced apart wall elements or support elements. Due to the use of a flexible material, an uncomplicated and stepless length adaptation becomes possible in at least the horizontal direction since it is unproblematic only to put such a section of a
25 comparatively long flexible carrier under tension which corresponds to the spacing between the two wall elements or support elements, whereas the remaining section of the flexible carrier can hang down freely in an unused manner. The fastening of a flexible carrier to a wall element or support element likewise becomes extremely advantageous In accordance
30 with the invention since, with support elements and also with narrow wall

elements, these elements can be surrounded simply by the flexible carrier, whereupon the carrier is then put under tension. In this case, the flexible carrier forms a loop which engages around the wall element or support element without the flexible carrier having to be fixed to the wall element or support element by additional fastening elements such as screws or dowels. In this case, the drilling, dowel application and screwing known from the prior art can consequently be completely dispensed with. The same applies accordingly to the closing of boreholes and dowel hoses previously required for cosmetic reasons after removal of the side protection system since no such holes are required when a wall element or support element are surrounded by a flexible carrier in accordance with the invention.

If a flexible carrier in accordance with the invention has to be fastened to a comparatively wide wall element which cannot be surrounded by the carrier, it is possible to attach clamps or ferrules to the wall element while avoiding boreholes and the flexible carrier can then be fastened thereto, in particular hung thereon. It is alternatively naturally also possible to fasten a suitable wall connection element to a wall element by means of screws or dowels and then to connect the flexible carrier to this wall connection element.

In accordance with the invention, only very few, or no boreholes at all are therefore required in the wall elements or support elements and no boreholes are required in the floor region and ceiling region for the attachment of the side protection system, which greatly simplifies the construction of the side protection system in accordance with the invention. It is furthermore possible without difficulty with the side protection system in accordance with the invention to adapt the respective required length of the flexible carriers without the provision of elements of

different sizes. Finally, a very secure fastening of the carriers to the wall elements or support elements is achieved by the surrounding of the wall elements or support elements by these flexible carriers, which, for example, brings about a substantial advantage with respect to such side protection systems in which vertically extending posts are jammed between the floor and the ceiling with friction locking.

It is furthermore of advantage that the carriers in accordance with the invention can be fastened to the wall elements or support elements when the assembler is still secured by rail elements of a slab formwork located in the level beneath him. The setup of the side protection system in accordance with the invention is thus possible before the next ceiling is concreted so that the safety of the assembler is given at all times. The safety of the assembler of the side protection system in accordance with the invention can additionally be increased in that an assembler hangs his personal securing device to already assembled carriers in accordance with the invention.

Finally, only an extremely slight noise development results in the side protection system in accordance with the invention since no components of this side protection system have to be connected to hollow metal parts as is frequently the case in the prior art.

The invention can be implemented particularly advantageously if the flexible carrier is produced from a textile material and is designed in belt form. Such a carrier is preferably several centimeters wide and/or at most 5 mm thick. Such carriers are available commercially in stable and inexpensive variants, can be transported and stored in a space-saving manner in the rolled up state and can also be set under tension by means of commercial ratchet tensioners so that the side protection system in

accordance with the invention can be made available with safety losses with a small economic effort.

Alternatively to belt-type carriers, carriers can, however, also be used, for example, in the form of ropes.

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In a particularly economic variant of the side protection system in accordance with the invention, a carrier comprises flexible material has precisely one ratchet tensioner by which a carrier arranged between two wall elements or support elements can be set under tension. In this

10 respect, the free end of a carrier section can have an eyelet and the free end of another carrier section can have a hook which is dimensioned so that it is movable through the eyelet. This embodiment, which can be assembled without difficulties by a single assembler, will be explained in more detail in the following with reference to Fig. 13.

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Alternatively, each carrier comprising flexible material has one or more ratchet tensioners. In the simplest case, in this respect the two wall elements or support elements are located within a single loop which is then set under tension using a single ratchet tensioner. In this version,

20 only a small number of ratchet tensioners are required for the setup of the side protection system in accordance with the invention; however, comparatively large carrier lengths are required since two carrier sections always extend parallel to one another between the two wall elements or support elements located within the common loop, even though a single
25 such section would be sufficient for fastening the securing elements. In addition, it is of disadvantage in this variant that it can only be assembled with difficult by a single assembler since the carrier tends to slip downward due to gravity before the tightening at the wall elements or support elements.

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A further alternative possibility for fastening and tensioning a carrier between two wall elements or support elements comprises the fact that a section of the carrier is tensioned about a vertically extending first wall element or support element by means of a ratchet tensioner: and/or

5 a section of the carrier is tensioned about a vertically extending second wall element or support element by means of a ratchet tensioner; and/or a section of the carrier is tensioned between two further sections of the carrier or between a further section of the carrier and a vertically extending wall element or support element.

10 In the following, for simplification, a carrier section tensioned about a wall element or support element by means of a ratchet tensioner is called a "support belt" and a carrier section extending between two wall elements or support elements is called a "horizontal belt". It is nevertheless possible to form the so-called support belts and horizontal belts as a rope.

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In accordance with the above-described embodiment, in which a plurality of ratchet tensioners are used at a plurality of sections of a carrier, it is preferred if a respective support belt is fastened by means of one respective ratchet tensioner to one respective wall element or support element by

20 clamping tight. Each of these support belts can then have, for example, one, two or three eyelets and hooks to which a horizontal belt can be fastened in a simple manner. Such a horizontal belt then extending between two support belts can in turn be tensioned by means of a third ratchet tensioner, whereupon the carrier comprising a total of three
25 sections (two support belts and one horizontal belt) is fully assembled.

Such an assembly can be carried out in a simple manner by a single assembler since a sliding off of these support belts is reliably prevented due to the clamping tight of the support belts to the wall elements or support elements which takes place first.

In another embodiment of the invention, a support belt is tensioned by a ratchet tensioner only at one of the two wall elements or support elements, whereupon a horizontal belt is fastened to this support belt, is looped around the other wall element or support element, is guided back
5 to the support element and is finally fastened there. Subsequently, this horizontal belt can then be tensioned by means of a ratchet tensioner. In this case, the use of a third ratchet tensioner is saved; however, a much greater length of the horizontal belt is required.

- 10 Alternatively to the use of a support belt, a carrier or horizontal belt can also be fastened to a wall connection element which is clamped or screwed to a wall element. This is in particular sensible when a wall element is dimensioned such that a support belt with a very large circumference would be required. A horizontal belt can in this respect be clamped either
15 between two wall connection elements or between a wall connection element and a support belt.

It is particularly preferred if a wall connection element has a fixing section for engagement into a recess of a securing element. In this case, the fixing
20 section can be introduced into the recess of the securing element on the fastening of the securing element, whereby the securing element is fixed in the horizontal direction along the carrier. It is avoided in this manner that too large a gap arises between the wall element carrying the wall connection element and the adjacent securing element. In addition, a
25 subsequent slipping of this securing element is effectively countered. In this case, the wall connection element therefore has a dual function. On the one hand, it provides a fastening possibility for a carrier or for a horizontal belt; on the other hand, it fixes a securing element.

On the use of grating-shaped securing elements, the fixing section can simply engage into a recess anyway present in the grating grid without a special recess having to be provided in the securing element here.

- 5 The securing elements are preferably fastened to the carriers using coupling elements which each have an open or closed eyelet whose size is adapted to the cross-section of the carriers. The coupling elements can in this respect be designed as simple bending wire parts. The function of the coupling elements comprises the fact of preventing a movement of the
- 10 securing elements perpendicular to the carrier or perpendicular to the plane of the securing elements. For this purpose, a suitable latch prolongation which will inter alia be explained in more detail within the framework of the description of the Figures is provided at the eyelet of a coupling element.
- 15 On the use of closed eyelets, it is necessary to thread the coupling elements onto the carrier before the attachment of the carriers to the wall elements or support elements, which then brings about the advantage that the coupling elements no longer represent separate, losable parts. On the use of open eyelets, it is, in contrast, also possible to fasten coupling
- 20 elements to already tensioned carriers.

When a carrier or a horizontal belt is tensioned over a particularly great length, it is possible to fasten the carrier to an additionally provided ceiling support using a coupling element, with the coupling element in

25 this respect preferably being introduced into a locating hole of such a ceiling support in order thus to achieve an additional vertical support of the carrier.

On the assembly of the securing element to carriers by means of the

30 named coupling elements, the securing elements are leant onto the

carriers from the inner side of the building and is then fixed to said carrier using coupling elements. When grating-type securing element having a corresponding grating grid are used, they are still vertically accessible over a specific spacing by means of the coupling elements. As a rule, such
 5 movable securing elements are supported at the ground side in the vertical direction.

It is particularly preferred if the coupling element has a latch prolongation which extends obliquely to the plane bounded by the eyelet. In this
 10 respect, the coupling element connected to a belt-shaped carrier can be pivotable about an axis extending perpendicular to the belt-shaped carrier with a slight deformation of said carrier to generate a bayonet locking between the coupling element and the securing element. To allow this pivoting, it is sensible to provide the coupling element with an additional
 15 handle section at which the coupling element can be gripped by the assembler. The last-named embodiment of the coupling element will be explained in more detail within the framework of the description of the Figures.

20 Alternatively to the use of the above coupling elements, the securing elements can also be provided with eyelets fixedly attached thereto and the respective carriers can be threaded into said eyelets.

It is particularly advantageous if mutually adjacent securing elements are
 25 pivotally mutually connected or connectable, in particular hookable, with each securing element preferably having hook elements at one longitudinal side and eyelet elements at the other longitudinal side. It is, however, equally possible to connect adjacent securing elements mutually pivotally by means of cable binders, belts, clamping belts, wires or ropes.
 30 With grating-shaped securing elements, in this respect e.g. the respective

mutually facing, most outward vertical struts are coupled to one another. A plurality of pivotally mutually connected securing elements are in this respect pivotable about an axis extending along its coupling line so that it can be adapted steplessly in a simple manner to different widths in

5 accordance with the concertina principle. In this respect, it is not necessary to fasten each securing element to the carriers using coupling elements. Two mutually coupled securing elements can rather, for example, be kinked away from a tensioned carrier in V shape without them themselves being directly fastened to the carrier since these two
10 securing elements are sufficiently fixed by the further securing elements adjacent to them. The further securing elements are in this respect attached to the tensioned carriers using coupling elements. Different width adaptations can be carried out without problem by such V-shaped securing elements kinked away from the carrier in dependence on the
15 kink angle. In addition, it is also possible, for example, to construct around columns or supports without interrupting a sequence of horizontally mutually adjacent securing elements. For this purpose, as required, more than two securing elements can also be kinked away from the carrier.

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It is of advantage if each securing element has two hook elements spaced apart from one another at one longitudinal side and two eyelet elements correspondingly spaced apart from one another at the other longitudinal side, with the free end sections of the two hook elements preferably being
25 able to be formed with different lengths. On the introduction of the two hook elements of a securing element into the two eyelet elements of a securing element adjacent thereto, the assembler can first concentrate on the hanging in of the hook element having the longer free end section. When this free end section has been introduced into the associated eyelet
30 element, the other hook element with the shorter free end section can then

be hung without problem into the second eyelet element of the adjacent securing element. In this manner, the coupling of mutually adjacent securing elements can be effected particularly simply by a single assembler.

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The hook elements of a row of a plurality of mutually hooked together securing elements can extend alternately upwardly and downwardly, with in particular all the securing elements being designed the same as one another. The mutually same design of the securing elements in this respect brings about an inexpensive manufacture and storage since no
10 mutually different securing elements have to be produced and kept available. Alternatively, it is, however, also possible within the framework of the invention to provide securing elements of two different types, for example, with respective different types of securing elements being
15 mutually adjacently coupled to one another.

If the hook elements of the securing elements extend alternately upwardly and downwardly, it is of advantage if the securing elements are hooked together pair-wise before their fastening to the carrier and are
20 then subsequently coupled as a pair of securing elements to securing elements already fastened to the carrier. It becomes possible in this respect, in dependence on the orientation of the first securing elements mounted on the carrier, to thread the pairs of securing elements either from above or from below onto the securing elements already fastened to
25 the carrier. If securing elements are supported at the floor side, they are as a rule threaded on from above; if they should be adjacent to a ceiling, they are threaded on from below.

It is possible in accordance with the invention to support first securing
30 elements at the floor side and to connect horizontal struts of second

securing elements to horizontal struts of the first securing elements with force transmission, with in particular first and second securing elements overlapping on another in the vertical direction. The force transmitting connection can be established in any desired manner, in particular by
5 means of cable binders, belts, clamping belts, wires or ropes. All these means make it possible to adapt the length of the loop which connects the two horizontal struts to one another to the respective circumstances. Such an arrangement of rows of securing elements overlapping in the vertical direction is in particular sensible when a room-high side protection should
10 be constructed.

Instead of the provision of the named force-transmitting connection, the second securing elements can also be supported at coupling elements which hold the first securing elements to a carrier.

15 If the rows of securing elements arranged mutually offset vertically are connected to one another with force transmission in the described manner, an additional stability of the total arrangement can be achieved in that region in which of a total of four securing elements a respective two are horizontally adjacent to one another and simultaneously a respective
20 two mutually overlap in the vertical direction vertical struts are also connected to one another with force transmission. Care must be taken in this respect that vertical struts of all four securing elements are connected to one another, e.g. by cable binders. In this manner, a grouping of four securing elements can be produced whose height can be individually set
25 by the loop length of the force-transmitting connection between the horizontal struts.

The securing elements which can be used within the framework of the invention are preferably designed in grating form. It is, however, equally
30 possible to use nets spanned in a frame, wooden plates, plastic plates,

Plexiglas plates or the like. The above-explained securing elements, which are pivotally connected to one another, can also be used as conventional fence elements without the carriers in accordance with the invention.

- 5 An advantage of the invention can also be seen in the fact that only very few different parts are required. It is sufficient to provide securing elements, column belts, horizontal belts, wall connection elements and coupling elements respectively made mutually the same to close openings in structures of any desired size practically without gaps and with small
10 effort.

Further preferred embodiments are explained in the dependent claims and in the description of the Figures.

- 15 The invention will be described in more detail in the following with reference to embodiments and to the Figures; there are shown in these:

- Fig. 1 a plan view of a securing element which can be used in accordance with the invention;
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- Fig. 2 a three-dimensional view of the securing element in accordance with Fig. 1;
- Fig. 3 a three-dimensional detail view of a first coupling region
25 between two securing elements;
- Fig. 4 a three-dimensional detail view of a second coupling region between two securing elements;

- Fig. 5 a plan view of four mutually coupled securing elements in accordance with Figs. 1 to 4;
- 5 Fig. 6 a three-dimensional view of three mutually coupled securing elements in accordance with Fig. 5;
- Fig. 7 a three-dimensional view of three mutually coupled securing elements pivoted with respect to one another;
- 10 Fig. 8 a three-dimensional view of mutually coupled securing elements which are fixed to a carrier;
- Fig. 9 a further three-dimensional view of mutually coupled securing elements which are fixed to a carrier;
- 15 Fig. 10 a three-dimensional view of a side protection system in accordance with the invention with a row of securing elements;
- 20 Fig. 11 a three-dimensional view of a side protection system in accordance with the invention with two rows of securing elements;
- Fig. 12 a three-dimensional view of a column built around by a side protection system in accordance with the invention;
- 25 Fig. 13 a three-dimensional view of two columns between which a carrier which can be used in accordance with the invention is tensioned; and
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Fig. 14 a three-dimensional view of a stack of securing elements which can be used in accordance with the invention.

5 Fig. 1 and 3 show a securing element which can be used In accordance with the invention in the form of a grating which is formed with vertical struts 12 and horizontal struts 14. Such a securing element 10 can, for example, have dimensions of 200 cm x 60 cm and a weight of approximately 7.5 kg so that it can be handled easily by a single
 10 assembler. Other dimensions and weights are equally possible, however. The grating grid defined by the vertical struts 12 and the horizontal struts 4 can be 20 mm x 100 mm, for example. Other dimensions are also possible here.

Such securing elements, which are rectangular in their basic shape, can
 15 be fastened In accordance with the invention both in a vertical alignment and in a horizontal alignment to horizontally or vertically extending carriers.

The second horizontal strut 14 from the top is formed at its left end as a
 20 hook element 16 with a long, vertically extending free end section 18. In a corresponding manner, the left end of the second horizontal strut 14 from the bottom is designed as a further hook elements 129 with a short, vertically upwardly projecting free end section 21.

25 The free end sections 18 and 21 are located within recesses 20 of the securing element 10 at the marginal side so that they essentially continue the pattern of the vertical struts 12. This arrangement enables the coupling of two securing elements 10 without the forming of a relevant gap between them.

The ends of the respective horizontal struts 14 disposed opposite the hook elements 16, 19 are each designed as eyelet elements 22 which are likewise located within marginal-side recesses 24 of the securing element 10 in order in turn to enable a largely gap-free coupling of two securing elements 10. The eyelet elements 22 extend in a plane extending perpendicular to the vertical struts 12 and the horizontal struts 14 so that two hook elements 16, 19 of a further securing element 10 can be introduced without problem into the eyelet elements 22 of the securing element 10 shown in Figs. 1 and 2.

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The two horizontal struts 14, which are provided with hook elements and eyelet elements 16, 19, 22, are each formed in two parts and overlapping at the center of the securing elements 10 in order thus to facilitate the production of the two parts of these horizontal struts 14. A single-part design of the horizontal struts 14 is, however, also possible. One of the two parts of these horizontal struts 14 respectively has the hook elements 16, 19 and the other the eyelet elements 22.

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Fig. 3 shows at the left a securing element 10 which is hung with its hook element 19 having a short free end section 21 from above into an eyelet element 22 of a further securing element 10 shown at the right. The free end section 21 in this respect extends vertically downwardly.

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In a corresponding manner, Fig. 4 shows at the left a securing element 10 which has been introduced with its hook element 16 having a long free end section 18 from below into the eyelet element 22 of a further securing element 10 shown at the right. The free end section 18 in this respect extends vertically upwardly.

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Figs. 3 and 4 thus illustrate that securing elements 10 can, on the one hand, be assembled to already assembled securing elements 10 in that they are introduced with their hook elements 16, 19 from above (Fig. 3 and from below (Fig. 4) into the eyelet elements of the already assembled securing elements 10. It is alternatively naturally also possible to plug on or thread n securing elements 10 to be assembled with their eyelet elements 2 from above or from below onto the hook elements 16, 10 of already assembled securing elements 10.

10 Figs. 3 and show that the recesses 20, 24 at the marginal side described in connection with Fig. 1 ensure that there is no gap between mutually coupled securing elements 10 which is substantially larger than the spacing between adjacent vertical struts 12 so that a very largely throughgoing grating grid can also be produced by coupled securing
15 elements 16.

Fig. 5 shows in a plan view four mutually coupled securing elements 10, with it being easily visible here that the hook elements 16, 19 of the individual mutually following securing elements 10 extend alternately
20 upwardly and downwardly. The following procedure is followed on the assembly of the securing elements 10 in accordance with Fig. 5:

If, for example, the securing element 10 shown at the left has already been assembled and if all securing elements 10 should be supported at the floor
25 side, the two middle securing elements 10 are hooked to one another and are then threaded as a pair from above onto the hook elements 16, 19 of the securing elements 10 shown at the left. Subsequently, a further pair of securing elements 10 or an individual securing element 10 can then be threaded from above onto the hook elements 16, 19 of the third securing
30 element from the left in accordance with Fig. 5.

If the securing elements 10 should be assembled adjacent to a ceiling and if the two securing elements 10 shown at the left have, for example, already been assembled, the two securing elements 10 shown at the right
 5 are first hooked to one another and are then threaded as a pair from below onto the hook elements 19, 19 of the second securing element 10 from the left in accordance with Fig. 5. Accordingly, further securing elements can then be coupled pair-wise or individually to the securing elements 10 shown in Fig. 5.

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Since the hook elements 16 have a longer free end section 18 than the hook elements 19, an assembler can first concentrate of the threading of an eyelet element 22 onto the free end section 18 and the subsequently on the threading of the further eyelet elements 22 onto the free end section
 15 21. The first eyelet element 22 is already connected to the hook element 16 during the second threading on so that the assembler can concentrate on the threading of the second eyelet element 22 onto the hook element 16. The same applies accordingly to the plugging in of hook elements 16, 19 into the eyelet elements 22.

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Fig. 6 shows a three-dimensional representation of an arrangement in accordance with Fig. 5, with here, however, only three securing elements 10 being shown.

25 Fig. 7 shows in a three-dimensional view three securing elements 10 which are tilted toward one another like a concertina. This tilting is possible since the hook elements 16, 19 introduced into the eyelet elements 22 have the effect of hinges which allow a pivoting of the securing elements about the axis of the free end sections 18, 21 of the
 30 hook elements 16, 19. The total width of a plurality of mutually coupled

securing elements 10 can be steplessly set by this possibility of pivoting. An enlarged pivot angle in this respect effects a shortening of the total width of such a row. Furthermore, the pivoting opens up the possibility of building around columns 10, for example, with securing elements 10
5 coupled In accordance with the invention such as will be explained in more detail in the following in connection with Fig. 12.

Fig. 8 shows two securing elements 10 which are coupled to one another by means of hook element 16 and eyelet element 22 and which are fixed to
10 a horizontally tensioned belt-shaped carrier 26, with here a view of an inner building side being shown. A view of the outer building side is shown in Fig. 9, with here the coupling of the two securing elements 10 by means of the hook element 19 and of the eyelet element 22 being shown. The carrier 26 in this representation extends in front of the securing
15 elements 10, whereas it extends behind the securing element 10 in accordance with Fig. 8.

In accordance with Fig. 8 and Fig. 9, a respective securing element 10 is connected to the carrier 26 by means of a coupling element 28, with the
20 coupling elements 28 being designed identical to one another in accordance with Fig. 8 and Fig. 9.

The coupling element 28 has an open eyelet 30 whose shape is adapted to the cross-section of the belt-shaped carrier 26. The eyelet 30 of the
25 coupling element 28 can either be threaded onto the carrier 26 before the tensioning thereof or an already tensioned carrier 28 can be introduced into said eyelet with a certain deformation of said carrier through the opening of the eyelet 30 (visible in Fig. 8). Since the carrier 28 has the shape of a belt and since the shape of the eyelet 28 is adapted to the
30 shape of the carrier 26, it is not possible to rotate the coupling element 28

over a larger angular range about the longitudinal axis of a tensioned carrier 26. It is ensured in this respect that a prolongation 32 of the coupling element 28 extending from the eyelet 30 perpendicular to a securing elements 1 through its vertical struts 12 is held in its position in a relatively stable manner. The prolongation 32 passes over a handle section 34 which is bent substantially in U shape and at which an assembler can grip the coupling element 28 and can rotate it about the axis of the prolongation 32 with a slight deformation of the carrier 26.

- 10 A latch prolongation 36 adjoins the handle section 34 and extends obliquely to the plane bounded by the eyelet 30 and thus engages together with a securing section 38 projecting from it in the direction of the carrier 26 behind a vertical strut 12 so that a bayonet lock connection results between the coupling element 28, the carrier 26 and the securing element 10.

On the establishing of a connection between the carrier 26 and the securing element 10, the securing element 10 is leant onto the carrier 26 from the inner building side so that the handle section 3 of at least one coupling element 28 extends through two vertical struts 12 of the securing element. Subsequently, an assembler grips the handle section 34 and rotates it in the arrangement shown in Fig. 8 clockwise such that the latch prolongation 36 extend downwardly in the vertical direction. In this respect, the belt-shaped carrier 26 is slightly deformed by the eyelet 30. In this position, the latch prolongation 346 with the securing section 38 adjoining it can then also be moved through the two vertical struts 12 of the securing element 12 until the vertical struts 12 of the carrier 26 touch. Subsequently, the assembler releases the handle section 34 again, whereupon the carrier 26 standing under tension is dismantled again and thereby aligns the eyelet 30 vertically. This has the result that the latch

prolongation 36 with its securing section 38 again moves into the position shown in Fig 8 in which it engages behind a vertical strut 12 and thereby fixes the securing element 10 to the carrier 26.

5 The decoupling of the securing element 10 and the carrier 26 takes place in the reverse order.

In accordance with the invention, it is not necessary to fix each securing element 10 of a row of mutually coupled securing elements 10 to the carrier 26 by means of coupling elements 28. It is rather the case that
 10 here some securing elements 10 can easily be saved since they are held in a sufficient manner via the hook connections 16, 19, 22 at such securing elements 10 which are in turn coupled to the carrier 26.

Fig. 10 shows a building opening 40 which is formed in an arched façade
 15 and which is bounded by a floor 42, by a ceiling 44 and by two columns 46.

A respective three column belts 48 mutually spaced apart vertically are fastened to both columns 46 by means of ratchet tensioners 50. The
 20 column belts 48 each have at least one eyelet 52 into which the ends of a horizontal belt 54 can be hooked.

Two respective column belts 48 of the two columns 46 located at the same level are connected to one another via a horizontal belt 54 which in turn
 25 likewise has a respective ratchet tensioner 50 by which it can be tensioned between the two columns 46. A unit of two column belts 48 and one horizontal belt 54 represents a carrier 26 in accordance with the invention. On the assembly of such a carrier 26, the two column belts 48 are fixed to the columns 46 by their ratchet tensioners 50. Subsequently,
 30 the horizontal belt 54 with its two ends is hung into the eyelets 52 of the

column belts 48 and is subsequently tensioned by means of a ratchet tensioner 50. This procedure can be carried out without problem by a single assembler.

- 5 It can be recognized in the outer right hand region of Fig. 10 that the column belts 48 each also have a further eyelet 52 into which further horizontal belts 54 can be hung which then extend to a column not shown in Fig. 10 and located to the right of the right column of Fig. 10, which illustrates that the side protection system in accordance with the
10 invention can be continued as desired in the horizontal direction.

- A ceiling support 56 is arranged approximately centrally between the two columns 46 in accordance with Fig. 10, with the horizontal belts 54 contacting this ceiling support 56 at the outer building side so that the
15 horizontal belts 54 are each kinked downward a little in the region of the ceiling support. It is hereby achieved that the side protection system in accordance with the invention extends to a maximum width at the outer building side so that the working space in the building interior is not restricted. In addition, it is possible to support the horizontal belts 54 in
20 the vertical direction at the by means of coupling elements 28 at the ceiling support, for example, in order thus to achieve additional stability.

- The securing elements 10 shown in Fig. 10 are coupled by means of coupling elements 28 in accordance with Figs. 8 and 9 to the two lower
25 horizontal belts 54 which extend parallel to one another. In this respect - as already mentioned - it is not necessary to connect every securing element 10 to the horizontal belts 54. It is rather the case that, for example, those securing elements which are located in the region of the ceiling support 56 or in the region of the columns 46 are pivoted away

somewhat from the horizontal belts 54 without being directly coupled to them.

The function of the topmost horizontal belt 54 in accordance with Fig. 10 results from the representation of Fig. 11 which substantially corresponds to the representation of Fig. 10, but additionally has an upper row of securing elements 10. In contrast to Fig. 10, a room-high side protection is achieved by the two mutually overlapping rows of securing elements 10 arranged over one another. The upper row of securing elements 10 is in this respect connected to the upper two horizontal belts 54 by means of coupling elements 28. The inherent weight of the securing elements 10 of the upper row is taken up by coupling elements 28 which are coupled to the middle horizontal belt 54. Horizontal struts 14 of the upper row of securing elements 10 are supported at these coupling elements 28 or at their prolongations 12 (see Fig. 8). As already mentioned above, it is alternatively and preferably possible to connect adjacent horizontal struts 14 of lower and upper securing elements 10 overlapping one another vertically to one another with force transmission, which can be effected, for example, by means of cable binders.

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Fig. 12 illustrates the manner in which a rectangular or round column 46 can be built around using a side protection system in accordance with the invention. A column belt 48 from which horizontal belts 54 extend in opposite directions is tightly bound to the column 46 by means of a ratchet tensioner 50. Fig. 12 shows that the securing element 10 shown at the far left as well as the second securing element 10 from the right are held by means of coupling elements 28 at one respective horizontal belt 54. The coupling element 28 shown at the right is in this respect provided in the region of the outermost vertical strut 12 of the respective securing element 10 so that the latter can be pivoted away from the horizontal belt

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54 about this vertical strut 12. The two securing elements 10 which adjoin the securing element 210 shown at the far left are not coupled to horizontal belts 54 so that overall the kinked extend to securing elements 10 in accordance with Fig. 12 can be reached with which a column 46 can be built around.

Fig. 13 shows two columns 46 mutually spaced apart vertically between which a carrier 26' is tensioned. The carrier 26' in this respect comprises a ratchet tensioner 50 to which two carrier sections are fastened in a commercial manner which can be tensioned toward one another by the ratchet tensioner 50. A first short carrier section has an eyelet 58 at its free end remote from the ratchet tensioner, whereas a second long carrier section has a hook 60 at its free end remote from the ratchet tensioner. Furthermore, an additional eyelet 59 is threaded onto the long carrier section.

The following procedure is followed on the attachment of the named carrier to a column 46 preferably taking place by a single assembler:

The long carrier section is looped around the column and is threaded through the eyelet 58 with the hook 60 at the front. In this manner, a loop is formed which surrounds the column 46. The additional eyelet 59 threaded onto the long carrier section is positioned so that it substantially comes to lie opposite the eyelet 58. Subsequently, the hook 60 is hung into the eyelet 59' of an already assembled carrier 26", whereupon a tensioning of the carrier 26' by means of the ratchet tensioner 50 takes place. This tensioning procedure has the effect that the long carrier sections is freely movable in the eyelet 58; on the one hand a tensioning of that carrier region which is located between the two columns 46 and, on the other hand a binding tight of the loop which surrounds the column

46. The complete carrier 26' is thus tensioned and reliably fixed between the columns 46 by the actuation of a single ratchet tensioner, with simultaneously only a minimal carrier length being required.

- 5 The carrier construction described with respect to Fig. 13 can be used in conjunction with all above-described embodiments in an advantageous manner.

Fig. 14 illustrates the fact that the above-explained securing elements 10
10 in accordance with the invention can be stacked, stored and transported in particularly advantageously in a space-saving manner.

The invention is not restricted to the embodiments explained above. Any desired modifications are rather possible here within the claims.

Reference numeral list

5	10	securing element
	12	vertical strut
	14	horizontal strut
	16	hook element
	18	free end section
10	19	hook element
	20	marginal recesses
	21	free end section
	22	eyelet elements
	24	marginal recesses
15	26, 26', 26"	carriers
	28	coupling element
	30	eyelet
	32	prolongation
	34	handle section
20	36	latch prolongation
	38	securing section
	40	building opening
	42	floor
	44	ceiling
25	46	columns
	48	column belts
	50, 50'	ratchet tensioner
	52	eyelet
	54	horizontal belts
30	56	ceiling support
	58, 58'	eyelet
	59, 59'	eyelet
	60	hook

Claims

- 5 1. A side protection system for construction sites having securing
elements (10) fastened to a plurality of carriers (26, 48, 54),
characterized in that
the carriers (26, 48, 54) respectively comprising a flexible material
are arranged under tension between two vertically extending wall
10 elements or support elements (46), with board-like or grating-like
securing elements (10) being releasably connected to at least two
carriers (26, 48, 54) vertically spaced apart from one another.
- 15 2. A side protection system in accordance with claim 1,
characterized in that
the carrier (26, 48, 54), which in particular comprises a textile
material, is designed in belt shape and is preferably several
centimeters thick and/or at most 5 mm thick.
- 20 3. A side protection system in accordance with one of the preceding
claims,
characterized in that
a carrier (26', 26'') comprising a flexible material has precisely one
ratchet tensioner (50, 50'), with the free end of one carrier section
25 having an eyelet (58, 58') and the free end of another carrier section
having a hook (60) which is dimensioned such that it is movable
through the eyelet (58, 58').
4. A side protection system in accordance with one of the claims 1 or 2,

characterized in that

a carrier (26, 48, 54) comprising a flexible material has at least one ratchet tensioner (50), with in particular

a section (48) of the carrier (26, 48, 54) being tensioned about a

5 vertically extending first wall element or support element (46) by means of a ratchet tensioner (50); and/or

a section (48) of the carrier (26, 48, 54) being tensioned about a

vertically extending second wall element or support element (46) by means of a ratchet tensioner (50); and/or

10 a section (48) of the carrier (26, 48, 54) being tensioned by means of a ratchet tensioner (50) between two further sections (48) of the carrier (26, 48, 54) or between a further section (48) of the carrier (26, 48, 54) and a vertically extending wall element or support element (46).

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5. A side protection system in accordance with any one of the preceding claims,

characterized in that

the carrier is fastened to a wall connection element which has a

20 fixing section for engagement into a recess of a securing element (10).

6. A side protection system in accordance with any one of the preceding claims,

25 characterized in that

the securing elements (10) are fastened to the carriers (26, 48, 54)

by coupling elements (28) which each have an open or closed eyelet

(30) whose size is adapted to the cross-section of the carriers (26, 48, 54).

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7. A side protection system in accordance with claim 6,
characterized in that
the coupling element (28) has a latch prolongation (36) which
extends obliquely to the plane bounded by the eyelet (30); and in
5 that the coupling element (28) connected to a belt-shaped carrier
(26, 48, 54) is pivotable about an axis extending perpendicular to
the belt-shaped carrier (26, 48, 54) with slight deformation thereof
to generate a bayonet lock connection between the coupling element
(28) and the securing element (10).
10
8. A side protection system in accordance with any one of the
preceding claims,
characterized in that
the mutually adjacent securing elements (10) are pivotally connected
15 to one another, in particular hookable to one another, with each
securing element (10) preferably having hook elements (16, 19) at
one longitudinal side and eyelet elements (22) at the other
longitudinal side.
- 20 9. A side protection system in accordance with claim 8,
characterized in that
each securing element (10) has two mutually spaced apart hook
elements (16, 19) at one longitudinal side and two correspondingly
mutually spaced apart eyelet elements (22) at the other longitudinal
25 side, with the free end sections (18, 21) of the two hook elements
(16, 19) being made of different lengths.
10. A side protection system in accordance with one of the claims 8 or 9,
characterized in that

the hook elements (16, 19) of a row of a plurality of hooked together securing elements (10) extend alternately upwardly and downwardly, with in particular all the securing elements (10) being designed the same as one another.

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11. A side protection system in accordance with any one of the preceding claims,

characterized in that

- 10 the first securing elements (10) are supported at the floor side and horizontal struts of second securing elements (10) are connected to adjacent horizontal struts (10) of the first securing elements (10) with friction transmission, in particular by means of cable binders, with in particular first and second securing elements (10) overlapping one another in the vertical direction.

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