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(54) **STAIR STEP NOSING**

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NEZ-DE-MARCHE POUR MARCHE D'ESCALIER

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EP 1 008 702 B1

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Description

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001] The present invention relates generally to the field of construction and, more particularly, to the structures of edges of faced stair steps.

2. Description of the Prior Art

[0002] An example of a facing structure for a stair step forward portion is described in DE Patent No. 3,907,959; Int. Cl. E04F 11/16, issued 1990. In this disclosed art, said facing structure comprises a L-shaped working member and a vertical anchor portion connected to a lower surface of the said working member. In so doing, both the working member and anchor portion are made of a resilient material.

[0003] To secure the known facing structure, the use is made of an additional fastening member fabricated in the form of a metal angle having a longitudinal slot in which the vertical anchor portion of a removable facing structure of the stair step forward portion is located. Moreover, it is necessary that horizontal facing plates of stair steps be provided with a special platform to accommodate the working member of the said facing structure for the stair step forward portion. Thus, the assembly of the known facing structure for the stair step forward portion is rather labor-consuming.

[0004] The drawbacks with this known facing structure for the stair step forward portion reside also in the fact that due to a small thickness of the working member, it is essentially impossible to ensure both a long operation life of the facing structure and conditions of spontaneous decomposition of the ice coating formed on the surface thereof under the action of a pedestrian weight. Besides, the availability of only one vertical fastening member fails to provide a reliable securing of the facing structure.

[0005] Another example of a facing structure for a stair step forward portion is described in FR Patent No. 2,694,585; Int. Cl. E04F 11/16, issued 1994, being the closest prior art with respect to the totality of accomplished operations and structural features in accordance with the present invention. In this disclosed art, said facing structure comprises a L-shaped working member, a horizontal and a vertical fastening members all made of a resilient material, said fastening members are interconnected and attached to the working member of the facing structure through an additional connecting member.

[0006] A disadvantage of the known facing structure for the stair step forward portion resides in the fact that it has a complicated cross-section shape necessitating the use of complex attachments when fabricating thereof. Moreover, it is necessary that horizontal facing plates

of stair steps be provided with a special platform to accommodate the working member of the said facing structure for the stair step forward portion, in other words, a strictly defined thickness, which complicates the assembly of the facing structure and increases the cost of works performed.

[0007] Another disadvantage of the known facing structure for the stair step forward portion consists in that due to a small thickness of the working member, it is essentially impossible to ensure both a long operation life of the facing structure and conditions of spontaneous decomposition of the ice coating formed on the surface thereof under the action of a pedestrian weight.

15 SUMMARY OF THE INVENTION

[0008] It is, therefore, an object of the present invention to provide a facing structure for a stair step forward portion having a working member whose structural accomplishment would enable to achieve not only simplification in the processes of the facing structure manufacture and assembly and hence a decrease in the cost of civil-engineering, but also the increase in the operational parameters at the expense of the provision of both a long operation life and the amount of the "ice - working member" interface stress concentration required to decompose the ice under the action of a pedestrian weight.

[0009] This object is solved in a facing structure for a stair step forward portion in accordance with the present invention, comprising a working member made of a resilient material and a horizontal and a vertical fastening member, wherein the working member is manufactured in the form of a beam with its rearward and lower surfaces being connected to said horizontal and vertical fastening members respectively, the thickness H of the working member and the modulus of elasticity E of a resilient material satisfy the relationships:

$$H > h + h_1, \quad (1)$$

$$E \leq H \times k, \quad (2)$$

where:

h — the thickness of the facing material of the horizontal surface of stair steps [m],

h_1 — the thickness of the horizontal fastening member [m],

k — the coefficient equal to 10^{11} [N/m³].

[0010] It is advisable that fastening members be made of the material of the working member and located, for example, integral therewith.

[0011] It is advantageous that the fastening members be made of the material whose modulus of elasticity is

at least by an order of magnitude greater than the modulus of elasticity of a resilient material of the working member.

[0012] Such an accomplishment of the facing structure of the stair step forward portion enables simplification of the process of its manufacture, since connecting members are absent and fastening members are connected not to each other but to a rather massive working member of the facing structure. Besides, the use of the facing structure of the stair step forward portion in accordance with the present invention makes it possible to simplify the process of its assembly, since it is unnecessary to provide the facing material of stair step surfaces with special platforms. In other words, conventional plates of rectangular shape having the same thickness may be used without any special additional working-up of their forward portions.

[0013] A further result attained when using the facing structure in accordance with the present invention consists in that by satisfying the above relationships (1) and (2), the edges of the stair steps acquire springiness. As a consequence, stresses arise on the "working member - ice coating" interface whose amount meets the conditions of the "effect of self-cleaning" of the edges of outdoor stair steps from the ice (ice coating) under the action of a pedestrian weight.

BRIEF DESCRIPTION OF THE DRAWINGS

[0014] The various objects, advantages and novel features of the present invention will be more readily apparent from the following detailed description when read in conjunction with the appended drawings, in which:

FIG. 1 is a general cross-sectional view of faced stair steps, in accordance with the present invention;

FIG. 2 is a side view of an embodiment of fastening members of a facing structure of a stair step forward portion, said members being made of a resilient material and integral with a working member, in accordance with the present invention;

FIG. 3 is a side view of an embodiment of metal fastening members of a facing structure of a stair step forward portion, in accordance with the present invention.

BEST MODE TO CARRY OUT THE INVENTION

[0015] Referring to FIG. 1, a facing structure for a forward portion of steps of the stair 1 comprises a working member 2 made in the form of a beam, a vertical fastening member 3 and a horizontal fastening member 4, with lower 5 and rearward 6 surfaces of the said working member 2 being connected to said vertical 3 and horizontal 4 fastening members respectively.

[0016] In the preferred embodiment of the present invention, an upper surface of the working member 2 is

provided with teeth 7. The horizontal fastening member 4 is located under a facing material 8 of the surface of a respective step of the stair 1. The vertical fastening member 3 is located under a facing material 9 of the surface of a respective riser of the stair 1. Ceramic, marble and the like plates may be used as the facing material 8 and 9. Attachment of the facing structure of the stair step forward portion to a concrete stair 1 and of the facing material 8 and 9 is accomplished by means of an adhesive 10. In the preferred embodiment of the present invention, a cold-resistant "Atlas Plus" brand adhesive is used.

[0017] Referring again to FIG. 1, it is advisable that the horizontal fastening member 4 be mounted flush with the lower surface 5 of the working member 2, since in this case the process of assembly is simplified.

[0018] Referring to FIGS. 1 and 2, the fastening members 3 and 4 may be made of the same material as that of the working member 2, and in particular integral therewith. However in some cases, it is advisable that the fastening members 3 and 4 be made of more rigid material (FIG. 3), for example aluminium alloy.

[0019] To ensure the "effect of self-cleaning" from the ice and ice coating, the thickness H and the modulus of elasticity E of the material of the working member 2 must satisfy the relationships (1) and (2).

[0020] Inside the working member 2 of the facing structure, there may be provided through holes 11 having a cylindrical, square or triangular cross-section, that imparts a required pliability to the working member to realize the above mentioned "effect of self-cleaning" in case where it is made of the material having the modulus of elasticity failing to satisfy the relationships (1) and (2).

[0021] If the fastening members 3 and 4 are made of more rigid material (whose modulus of elasticity is at least by an order of magnitude greater than the modulus of elasticity of a resilient material of the working member 2), they may have different section, for example an angle L-shaped section (FIG. 3).

[0022] Assembly of the facing structure of the stair step forward portion is carried out in the following sequence. The surface of the stair step and riser cleaned from dirt and dust is coated with the layer of an adhesive 10. Thereupon, the facing structure of the rearward stair step portion is mounted. Then an upper surface of the horizontal fastening member 4 and a rearward surface 6 of the working member 2 are coated with the layer of an adhesive 10 followed by the installation of a plate 8 of the facing material of the horizontal step surfaces. The facing of a riser using a facing material 9 is carried out in much the same way. Since the thickness H of the working member 2 exceeds the sum of the thickness h of the facing material 8 and the thickness h_1 of the horizontal fastening member 4, then, by varying the layer thickness of the adhesive 10, a required location of the facing members, for example flush-mounted, is provided. Connection of the working member 2 and fastening members 3 and 4 of the facing structure of the stair step

forward portion directly to the stair 1 imparts more reliability and longevity to the structure.

[0023] While the structure is in use, the ice or ice coating is formed on the surface of the working member 2. Under the action of a pedestrian weight, elastic strains of the working member 2 take place resulting in stresses on the "working member - ice" interface, the amount of said stresses being sufficient to decompose the ice coating. In this way "self-cleaning" of the most dangerous portion of the stair step from the ice occurs.

INDUSTRIAL APPLICABILITY

[0024] The facing of the stair step forward portion may be used when manufacturing outdoor stairs and that for pedestrian underpasses thus ensuring simplification of the structure and assembly and realizing the "effect of self-cleaning" from the ice (ice coating) while it is in use.

[0025] Although the present invention has been described with reference to preferred embodiments, the invention is not limited to the details thereof, and various changes and modifications obvious to one skilled in the art to which the invention pertains are deemed to be within the scope of the invention as further defined in the appended claims.

Claims

1. A facing structure for a stair step forward portion comprising a working member (2) made of a resilient material and a horizontal and a vertical fastening member (3, 4), **characterized in that** the working member is manufactured in the form of a beam with its rearward and lower surfaces (5, 6) being connected to said horizontal and vertical fastening members respectively, wherein the thickness **H** of the working member and the modulus of elasticity **E** of a resilient material satisfy the relationships:

$$H > h + h_1,$$

$$E \leq H \times k,$$

where:

h - the thickness of a facing material of the horizontal surface of stair steps [m],
 h_1 - the thickness of a horizontal fastening member [m],
 k - the coefficient equal to 10^{11} [N/m³].

2. A facing structure as set forth in claim 1, **characterized in that** the fastening members are made of the same material as that of the working member and, for example integral therewith.

3. A facing structure as set forth in claim 2, **characterized in that** the fastening members are made integral with the working member.

4. A facing structure as set forth in claim 1, **characterized in that** the fastening members are made of the material whose modulus of elasticity is at least by an order of magnitude greater than the modulus of elasticity of a resilient material of the working member.

Patentansprüche

1. Verblendanordnung für einen vorderen Treppenstufenabschnitt, mit einem Arbeitsteil (2), das aus einem federnd nachgiebigen Werkstoff hergestellt ist, und einem horizontalen und einem vertikalen Befestigungsteil (3, 4), **dadurch gekennzeichnet, daß** das Arbeitsteil in der Form eines Trägers hergestellt ist, dessen hintere und untere Oberfläche (5, 6) mit dem horizontalen bzw. vertikalen Befestigungsteil verbunden sind, wobei die Dicke **H** des Arbeitsteiles und der Elastizitätsmodul **E** eines federnd nachgiebigen Werkstoffes den Beziehungen genügen:

$$H > h + h_1,$$

$$E \leq H \times k,$$

wobei:

h - die Dicke eines Verblendmaterials der horizontalen Oberfläche der Treppenstufen [m],
 h_1 - die Dicke eines horizontalen Befestigungsteiles [m]
 k - der Koeffizient gleich 10^{11} [N/m³]

ist.

2. Verblendanordnung nach Anspruch 1, **dadurch gekennzeichnet, daß** die Befestigungsteile aus dem gleichen Material wie das Arbeitsteil hergestellt und z.B. einstückig damit sind.
3. Verblendanordnung nach Anspruch 2, **dadurch gekennzeichnet, daß** die Befestigungsteile einstückig mit dem Arbeitsteil hergestellt sind.
4. Verblendanordnung nach Anspruch 1, **dadurch gekennzeichnet, daß** die Befestigungsteile aus einem Werkstoff sind, dessen Elastizitätsmodul um mindestens eine Größenordnung größer als der Elastizitätsmodul eines federnd nachgiebigen Werkstoffes des Arbeitsteiles ist.

Revendications

1. Structure de parement pour la partie antérieure d'une marche d'escalier, comprenant un élément fonctionnel (2) réalisé en matériau élastique et un élément de fixation horizontal ainsi qu'un élément de fixation vertical (3, 4), **caractérisée en ce que** l'élément fonctionnel est fabriqué sous la forme d'une poutre dont la surface postérieure et la surface inférieure (5, 6) sont connectées audit élément de fixation horizontal et audit élément de fixation vertical respectivement, et dans laquelle l'épaisseur (H) de l'élément fonctionnel et le module d'élasticité E du matériau élastique satisfont les relations :

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$$H > h + h_1,$$

$$E \leq H \times k,$$

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dans lesquelles :

h est l'épaisseur d'un matériau de parement de la surface horizontale des marches d'escalier [m],

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h_1 est l'épaisseur d'un élément de fixation horizontal [m], et

k est un coefficient égal à 10^{11} [N/m³].

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2. Structure de parement selon la revendication 1, **caractérisée en ce que** les éléments de fixation sont réalisés avec le même matériau que celui de l'élément fonctionnel, et par exemple intégrés avec celui-ci.

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3. Structure de parement selon la revendication 2, **caractérisée en ce que** les éléments de fixation sont réalisés de manière intégrée avec l'élément fonctionnel.

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4. Structure de parement selon la revendication 1, **caractérisée en ce que** les éléments de fixation sont réalisés en un matériau dont le module d'élasticité est supérieur, d'au moins un ordre de grandeur, au module d'élasticité du matériau élastique de l'élément fonctionnel.

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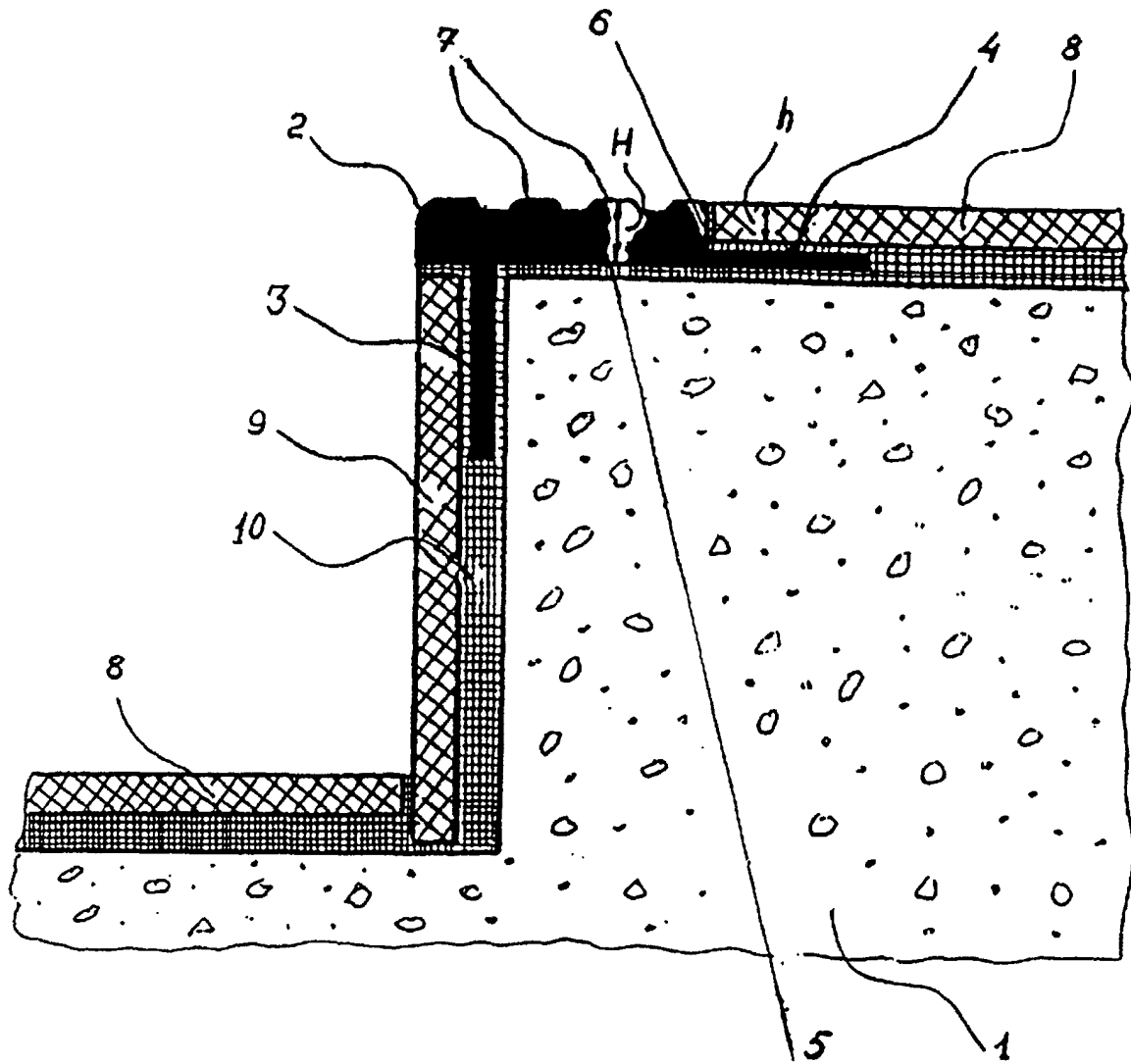


Fig. 1

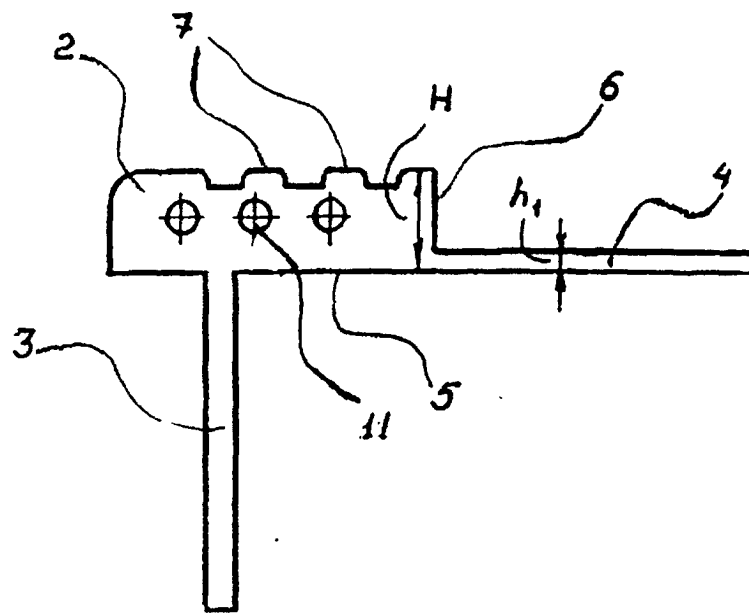


Fig. 2

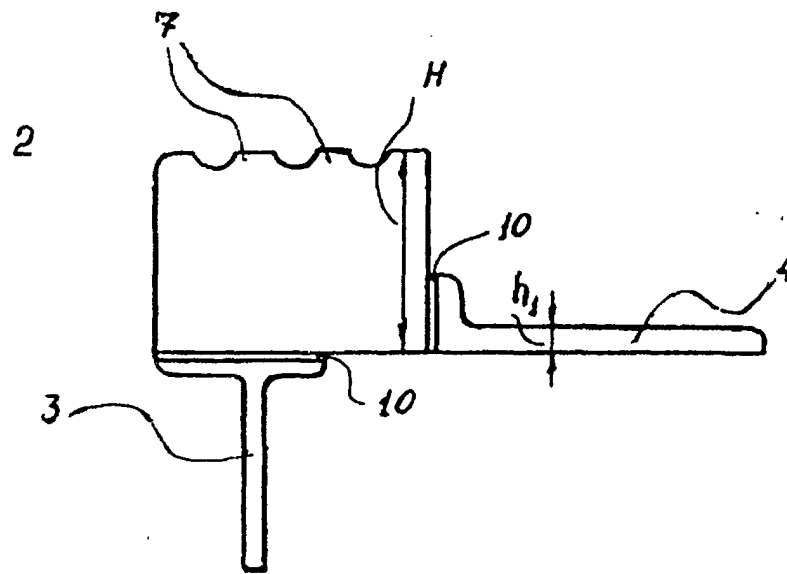


Fig. 3