

Title: Stair or ladder steps of the plate-shaped step type

Technical Field

The invention relates to stair or ladder steps of the plate-shaped step type, where plate members bent downwards are provided at all four rims of the
5 stepping surface, viz. at the front rim, the rear rim, and the two side rims, said downwardly bent rims being welded together at the corners where said plate members abut one another due to the bending.

Background Art

Stair or ladder steps of the above shape are known for instance from the
10 production previously sold by the same Applicant and which furthermore appear from the Applicant's brochure material.

Such stair or ladder steps are usually secured between the stringers by means of bolts extending through openings in each of the two plate mem-
bers bent downwards at the side rims, said bolts further extending through
15 openings in the respective adjacent stringers. Obviously, the ladder steps can, of course, also be secured to the stringers in other suitable manners, such as by way of welding, in stead of by means of bolt connections.

Such a stair necessitates a predetermined height of the individual steps, where said height corresponds to the width of the plate members bent
20 downwards in order to ensure that the steps can stand the required loads. Thus an opening is provided between the stepping surface of a step and the lower rim of the front rim bent downwards of the step just thereabove. This opening presents an undesired "foot trap" because a foot can get jammed in this opening or be injured by the rather sharp plate rim.

25 When the width of the front rim is low in such a manner that the step is

of a low height and the above opening is therefore sufficiently large for avoiding the foot trap, the resulting step does not possess a sufficient strength. On the other hand, when the front rim extends to the stepping surface of the step therebelow, the consumption of material is relatively
5 extensive and the stepping surface is not particularly wide although the foot trap has indeed thereby been avoided.

Brief Description of the Invention

The object of the invention is to provide stair or ladder steps of the above type, where an improved utilization of the materials is obtained compared
10 to the previously known steps of the plate-shaped step type, said utilization of the materials being expressed by the relationship of the strength and weight of a step, and where the above "foot trap" involved when the step forms part of a stair structure is avoided.

The stair or ladder step according to the invention is characterised in that
15 the plate member bent downwards at the front rim is rolled over to form a cylindrical pipe.

In this manner the sharp plate rim is avoided at the front rim bent downwards, and furthermore the foot trap is avoided because plenty of room is provided for a foot. In addition, the step is provided with a rather high
20 strength.

As the plate member bent downwards at the rear rim is also rolled over to form a cylindrical pipe, a further reinforcement of the step is obtained. In addition, the front rim and the rear rim can accordingly be identical with the result that the stair or ladder step can be turned 180° about a vertical
25 axis of symmetry in connection with the mounting procedure.

A further reinforcement of the step may be obtained as stated in claim 3

by the weldings also including the locations where the ends of the cylindrical pipes abut one another by the plate members bent downwards at the side rims.

The subject matter of claim 4 results in a sound insulation of the individual
5 steps because the cylindrical pipes of the steps are utilized.

It is, of course, possible to use several types of soundproofing materials, but polyurethane foam turned out to be extremely advantageous for the purpose.

Brief Description of the Drawing

10 The invention is explained in greater detail below with reference to the accompanying drawings, in which

Fig. 1 is a perspective view of a stair or ladder step according to the invention,

Fig. 2 illustrates the stair or ladder step of Fig. 1, seen from one side rim,
15 and

Fig. 3 is a cross-sectional view taken along the line A-A of Fig. 1.

Best Mode for Carrying Out the Invention

The stair or ladder step 1 shown in Fig. 1 comprises a stepping surface 2 with a front rim 3, a rear rim 4, and two side rims 5 and 6, respectively.

20 At the above rims 3, 4, 5, and 6 the step 1 comprises plate members 7, 8, 9, and 10, respectively, bent downwards from the stepping surface 2. The plate members 7 and 8, respectively, bent downwards at the front

and rear rims 3 and 4, respectively, are rolled over to form respective cylindrical pipes 11 and 12. The plate members 7, 8, 9, and 10 are thus preferably perpendicular to the stepping surface 2.

The plate members 7, 8, 9, and 10 bent downwards are welded together at the corners, where said plate members abut one another due to the bending procedure. The weldings also include the locations where the ends of the cylindrical pipes 11 and 12 abut one another by the plate members 9 and 10 bent downwards at the side rims 5, 6. The weldings are preferably provided in form of welding seams, but they may also be provided in form of spot weldings.

The plate members 9 and 10 bent downwards comprise holes or openings 13, 14 for mounting bolts not shown, said openings allowing the step to be secured in a manner known per se to stringers not shown either.

The plate members comprise furthermore openings 15 communicating with the interior of the cylindrical pipes 11, 12. Through these openings 15 the cylindrical pipes 11, 12 are filled with a foamed soundproofing material, preferably polyurethane foam. Rubber-like soundproofing materials can also be used.

The stepping surface 2 can be planar and optionally coated with an antiskid layer, but it is preferably shaped in a manner known per se with an aperture pattern where the rims of the apertures project beyond the plane of the stepping surface 2. The rims about the apertures provide a resistance against skidding of the shoe sole of a person. Furthermore, this shaping of the stepping surface by way of cold deformation provides a reinforcement of the step.

The stair or ladder step can be made of stainless steel or aluminium, but often it is preferred to manufacture the step from steel being electroplated

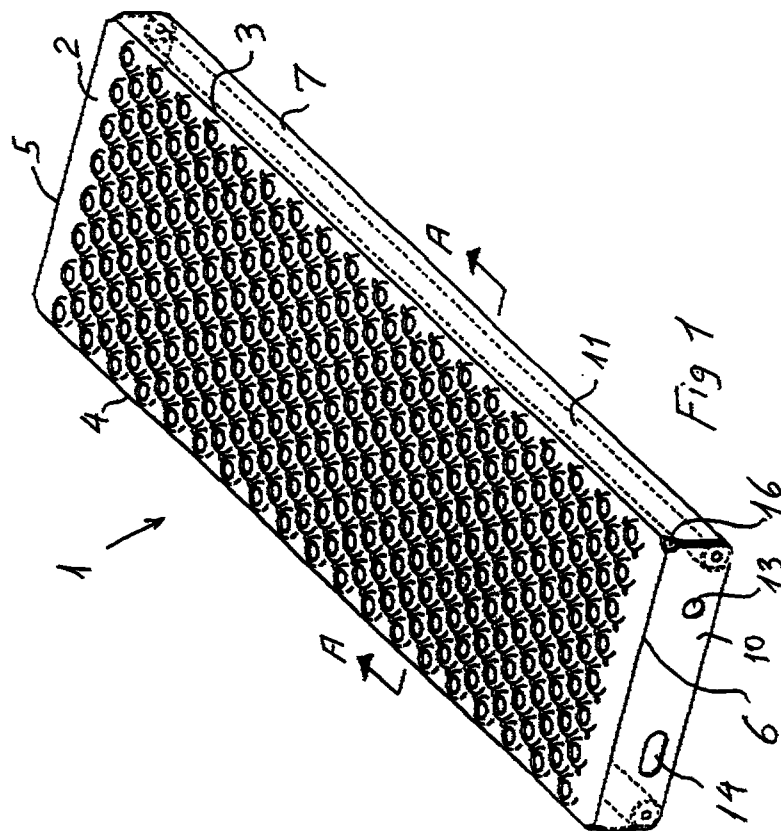
after the manufacturing procedure. Small apertures 16 are formed at the four corners for the electroplating process, the stepping surface 2 abutting two abutting plate members bent downwards in said four corners.

Within the scope of the invention only the plate member bent downwards
5 at the front rim of the stepping surface is rolled over to form a cylindrical pipe, although all advantages are not obtained by such a structure. Such a solution does indeed imply that the foot trap is avoided, but the total reinforcement and soundproofing effect are not obtained. Furthermore, it is of importance how the stair or ladder step is turned at the mounting of
10 the staircase.



Claims

1. A stair or ladder step of the plate-shaped step type, where plate members bent downwards are provided at all four rims of the stepping surface, viz. at the front rim, the rear rim, and the two side rims, said
5 downwardly bent rims being welded together at the corners where said plate members abut one another due to the bending, c h a r a c t e r -
i s e d in that the plate member bent downwards at the front rim is rolled over to form a cylindrical pipe.
2. A stair or ladder step as claimed in claim 1, c h a r a c t e r i s e d in
10 that also the plate member bent downwards at the rear rim is rolled over to form a cylindrical pipe.
3. A stair or ladder step as claimed in claim 1 or 2, c h a r a c t e r -
i s e d in that the weldings also include the locations where the ends of the cylindrical pipes abut one another at the plate members bent down-
15 wards at the side rims.
4. A stair or ladder step as claimed in claim 1, 2 or 3, c h a r a c t e r -
i s e d in that the plate members bent downwards at the side rims comprise through openings communicating with the interior of the cylindrical pipes, and that these pipes are filled with a foamed soundproofing
20 material.
5. A stair step as claimed in claim 4, c h a r a c t e r i s e d in that the soundproofing material is polyurethane.



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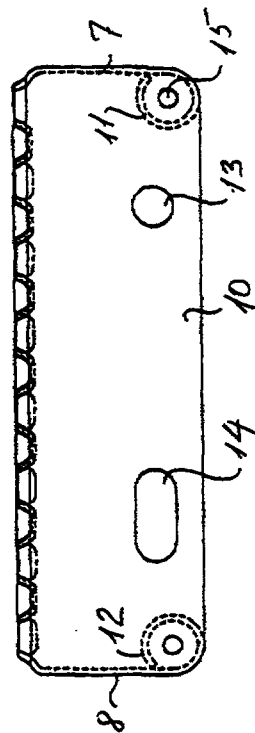


Fig 2

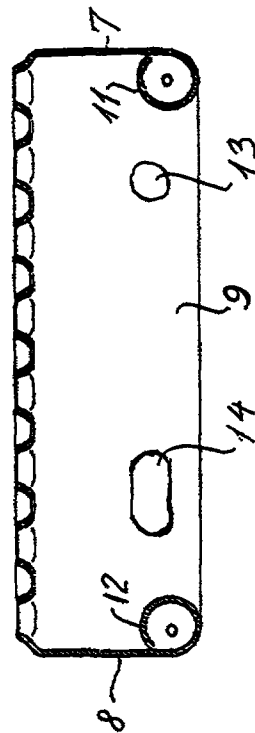


Fig 3

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁶ : E04F 11/112, 11/02, E06C 7/08	A1	(11) International Publication Number: WO 96/18008
		(43) International Publication Date: 13 June 1996 (13.06.96)
(21) International Application Number: PCT/DK95/00491 (22) International Filing Date: 7 December 1995 (07.12.95) (30) Priority Data: 1391/94 7 December 1994 (07.12.94) DK (71) Applicant (for all designated States except US): PF MANAGEMENT APS [DK/DK]; Hemningvej 39A, Nøvling, DK-7480 Vildbjerg (DK). (72) Inventor; and (75) Inventor/Applicant (for US only): PEDERSEN, Peder, Fahrten [DK/DK]; Fredenlundsvej 39, DK-7480 Vildbjerg (DK). (74) Agent: CHAS. HUDE A/S; 33, H.C. Andersens Boulevard, DK-1553 Copenhagen V (DK).		(81) Designated States: AL, AM, AT, AU, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DK, EE, ES, FI, GB, GE, HU, IS, JP, KE, KG, KP, KR, KZ, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TT, UA, UG, US, UZ, VN, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG), ARIPO patent (KE, LS, MW, SD, SZ, UG). Published With international search report.

(54) Title: STAIR OR LADDER STEPS OF THE PLATE-SHAPED STEP TYPE

(57) Abstract

A stair step (1) of the plate-shaped step type comprises plate members (7, 8, 9, 10) bent downwards from the stepping surface (2) at all four rims (3, 4, 5, 6), said plate members being welded together at the corners where they abut one another. The plate members (7, 8, 9, 10) at the front and rear rims are rolled over to form cylindrical pipes (11, 12) in such a manner that the plate member (7) at the front rim (3) is rounded at the bottom whereby it is avoided that a foot gets jammed between the steps of a staircase. The cylindrical pipes (11, 12) are filled with a foamed insulating material, such as polyurethane foam.

