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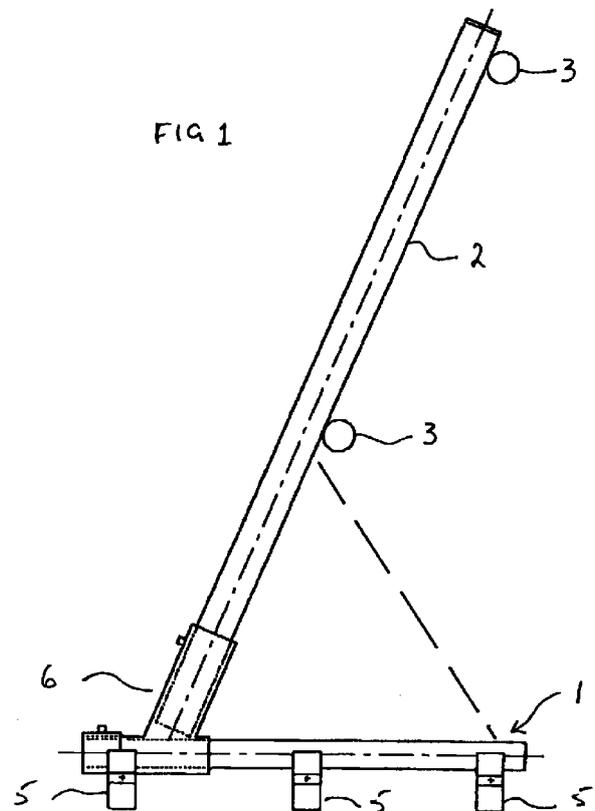
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(54) **Safety rail system**

(57) The application describes a safety railing system for standing seam roofs comprising a plurality of bases (1), uprights (2) and rails (3), wherein each base (1) includes clamping means (5) for joining the base to parallel seams of the roof and wherein each base (1) has at least one upright (2) fitted thereto or at least one means for fitting an upright (2) thereto. Generally, each base (1) consists of a frame, for example a rectangular frame, with two opposing sides and on each of these sides are arranged clamps (5) for fitting the base onto the seams of the roof. The clamps (5) grip the seams without penetrating the roof work.



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## Description

**[0001]** The present invention relates to a safety rail system, in particular for use on standing seam roofs.

**[0002]** Many industrial and commercial buildings are constructed with standing seam roofs. The roofing sheets, usually of aluminium, have raised seams and adjacent sheets are joined in an overlapping manner at the seams, to provide a waterproof seal. The roofs may be inclined or may be substantially flat, having only a fall of 1° or 2° to ensure rainwater run-off.

**[0003]** Although such roofs do not require a significant degree of maintenance after completion, it is evident that occasions will arise when work must be done on the roof. For example, the integrity of the roof may need to be inspected from time to time, particularly following bad weather, and the guttering, rooflights, ventilators etc may need to be cleaned and/or inspected.

**[0004]** The safety of people working on the roof is always of paramount importance. It is known to permanently fix a safety rail around the edge of the roof, by means of posts either fitted to the external wall of the building or to the main steel work of the roof. While such safety rails are effective, they tend to be relatively difficult to install and expensive, particularly bearing in mind that the safety rail only serves a function when work is being carried out on the roof, which will only be a small fraction of the life of the roof.

**[0005]** A particular disadvantage of railing posts which connect to the steel work of the roof is that it is necessary for the fixings to penetrate through the aluminium sheeting. Any penetration of the sheeting introduces the risk of poor sealing and water ingress. Thus, a railing system which penetrates the integrity of the roof is less desirable.

**[0006]** A safety railing system of a "free standing" design is also known. In this system, each upright of the railing system has a cantilever arm with a weight arranged inwardly of the rail. The railing system is balanced such that it provides protection to a workman falling against the rail, even though it is not fitted to the roof.

**[0007]** Known railing systems for roofs are shown in US-A-3880405, WO-A-89/09863 and WO-A-98/26141.

**[0008]** The applicants believe that there is still a need in the market for a new form of safety railing system for use on standing seam roofs.

**[0009]** The present invention provides a safety railing system for standing seam roofs comprising a plurality of bases, uprights and rails, wherein each base includes clamping means for joining the base to parallel seams of the roof and wherein each base has at least one upright fitted thereto or at least one means for fitting an upright thereto.

**[0010]** Generally, each base consists of a frame, for example a rectangular frame, with two opposing sides and on each of these sides are arranged clamps for fitting the base onto the seams of the roof. The clamps grip the seams without penetrating the roof work. Preferably,

the base spans between adjacent seams, in which case there is one upright for each base. Connected to the uprights are one or more rails as is conventional.

**[0011]** Preferably, the upright is angled inwardly of the base, at an angle of from 60 to 75° - for example 67° - so that the centre of gravity of the railing system is well to the inside of the bottom of the upright. The angling of the uprights also has the advantage that a workman holding the railing will tend to be standing or walking inwardly of the base, thus avoiding or at least diminishing the possible trip hazard provided by the base.

**[0012]** The invention also provides a kit of parts which comprises the above-mentioned bases, uprights and rails, in a non-assembled state. Still further, the invention provides a base for a safety railing system for standing seam roofs, the base including means for clamping the base on parallel seams of the roof and means for connecting at least one upright to the base.

**[0013]** It will be appreciated that the invention provides a relatively simple yet secure safety railing system. The clamping means for joining the base can be conventional seam clamps, as are well known in the art, or can be other types of clamps provided that they do not penetrate the sheet roofing. The railing system will generally be provided as a set of loose parts which are assembled on the roof, i.e. bases, uprights and rails. The parts themselves are relatively small allowing for easy handling and furthermore the assembly on the roof can be achieved quickly. It is simply necessary for the bases to be clamped in place, the uprights connected to the bases and then the rails connected to the uprights. Equally, the railing system can be disassembled relatively quickly when the work is finished, in the case that the safety rail system is being used as a temporary rather than permanent fixture.

**[0014]** A preferred embodiment of the invention is described in more detail below, by example only, and with reference to the accompanying drawings wherein:

Fig. 1 is a side view of the railing system according to one embodiment of the present invention;  
Fig. 2 is a front view of part of the railing system of Fig. 1, showing one of the bases; and  
Fig. 3 is a plan view of the base of the railing system as shown in Figs. 1 and 2.

**[0015]** The railing system comprises bases 1, uprights 2 and rails 3. Although not seen in the drawings, the system includes a plurality of bases, for example at 4m spacings, arranged along the roof. As shown in Fig. 2, in this embodiment each base has one upright 2 and the rails 3 are arranged between the uprights in a conventional fashion. The height of the top rail is, for example, 1.1m.

**[0016]** The base or frame 1 is rectangular and on two of its parallel sides 4, 4' are arranged seam clamps 5. The clamps 5 are seen most clearly in Fig. 2 and

these are clamped onto the seams of the roof in a well known manner. There may be two or three seam clamps on each side, the shape of which is adapted to the shape of the standing seams (generally circular). The two sides of the clamp largely surround the seam and are clamped together by means of a bolt or screw.

**[0017]** Centrally on one of the other sides of the base is a socket 6, welded to the frame. The socket is provided for the upright 2. The upright can be bolted into the socket in a normal manner. As shown most clearly in Fig. 1, the upright is angled relative to the base, for example at an angle of 67°.

**[0018]** The base may include a cross member 7 arranged parallel and between the side members 4, 4' to give greater strength and rigidity. The base may be formed of flat steel bars or, as shown in Fig. 2, some of the members may be formed of tubes. In either case, the seam clamps can be either bolted or welded to the side members as desired. The component parts of the frame itself will generally be welded together in a known manner.

**[0019]** The dashed lines in Figs. 1 and 2 indicate the possibility of struts being fixed between the upright 2 and the base 1, to reduce the deflection of the upright 1 and rails 3 under load. The struts would be welded to the upright and base.

**[0020]** The rectangular shape of the base is preferred, as this shape most easily allows for the socket 6 to be provided at one end of the base. It is preferable for the socket and thus the upright to be arranged at one end, for reasons of maximum resistance to overturning of the railing system, should a workman fall. It is also preferred that the socket is provided substantially centrally between the side members 4, 4', to ensure that even loads are imposed on the roof seams as the railing system is used.

**[0021]** The base can include a square frame with end extensions, on which the end seam clamps 5 are mounted. This form of rectangular base is illustrated in Fig. 3.

**[0022]** Although a rectangular base is shown, where the length of the base is at least as great as or preferably greater than the width between the side members 4, 4', it should be recognised that alternative base designs are possible, for example a base in the form of a letter "X", with the frame members extending diagonally between parallel seams, crossing each other in the middle. The socket 6 for the upright could be provided where the members cross, or there could be an extra member spanning the frame between the seams on which the socket is fitted.

**[0023]** Most standing seams roofs have a seam spacing of 400mm or 450mm. Accordingly, the width of the base will be adapted to this spacing. The length of the base can be 400-800mm, e.g. 600mm. It is preferred that the base spans only one pair of adjacent seams, since this will enable a smaller and thus lighter base to be produced. However, a base could span more

than two seams and include sockets for more than one upright. In this case the width of the base will exceed its length.

**[0024]** From the above description it will be understood that the invention provides a simple and secure safety railing system for standing seam roofs, in which the bases are clamped in a stable manner across adjacent seams but without penetrating the roof and thus without reducing the integrity of the roof.

## Claims

1. A safety railing system for standing seam roofs comprising a plurality of bases, uprights and rails, wherein each base includes clamping means for joining the base to parallel seams of the roof and wherein each base has at least one upright fitted thereto or at least one means for fitting an upright thereto.
2. A system according to claim 1, wherein each base consists of a frame, for example a rectangular frame, with two opposing sides and on each of these sides are arranged clamps for fitting the base onto the seams of the roof, the clamps gripping the seams without penetrating the roof work.
3. A system according to claim 1 or 2, wherein each upright is angled inwardly of the base, at an angle of from 60 to 75° - for example 67° - so that the centre of gravity of the railing system is to the inside of the bottom of the upright.
4. A base for a safety railing system for standing seam roofs, the base including means for clamping the base on parallel seams of the roof and means for connecting at least one upright to the base.
5. A kit of parts for a safety rail system comprising the bases, uprights and rails of claim 1, in a non-assembled state.

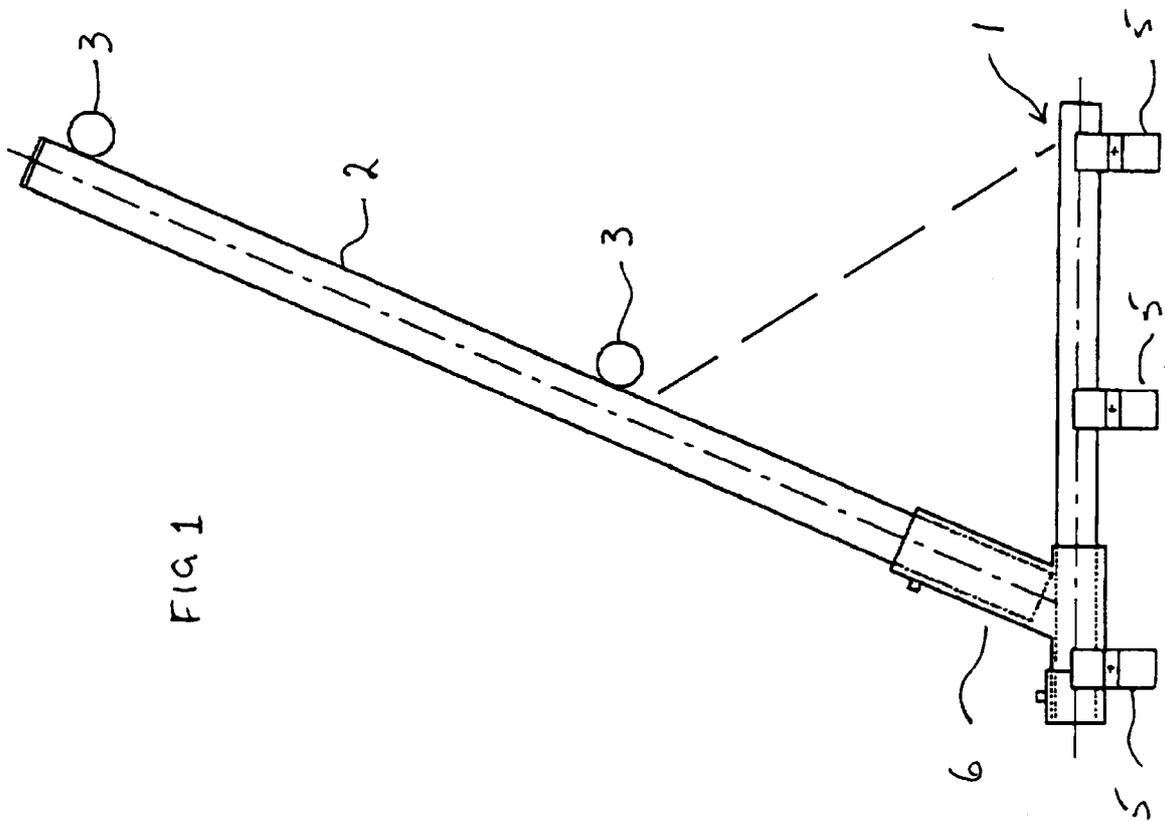


FIG 1

FIG 2

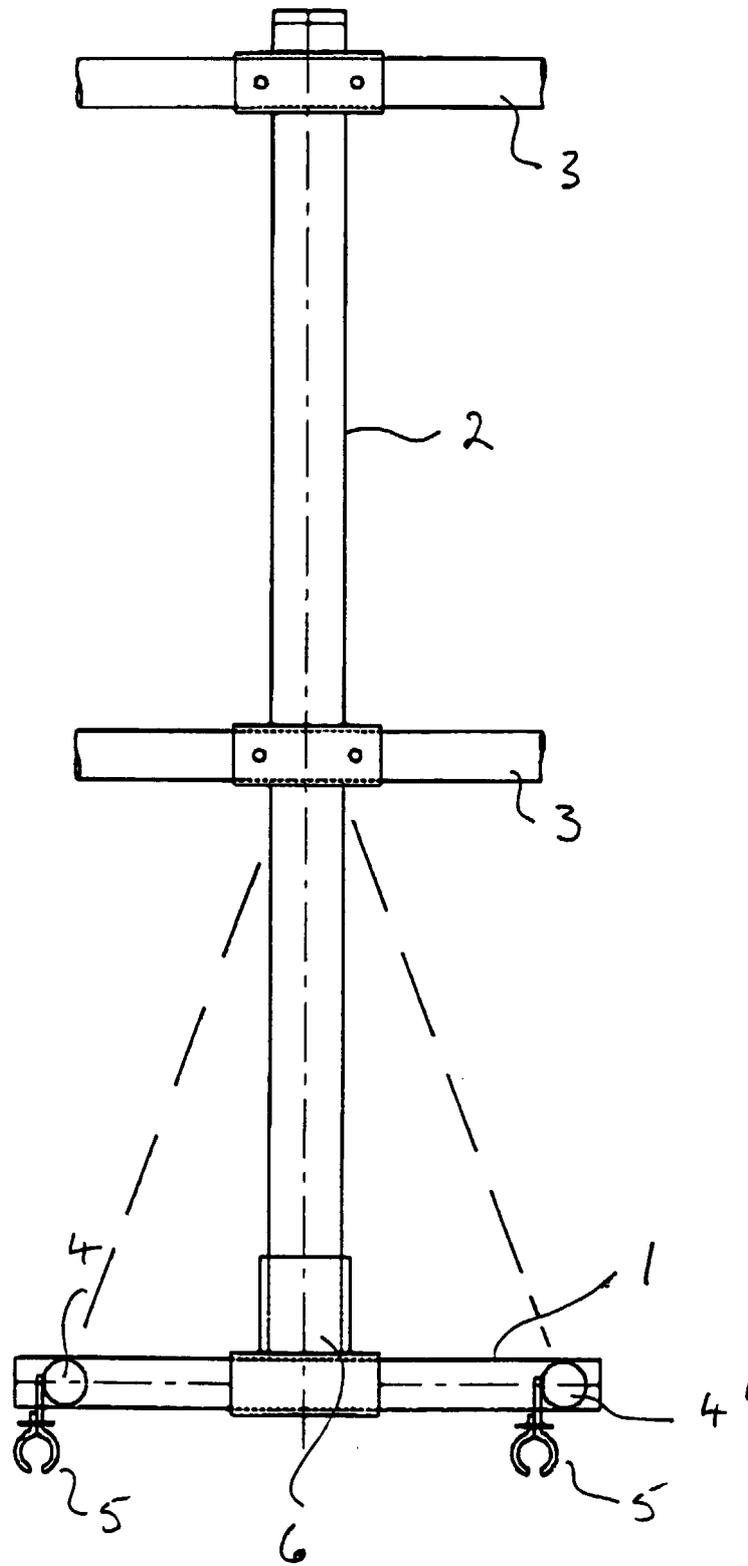
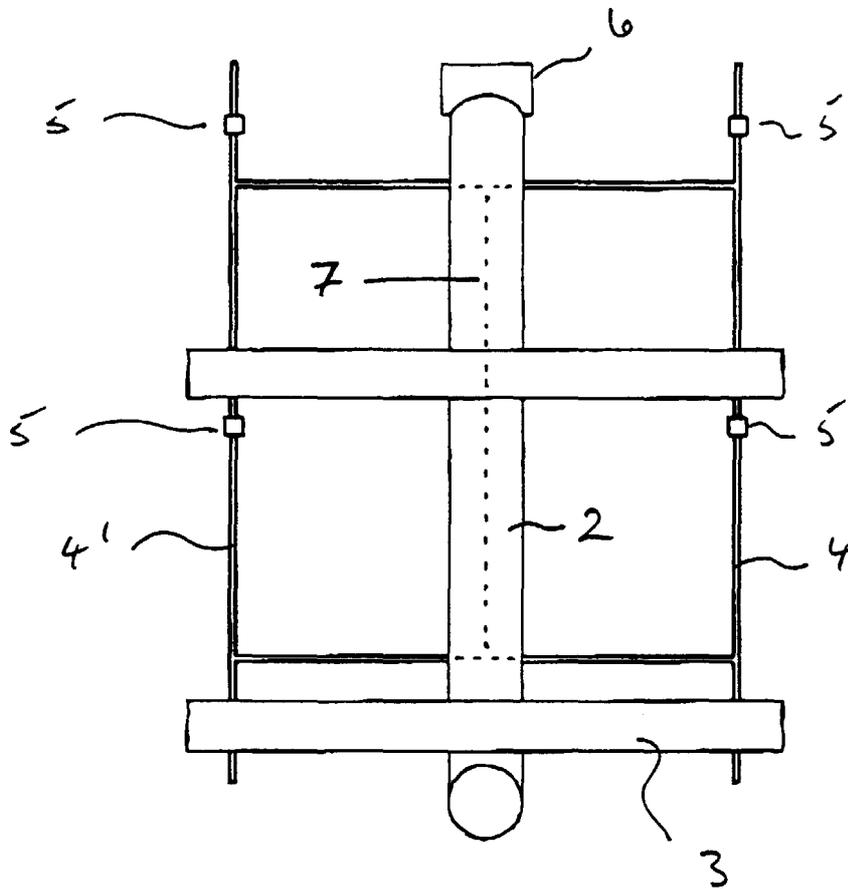


FIG 3





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EUROPEAN SEARCH REPORT

Application Number  
EP 00 30 0180

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D,X	US 3 880 405 A (BRUESKE RALPH H) 29 April 1975 (1975-04-29) * column 3, line 42 - line 64 * * column 4, line 40 - column 5, line 25 * * figures 6,7,11,12 *	1,4,5	
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The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 3 April 2000	Examiner Andlauer, D
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons ..... & : member of the same patent family, corresponding document	

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**ANNEX TO THE EUROPEAN SEARCH REPORT  
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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on  
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