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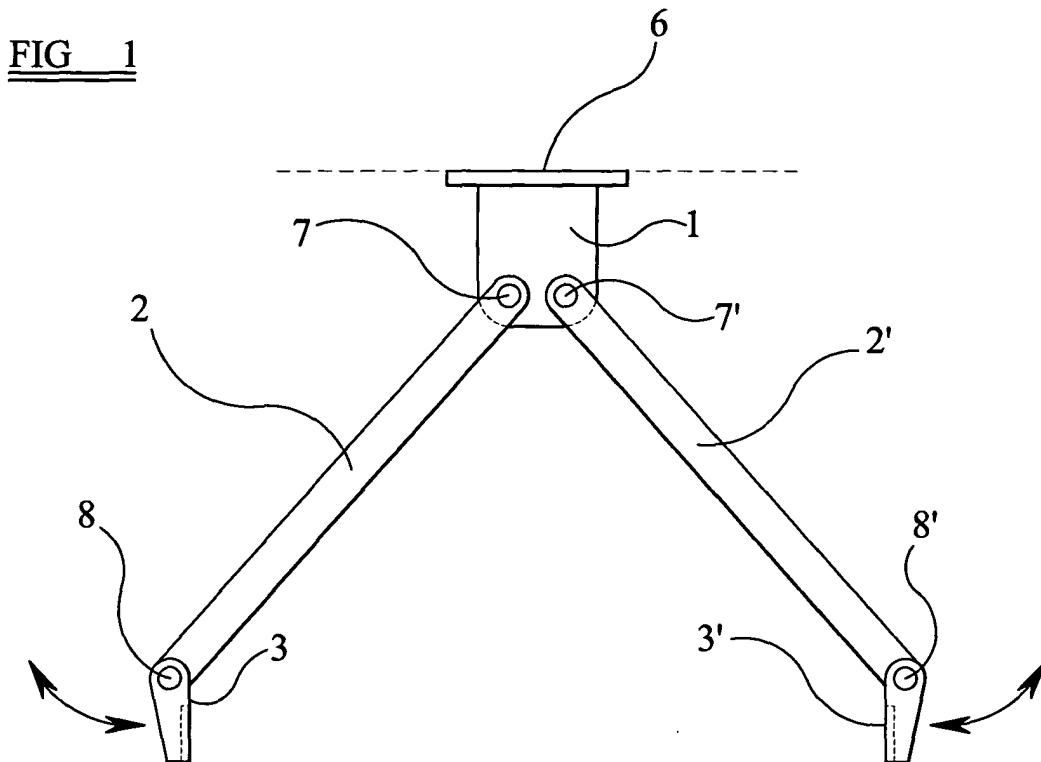
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Safety apparatus

(57)

The application describes a support for a safety line comprising a head part (1) including means for holding the safety line and a pair of brackets (2, 2') pivotably connected to the head part, each bracket at its end re-

note from the head part including spaced connecting means (3, 3') for connecting the bracket to at least two points along a part of the roof to which the support is to be fitted.



Description

[0001] The present invention relates to safety apparatus for industrial use, in particular a support for a horizontal safety line.

[0002] In order to provide a safe working environment for persons doing repair work or cleaning on top of buildings, it is conventional to provide a permanently installed safety line around the perimeter of the roof. Such systems are particularly common on warehouse type buildings whose roofs have a relatively shallow pitch and are formed of interlocking profiled sheeting. The safety line is connected to posts fitted at a certain spacing around the roof. When any work is needed to be done on the roof, a workman will attach himself to the safety line by means of a known coupling device which both moves along the safety line and can move over the line supports at each post. Such a coupling device is shown, for example, in GB-A-2199880.

[0003] A known safety line system is available from Protecta International and sold under the trade name "Ariana". In this system, a safety line is threaded through a line supporting bracket which is bolted to the top of a tubular post. At the base of this post is arranged an "x" shaped base which in turn is bolted to a pair of parallel plates which are riveted to adjacent crowns of the profiled roof. In an alternative arrangement, with a standing seam roof, the base is bolted to a strip which is clamped around the seams.

[0004] A disadvantage of this system and of other proprietary systems is that the base of the support post has to be made to fit the particular roof on which the safety system is to be installed. The span between the crowns or standing seams of roofs is not standard and, for example, the span could be 200mm, 400mm or 600mm. Furthermore, the cross-section of the crown or of the standing seam is variable, and therefore the plate to be riveted to the crowns, or the clamps to be fitted to the seams, need to be specially ordered for each fitting.

[0005] Against this background, it is one object of the invention to provide a support for a substantially horizontal safety line which is more versatile and can be fitted to a greater variety of roof designs.

[0006] According to the invention, there is provided a safety apparatus including a safety line and a plurality of supports for mounting the safety line on a structure, at least some of the supports each comprising:

a head part including means for holding the safety line between spaced supports;
and a pair of brackets pivotably connected to the head part;
each bracket at its end remote from the head part including spaced connecting means for connecting the bracket to at least two points along a part of the roof to which the bracket is to be fitted.

[0007] The apparatus may further comprise a cou-

pling device fitted on the safety line, the coupling device having means allowing it to pass over the head part of the supports.

[0008] Preferably, the connecting means are pivotably adjustable relative to the brackets and preferably the brackets are pivotably connected to the head part by spaced pivot points.

[0009] Each bracket can be formed of a pair of arms which diverge from the head part and preferably each arm has a degree of curvature. Between the two arms of each bracket there can extend a plate for connection to a roof, and in particular the top or side of the crown of a profiled roof. At the end of each arm there can be fitted a clamp for connecting the bracket to the seam of standing seam roof. The clamps may be fitted to a plate extending between the arms.

[0010] It will be understood that the pivotal connection of the brackets to the head part will allow the brackets to adopt different spacings, thereby being able to fit roofs with different spans between the profile crowns or the seams. In the preferred embodiment where a plate is pivotably connected to the bottom of each bracket, the plate can easily fit many different crown profiles, as well as different roof spacings.

[0011] Preferably, the head part of the supports includes a tube through which the safety line is passed.

[0012] The invention also provides a support for mounting a safety line on a structure, the support comprising:

a head part including means for holding the safety line;
and a pair of brackets pivotably connected to the head part;
each bracket at its end remote from the head part including spaced connecting means for connecting the bracket to at least two points along a part of the roof to which the support is to be fitted, and wherein the means for holding the safety line is formed as a tube through which the safety line can pass and over which a coupling device for a worker's safety lanyard can pass.

[0013] Each bracket can comprise a pair of divergent arms which are curved, whereby in the event of a fall the support will deform so as to absorb energy. The connecting means are preferably pivotably adjustable relative to the brackets and the brackets are preferably pivotably connected to the head part by spaced pivot points.

[0014] The invention still further provides a method of arranging a safety line on a structure, including the step of fitting a number of supports as defined above to the roof of the structure with the safety line connected therebetween.

[0015] Embodiments of the invention will include different head parts. For example, special head parts can be provided depending on whether the line support is

an end anchor for the safety line, an intermediate support or a corner support.

[0016] Preferred embodiments of the invention are described in more detail below, by example only, with reference to the accompanying drawings, wherein,

Fig. 1 is a front elevation of a safety line support according to one embodiment of the invention;

Fig. 2 is a side elevation of the support of Fig. 1;

Figs. 3a and 3b are partial side views showing two possible fittings of the brackets to the profiled roof;

Fig. 4 is a perspective view showing an alternative head part to the support, where the line is running parallel to the crowns or seams of the roof;

Fig. 5 is a perspective view showing one example of a head part for use with the support when the support is acting as an anchor at the end of the safety line;

Fig. 6 is a perspective view of an alternative head part for use as an end anchor;

Fig. 7 is a front elevation of a safety line support according to another embodiment of the invention, where the support is for fitting to the seam of a standing seam roof;

Fig. 8 is an exploded perspective view of a clamp and bar which is part of the support of Fig. 7;

Fig. 9a, b and c are further views of the seam clamp for use with the embodiment of Fig. 7.

[0017] The support of Fig. 1 comprises a head part 1 for holding a safety line, the safety line being indicated by a dashed line. To the head part 1 are pivotally connected two brackets 2, 2'. At the end of each bracket 2, 2' remote from the head part is arranged means 3 for connecting the brackets to the roof.

[0018] Head part 1 in this embodiment consists of a substantially flat plate to which is welded a tube 6 through which the safety line can be threaded. The coupling device with which the workman connects himself to the safety line can pass along the safety line and over the tube 6 in a known manner.

[0019] Such a coupling device is described, for example, in GB-A-2199880 or EP-A-0484494. To the coupling device the worker's lanyard is attached, the coupling device being fitted on the safety line which runs between the supports. The coupling device comprises a twistably mounted tube which has a longitudinal slot, the ends of the slot being profiled or tapered. This tube can run along the safety line and on abutment with the support, because of the profiled ends of the slot, it is automatically twisted so that the slot aligns with the head part, the tube 6 of the head part passing through the tube of the coupling device.

[0020] Each bracket is pivotally connected to the head part by a bolt 7, 7' extending through respective holes in the head part and the end of the bracket. The provision of separate, parallel pivot axes for each bracket provides for a higher degree of flexibility to the support

and, in particular, provides for correct alignment of the head part relative to the safety line. In a less preferred embodiment, the two brackets could be fitted to the head part by one pivot point, but this would lead to the risk that the tube on the head part might not be properly aligned with the safety line.

[0021] The means at the foot of each bracket for connecting the support to the roof is preferably connected in a pivotal manner to the bracket, for example by bolts 8, 8'. This allows the connecting means to be fitted to different shapes of roof crowns or seams. Where the support is to be fitted onto the top of the roof crowns, this pivoting also allows the connecting means to be maintained in a horizontal orientation, even as the brackets are moved together or apart for narrower or wider crown spacings.

[0022] Fig. 2 shows that the connecting means 3, 3' can include a plate 10 running along the bottom of each bracket. The pivotally connected plate has a series of apertures 11 by which the plate can be riveted to the roof, in a known manner. In a less preferred embodiment, the plate may be very narrow and be fixedly connected to the bracket, but this would limit the versatility of the adjustable support of the invention.

[0023] As clearly illustrated in the view of Fig. 2, each bracket is preferably formed by a pair of arms 12 which join at the head part, with the plate 10 connecting the remote ends of the arms 12. Thus, in side view the brackets 3 are substantially triangular, the arms 12 diverging from the head part.

[0024] However, it is preferred that each arm 12 is curved, as well as diverging from the head part. This makes the bracket 3 less rigid than if it were formed as a straight sided triangular structure. The bracket will thus deform to some degree in the event of a fall, adding to the absorption of any shock. It should be mentioned that the fact of brackets deforming to help absorb shock is known in the field of industrial safety equipment. It can also be mentioned that the spaced pivotal connection of the brackets 2 to the head part 1 also contributes to the shock absorption, since this spaced connection of the brackets to the head part again makes the structure less rigid than if the two brackets shared the same connection point to the head part.

[0025] As already mentioned, it is preferred that the connecting means 3 at the end of each bracket is pivotally connected to the bracket 2, allowing for the connecting means to be abutted flat with the top or the side of the crowns of a standard profiled roof. Two examples of the fitting are schematically illustrated in Figs. 3a and 3b. In Fig. 3a, the connecting means, here in the form of an elongated plate 10, is riveted to the side of a crown. In Fig. 3b, the plate 10 is riveted to the top of the crown. In both cases, the adjustability of the brackets on the head part and the adjustability of the connecting means on the brackets allows the support to be fitted to a wide range of roof designs, both in terms of the crown profiles and spacing of the crowns.

[0026] Fig. 4 shows an example of the head part 1 where the safety line is running parallel to the crowns or seams of the roof, rather than perpendicular. Accordingly, a 90° twist is provided between the lower part of the head, to which the brackets are connected, and the tube 6 through which the safety line runs. In an alternative version of this part, not illustrated, the tube part may be bent around 90° to provide a support which can be fitted at a corner of the safety line system. In yet another version, the tube part can be elongate and formed in a flexible manner, so that different degrees of angle at a corner can be provided (in a known manner).

[0027] Fig. 5 illustrates a head part 1 which is fitted at the top of the brackets 2, instead of a head part which directly supports the line. This part is for use in the situation that the support is at the end of a safety line run, and thus acts as an end post anchor. In practice, the safety line is connected to the body part 14 of the T-shaped head member 1 through an energy absorption element (in a known manner). The brackets 2 are connected through the apertures 15 in the head part of the member.

[0028] The alternative head part of Fig. 6 provides an end anchor for the safety line which has a greater degree of versatility. The brackets 2 are connected at points 7, 7', in the same way as in the earlier embodiments. In the embodiment of Fig. 6, the head part consists of an L-shaped adapter bracket 20 and projecting vertically from the horizontal part of the adapter bracket is a bolt 21. A link plate 22 is pivotally connected on the bolt 21 by means of a lock nut 23 and washer 24. At the end of the link plate 22 is an aperture 25 to which the safety line can be connected in a conventional manner (for example via an energy absorption element).

[0029] Fig. 7 is a view similar to Fig. 1, but showing an embodiment of the invention where the support is to be fitted onto the seams of a raised seam roof. In Fig. 7, like numerals are used to indicate like parts. In particular, the Figure show a head part 1 and brackets 2, as in the earlier embodiment. Along the bottom of the brackets is fitted a plate 10. Seam clamps 30 are bolted to the plate 10 by means of bolts 31. Each bracket preferably has two seam clamps 30, but a different number of clamps could be fitted to the plate 10 if desired.

[0030] Fig. 9 shows a perspective view of the seam clamp 30 to be fitted at each corner of the bottom of each bracket 2, in particular at each end of the plate 10 which connects to the arms 12 of each bracket. The seam clamps are basically conventional items which can be clamped around the seam of a raised seam roof. In this embodiment of the invention, the seam clamps 30 are pivotally connected to the brackets, by virtue of the pivoting of the plate 10 on the arms 12. Thus, the seams can be arranged vertically on the seams even when the brackets 2 are moved apart for fitting to different seam spans.

[0031] Fig. 9 shows views of the seam clamp 30, providing more detail of the clamp halves and bolting ar-

rangement.

[0032] It is envisaged that the described embodiment of the invention will easily fit roof profiles with spacings from 150mm to 600mm, for example. The support member would in practice be made from steel. The ultimate strength of the support would be approximately 2000KN, but as previously mentioned the support would tend to deform in the event of a fall.

[0033] When first fitting the safety line system including the supports as described above, a fitter would be supplied with two end supports, the requisite number of corner supports and a large number of intermediate supports (the number depending on the length of the run of the safety line). The supports would be riveted or otherwise fixed to the roof in the appropriate places and then the nuts fixing the brackets to the supports heads and the connecting plates or seams clamps would be tightened. The line would of course be tensioned in a conventional fashion, before workmen made use of the safety line system for the first time.

[0034] The skilled reader will understand that variations can be made to the construction of the safety system described above, with reference to the drawings, and the description is not intended to limit the scope of the invention which is defined by the attached claims.

Claims

1. A safety apparatus including a safety line and a plurality of supports for mounting the safety line on a structure, at least some of the supports each comprising:
 - a head part (1) including means for holding the safety line between spaced supports;
 - and a pair of brackets (2, 2') pivotally connected to the head part;
 - each bracket at its end remote from the head part including spaced connecting means (3, 3') for connecting the bracket to at least two points along a part of the roof to which the bracket is to be fitted.
2. An apparatus according to claim 1, further comprising a coupling device fitted on the safety line, the coupling device having means allowing it to pass over the head part of the supports.
3. An apparatus according to claim 1 or, wherein the connecting means (3, 3') are pivotally adjustable relative to the brackets.
4. An apparatus according to any preceding claim, wherein the brackets (2, 2') are pivotally connected to the head part by spaced pivot points.
5. An apparatus according to any preceding claim,

wherein each bracket (2; 2') is formed of a pair of arms (12) which diverge from the head part (1) and preferably each arm has a degree of curvature.

structure with the safety line connected there-between.

6. An apparatus according to claim 5, wherein between the two arms (12) of each bracket there extends a plate (10) for connection to a roof, and in particular the top or side of the crown of a profiled roof. 5
10
7. An apparatus according to claim 5, wherein at the end of each arm (12) there is fitted a clamp (30) for connecting the bracket to the seam of standing seam roof. 15
8. An apparatus according to claim 7, wherein the clamps (30) are fitted to a plate extending between the arms. 20
9. An apparatus according to any preceding claim, wherein the head (1) part of the supports includes a tube (6) through which the safety line is passed. 25
10. A support for mounting a safety line on a structure, the support comprising: 30
 - a head part (1) including means (6) for holding the safety line;
 - and a pair of brackets (2, 2') pivotably connected to the head part (1);
 - each bracket (2, 2') at its end remote from the head part (1) including spaced connecting means (3, 3') for connecting the bracket to at least two points along a part of the roof to which the support is to be fitted, and wherein the means for holding the safety line is formed as a tube (6) through which the safety line can pass and over which a coupling device for a worker's safety lanyard can pass. 35
40
11. A support for a safety line according to claim 10, wherein each bracket (2, 2') comprises a pair of divergent arms (12) which are curved, whereby in the event of a fall the support will deform so as to absorb energy. 45
12. A support according to claim 10 or 11 or, wherein the connecting means (3, 3') are pivotably adjustable relative to the brackets. 50
13. A support according to any of claims 10 to 12, wherein the brackets (2, 2') are pivotably connected to the head part (1) by spaced pivot points. 55
14. A method of arranging a safety line on a structure, including the step of fitting the supports of the apparatus of any of claims 1 to 8, or a plurality of supports according to claim 9 or 10, to the roof of the

FIG 1

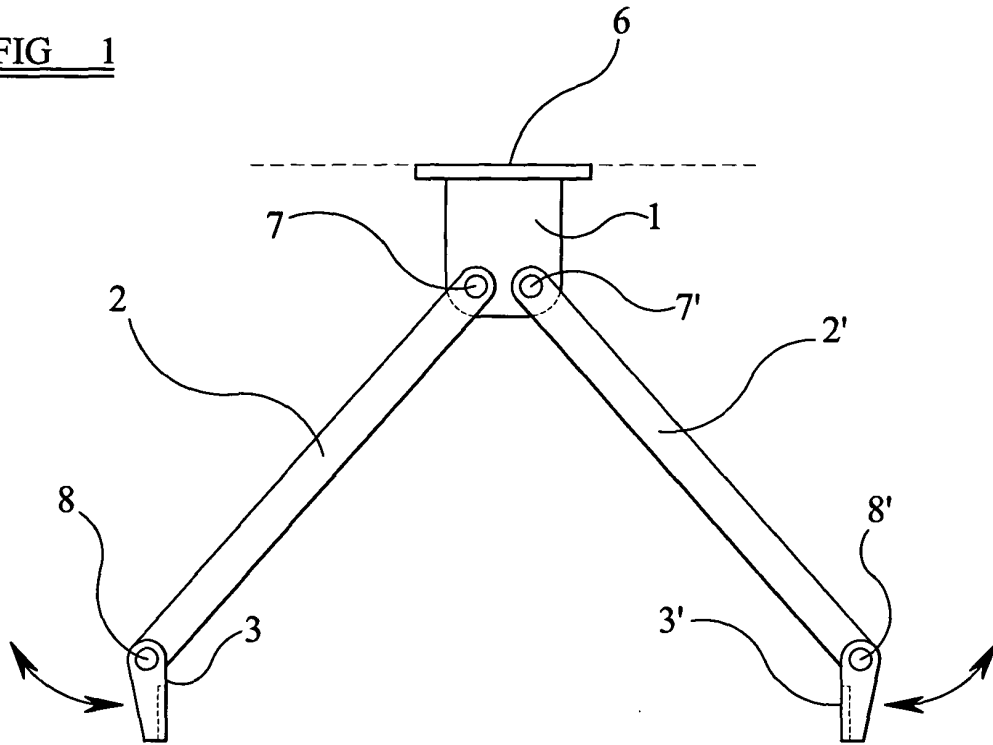


FIG 2

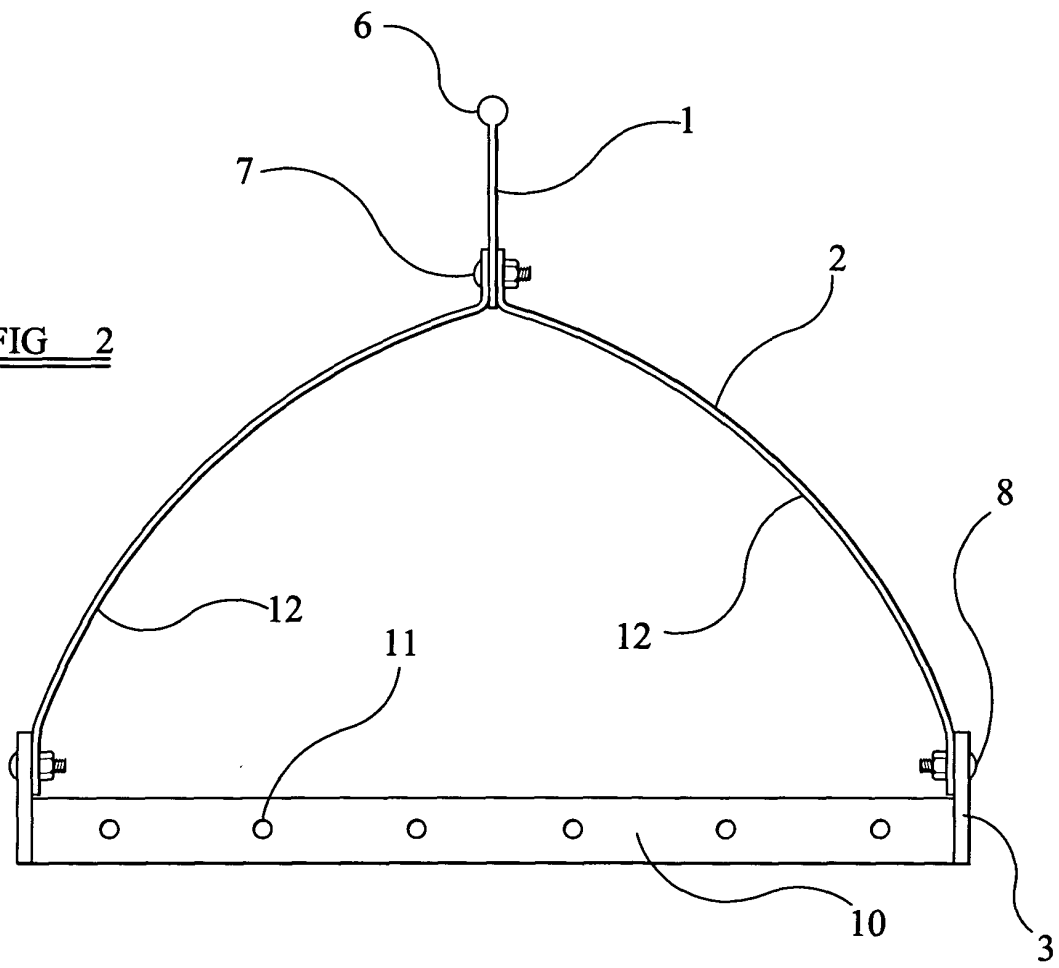


FIG 3a

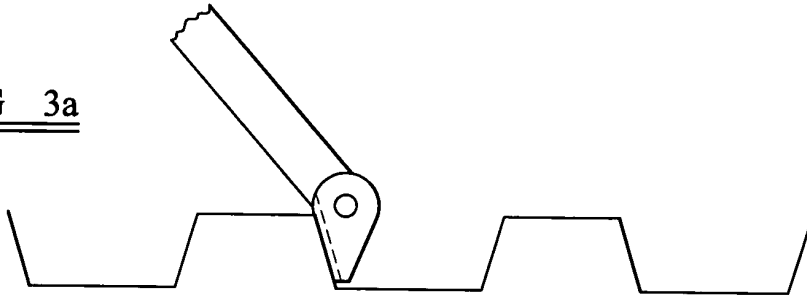


FIG 3b

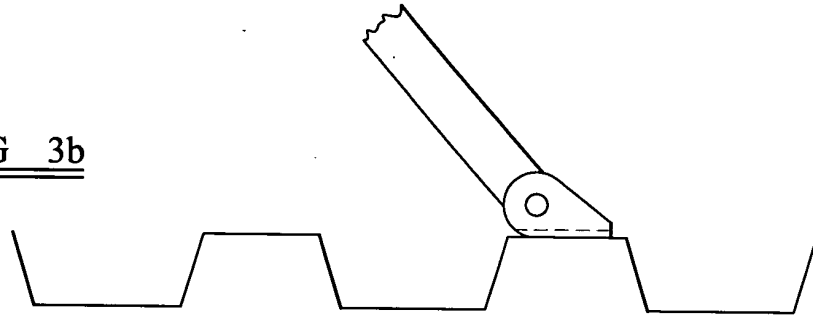


FIG 4

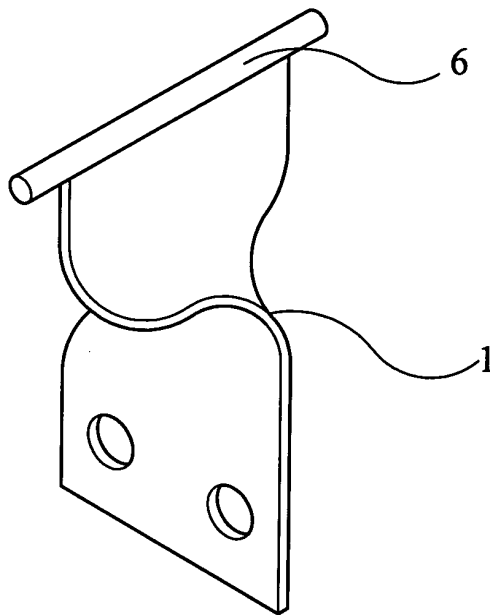


FIG 5

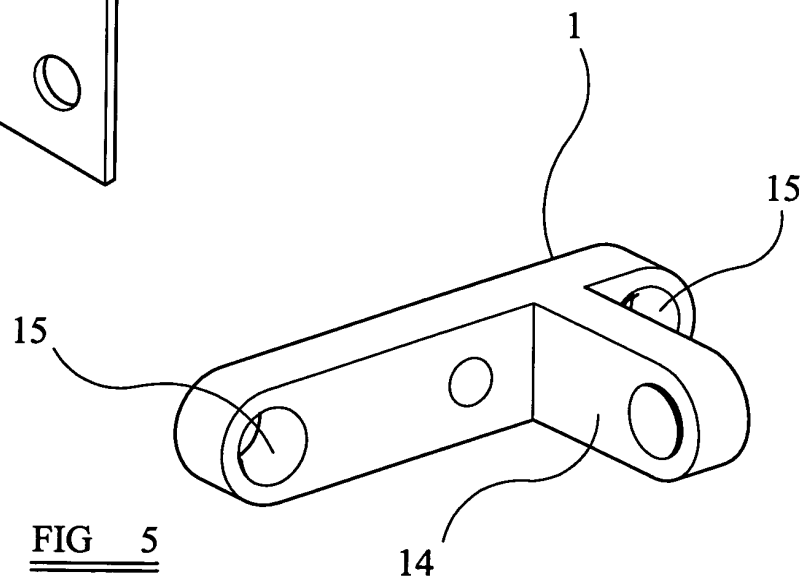


FIG 6

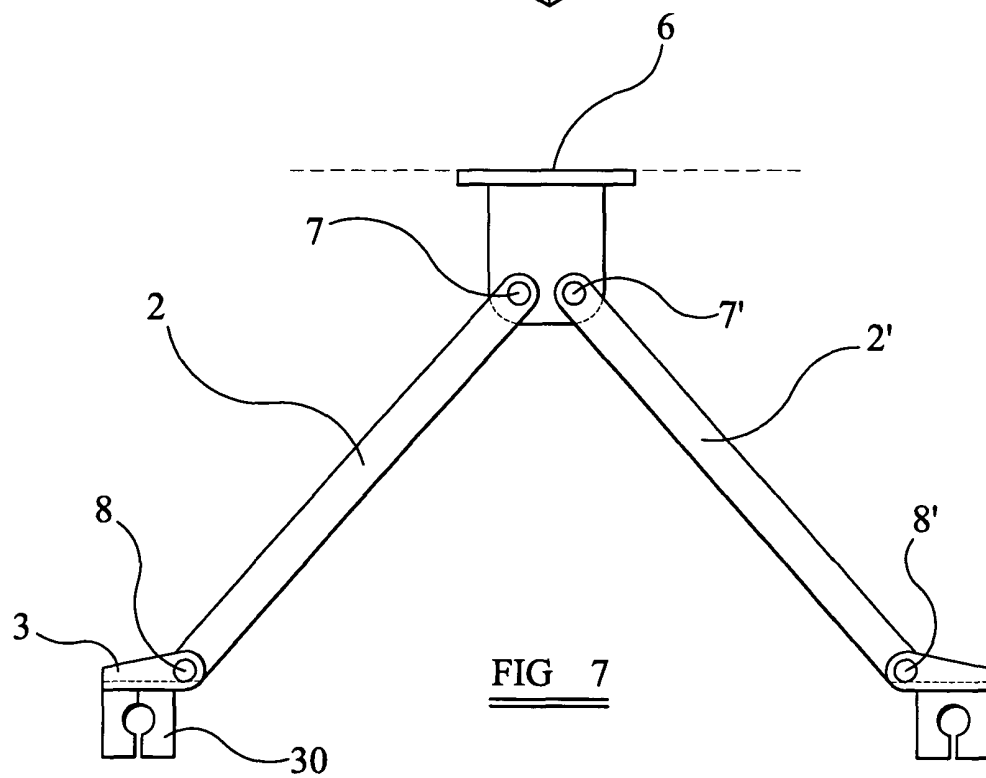
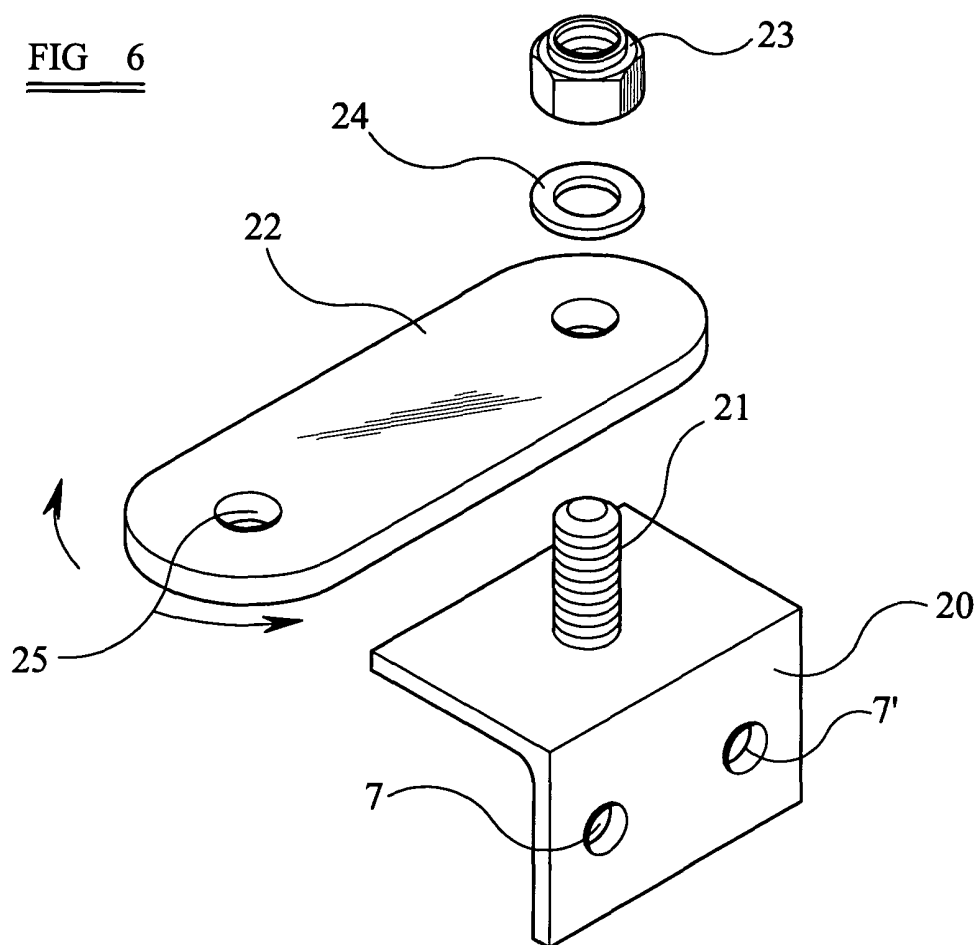


FIG 7

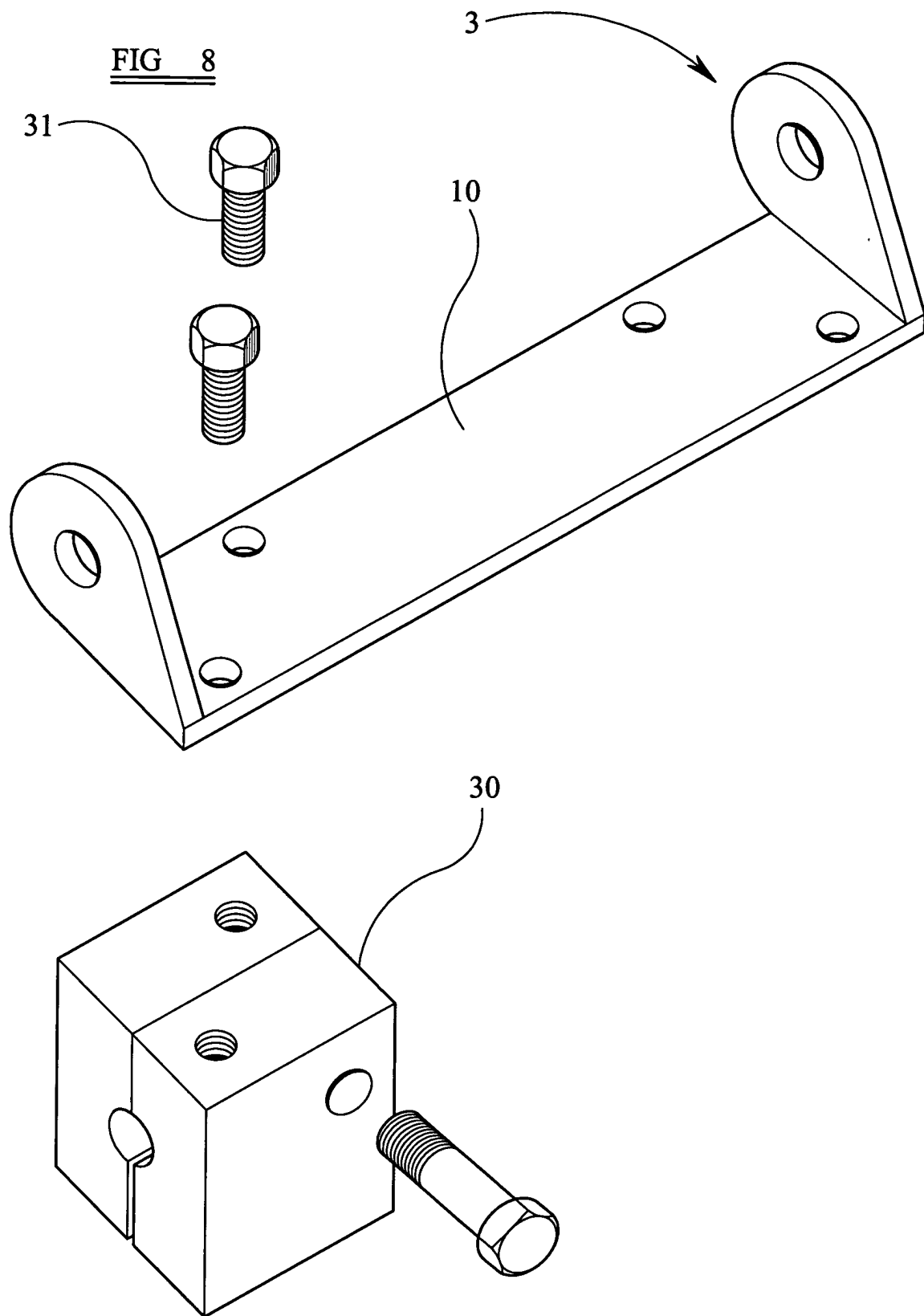
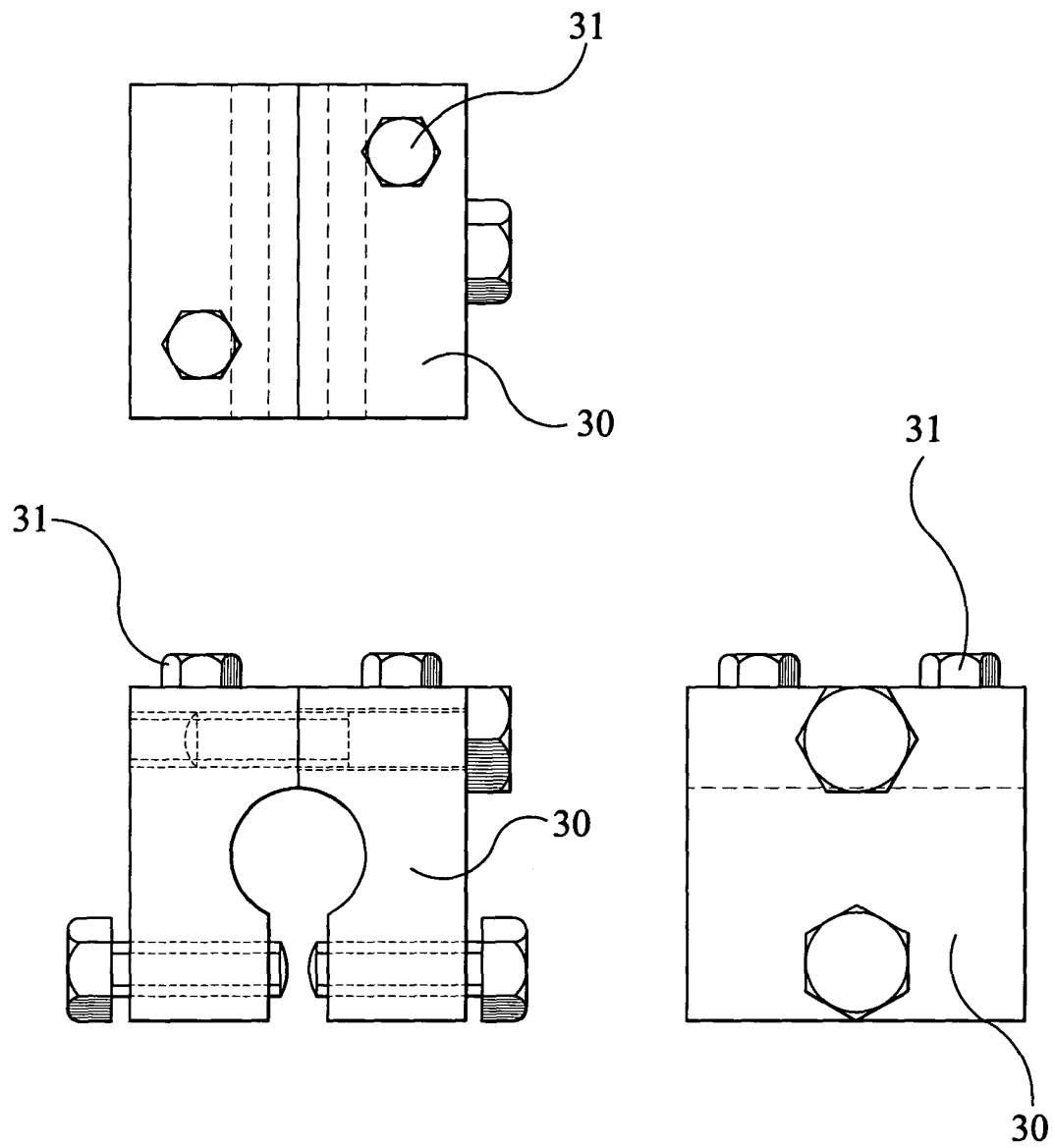


FIG 9





European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 03 25 7502

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
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			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
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The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
The Hague		18 February 2004	Neiller, F
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EP 03 25 7502

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18-02-2004

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