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(54) **A safety road barrier**

(57) A new road barrier, of the type comprising a steel strip (16) mounted on spacers, which are in turn mounted on uprights, has spacers (14), each of which is provided with an arched slot (141b) engaged by a bolt to the upright (12), in order to enable rotation of the spacer about a horizontal axis and corresponding lifting of the strip in the event of impact of a vehicle.

The end of the spacer (14) that carries the strip has a C-shaped opening the bent arms of which form tabs or flaps for engagement of the strip.

In the proximity of at least one of its ends, the barrier comprises an oblique tie rod which extends between the second upright, starting from the end, and the strip in a position corresponding to the third upright.

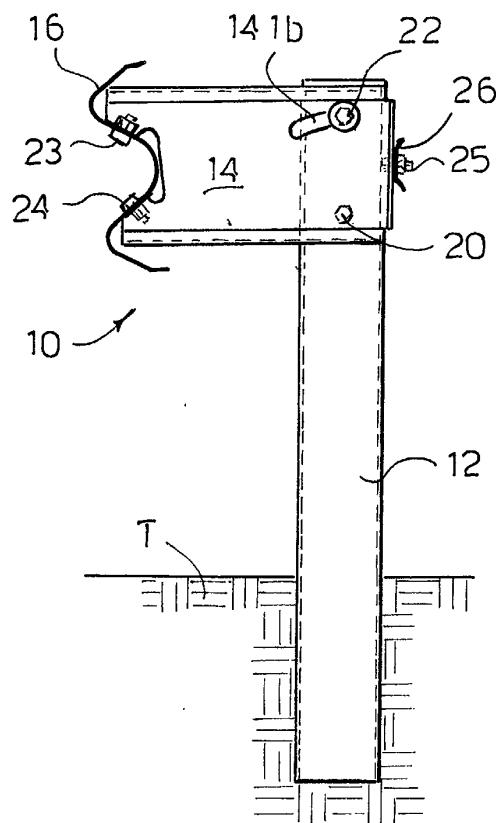


FIG 2

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Description

[0001] The invention relates to the sector of safety road barriers or guard-rails made of steel strip. In said barriers or guard-rails, a steel strip with undulated profile is carried on spacers, which are in turn carried in cantilever fashion by uprights or posts set at distances apart along the road.

[0002] The most recent barriers have spacers that are deformable, so that, in the event of impact by a vehicle, energy absorption is to a large extent provided by the deformation of the spacers.

[0003] A drawback, however, with various types of prior art safety barriers of the lies in their relatively remarkable transverse dimensions on account of the presence of the spacers. These transverse dimensions may be a serious problem on narrow roads, for example mountain roads.

[0004] A first aim of the present invention is thus to provide a barrier with reduced transverse dimensions. A further aim is to provide a barrier which is simple to install and easy to maintain, repair or replace in the event of impact, and which is easy to store in a warehouse or depot.

[0005] The above aims are reached by providing a safety road barrier or guard-rail as specified in Claim 1 and Claim 11. Further characteristics of the barrier are specified in the dependent claims.

[0006] The new barrier comprises a steel strip having an undulated profile, which is carried on posts or uprights by means of plate-type spacers, each of which is secured to the corresponding upright by means of a bottom bolt and a top bolt, the latter engaging an arched slot in the spacer. In this way, when a vehicle bumps against the steel strip, the latter, together with the spacer, undergoes a rotation through an arc, which is allowed by the arched slot, about the axis of the bottom bolt, so shifting to a higher level. The system enables energy absorption due to lifting of the steel strip as well as to the possible deformation of the parts and moreover enables the vehicle to be contained at a greater height, so improving the degree of safety.

[0007] Preferably, the spacer has a slit or aperture made in the part towards the strip, which confers on the spacer a C shape or channel shape. The ends of the C are bent for fixing the strip. The strip is preferably made of S420MC steel.

[0008] According to a further characteristic, the new barrier comprises an oblique tie rod in the vicinity of an end thereof. More in particular, the barrier comprises an oblique tie rod that extends between a second or penultimate upright, counting starting from the end, and the strip in a position corresponding to a third or antepenultimate upright.

[0009] The new barrier achieves the aims referred to above, and in particular provides a good containment for vehicles is light, has reduced transverse dimensions, and is simple to produce and install, and easy to main-

tain and repair or replace in the event of impact, whilst the parts making it up can be conveniently stored also on account of their reduced overall dimensions.

[0010] An exemplary unrestricted of the barrier will be described in what follows with reference to the attached drawings, in which:

Fig. 1 is a front view, at a reduced scale, of an end portion of the new barrier, shown interrupted on the left in the figure;

Fig. 2 is a cross sectional view of the barrier taken in a vertical plane indicated by 2-2 in Fig. 1, at a reduced scale, but enlarged as compared to the previous figure;

Fig. 3 is a cross sectional view of the barrier taken in the plane 3-3 of Fig. 1, at the same scale as that of Fig. 2; the upright is drawn broken-away;

Fig. 4 is a side view of a spacer of the barrier according to the invention, enlarged with respect to the previous figures;

Fig. 5 is a view from the left of the spacer of Fig. 4;

Fig. 6 is a view from the right of the spacer;

Fig. 7 is a top view of the spacer;

Fig. 8 is a front view of the top element of an oblique tie rod of the barrier;

Fig. 9 is a view from the left with respect to Fig. 8; and

Fig. 10 is a front view of the end of the barrier opposite to the one illustrated in Fig.1, shown broken-away on the right.

[0011] With reference to the figures, a new safety road barrier according to the invention is designated, as a whole, by the reference number 10 and comprises a plurality of uprights 12, which are constrained to the ground and set at distances apart along the extension of the barrier, a spacer 14 on each upright, and an undulated steel strip 16 carried by the spacers. In the proximity of each end, the barrier comprises an oblique tie rod 18 connected, with one of its ends, in the proximity of the foot of the second or penultimate upright (starting from the end of the barrier), and with the other end to the strip in a position of the strip that is preferably close to the third or antepenultimate upright.

[0012] Each upright or post 12 is preferably made of C-shaped or channel section, with the flanges of the C set along the extension of the road. The uprights or posts may be constrained to the ground T in any known way; for example, they may be fixed within an element made of reinforced concrete, as shown in the example illustrated.

[0013] The spacer 14 is made of sheared and bent sheet steel, and has a body 141, a top flange 142, a bottom flange 143 (the two flanges conferring on the body a channel configuration when viewed from the left of Fig. 4, with the end edges of the branches of the C preferably turned one towards the other), and a rear flange 144. The body 141 has a front slit 146 which is

open at the front and partially defined by arms 147 and 148 that are bent to form tabs or flaps diverging outwards. The body 141 has a bottom through hole 141a and a top through slot 141b, which is arched, with the centre of the arc substantially in the centre of the hole 141a. The rear flange 144 comprises a through hole 144a. The arms 147 and 148 have through holes 147a and 148a, respectively. The strip 16 is an undulated steel strip, preferably having a profile with two undulations, as may be seen in Figs. 2 and 3. Preferably, and this is a characteristic of the invention, an S420MC steel (according to UNI EN 10149-2 standards) is used. Each spacer is mounted on the respective upright by means of a bottom bolt 20, which engages the slot or hole 141a, and of a top bolt 22, preferably provided with a washer or collar, which engages the arched slot 141b. The strip 16 is mounted on the spacer 14 by means of bolts 23 and 24, which engage the holes 147a and 148a, respectively, of the tabs or flaps of the arms. On the rear flange 144, a respective bolt 25 secures a so-called rear component 26, which is in itself known, to the spacer. The function of the rear component, as in traditional barriers, is to bestow greater strength on the barrier, in so far as it distributes the energy of any impact over a number of uprights.

[0014] There now follows a description of the oblique tie rod 18, which constitutes a further characteristic of the barrier according to the invention. The tie rod 18 comprises a first element or bottom element 181 and a second element or top element 182. The bottom element is formed by a bar. The top element is illustrated in Figs. 8 and 9, and comprises an angled plate 183 and a U-shaped plate 184 constrained to the latter. The element 182 is joined to the element 181 preferably with a certain possibility of longitudinal adjustment and is fastened to it with bolts 185. The element 184 is fixed to the intermediate re-entrant portion of the strip by means of bolts 186, whilst the bottom end of the element 181 is fixed to the upright by means of bolts 190. The oblique tie rod extends from a position in the proximity of the foot of the penultimate upright of the barrier to a position in the proximity of the spacer of the antepenultimate upright of the barrier. It follows that the oblique tie rods in the vicinity of the two ends of the barrier are mounted in a mutually specular way, as may be seen in Figs. 1 and 10.

[0015] When the barrier according to the invention receives impact from a vehicle which hits the strip 16, the spacer or spacers located close to the point of impact, under the thrust generated, undergo a rotation about the axis of the bolt 20 through an arc that is allowed by the engagement of the bolt 22 within the arched slot 141b. The rotation absorbs part of the impact energy and, by bringing the strip up to a greater height, further contributes to the safety of the barrier, since it determines containment of the vehicle at a greater height. The oblique tie rods in the proximity of the ends of the barrier limit or prevent torsion of the uprights upon impact.

[0016] The parts that make up the barrier are relatively simple and can be stored and transported easily. In addition, a barrier that undergoes impact and deformation may be easily restored by replacement of the parts that have been damaged.

[0017] The barrier described herein is particularly, but not exclusively, devised to meet the requirements of Class H2 (high containment) according to the Decree of the Italian Ministry for Public Works of June 1998.

Claims

1. A safety road barrier comprising uprights, spacers carried on the uprights, and a strip having an undulated profile carried on the spacers, **characterized in that** at least one of said spacers (14) is formed with an arched slot (141b) and is engaged on the respective upright (12) by means of at least one bottom engagement means (20) and at least one top engagement means (22), which engages the arched slot, so that in the event of impact the spacer can describe an arc of rotation about the bottom engagement means.
2. The road barrier according to Claim 1, **characterized in that** said spacer has an aperture (146) in the part thereof that is to face the roadway, and the aperture is delimited by arms (147, 148) with tabs for engagement of the strip (16).
3. The road barrier according to Claim 1, in which the spacer is made of steel sheet with bent edges so as to present a substantially C-shaped or channel-shaped profile in vertical cross section.
4. The road barrier according to Claim 1, **characterized in that** the strip (16) having an undulated profile is made of steel.
5. The road barrier according to Claim 4, in which the strip is made of S420MC steel.
6. The road barrier according to Claim 1, in which upright is made of channel section or C-shaped section, with the flanges of the C designed to be set along the longitudinal extension of the road.
7. The road barrier according to Claim 1, **characterized in that** it further comprises at least one oblique tie rod (18) in the proximity of each end of said barrier.
8. The road barrier according to Claim 7, **characterized in that** the oblique tie rod (18) is constrained to the penultimate upright of the barrier in the proximity of the foot thereof and to the strip having an undulated profile, in the proximity of the antepenultimate

timate upright.

9. The road barrier according to Claim 8, **characterized in that** the oblique tie rod comprises two elements (181, 182) which can be mounted together in a length-adjustable way, and **in that** the element for connection to the strip (16) has one C-shaped part for embracing the central part of the undulated profile of the strip.
10. A spacer for road barriers, designed to be mounted on a barrier upright and to carry a barrier strip, **characterized in that** it comprises a substantially flat body (141) provided with at least one hole (141a) for engagement of an engagement means set at the bottom and with a slot (141b) set at the top, said slot extending according to an arc of a circle with an axis that is substantially coincident with the axis of said bottom hole.
11. A safety road barrier comprising uprights, spacers carried on the uprights, and at least one containment strip carried on the spacers, **characterized in that** it comprises oblique tie rods (18) in the proximity of each end.
12. The barrier according to Claim 11, **characterized in that** said oblique tie rod extends between a position in the proximity of the foot of the penultimate upright, in which it is constrained to the penultimate upright, and a position in the proximity of the antepenultimate upright, in which it is constrained to the strip.

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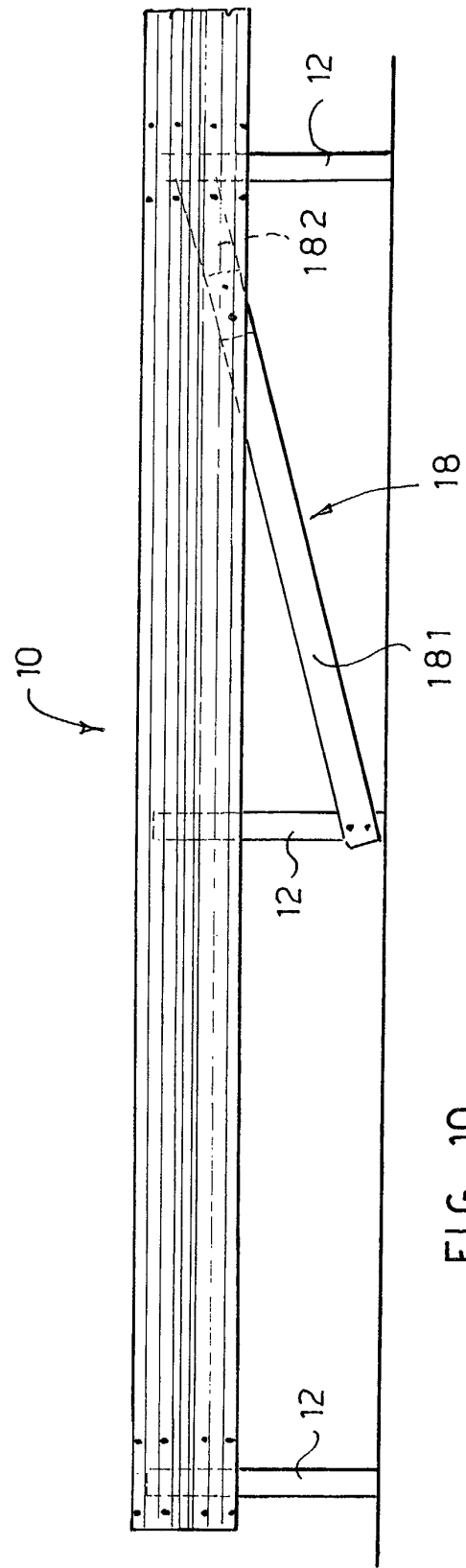
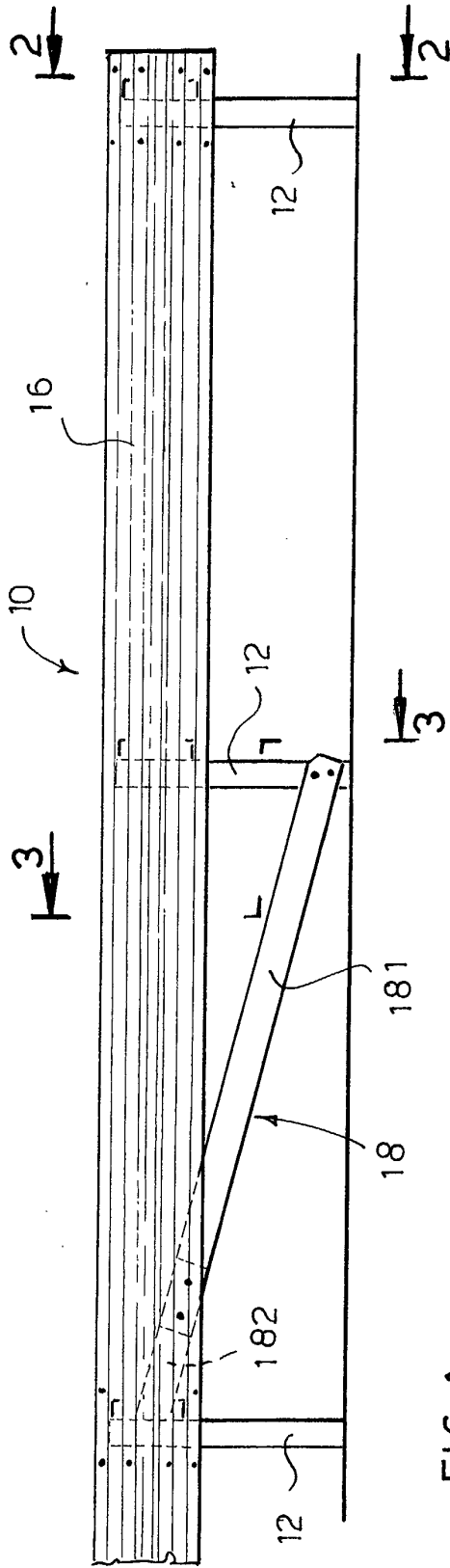
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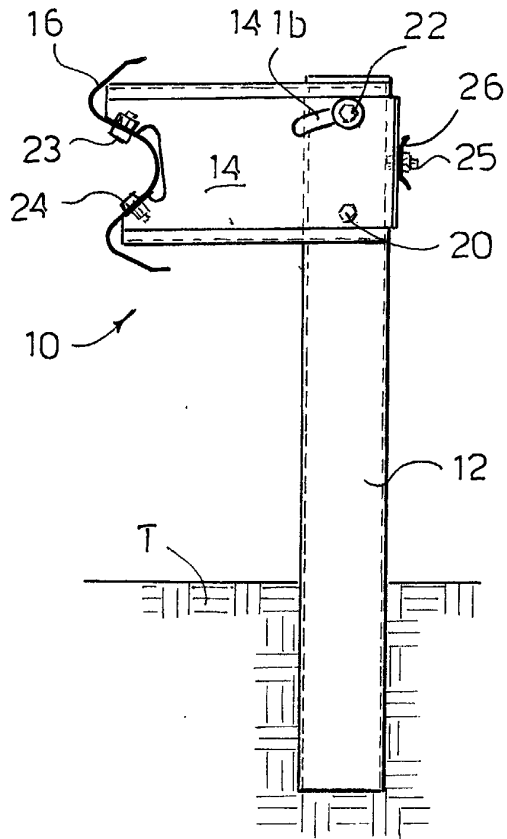


FIG. 2

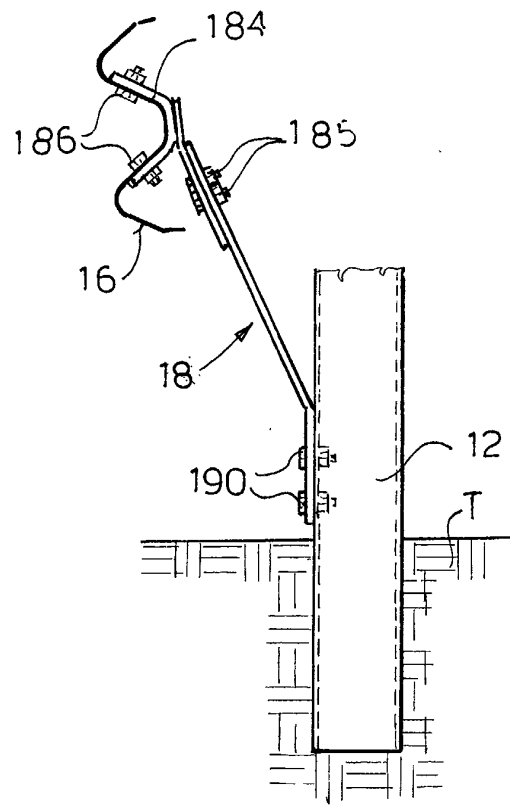


FIG. 3

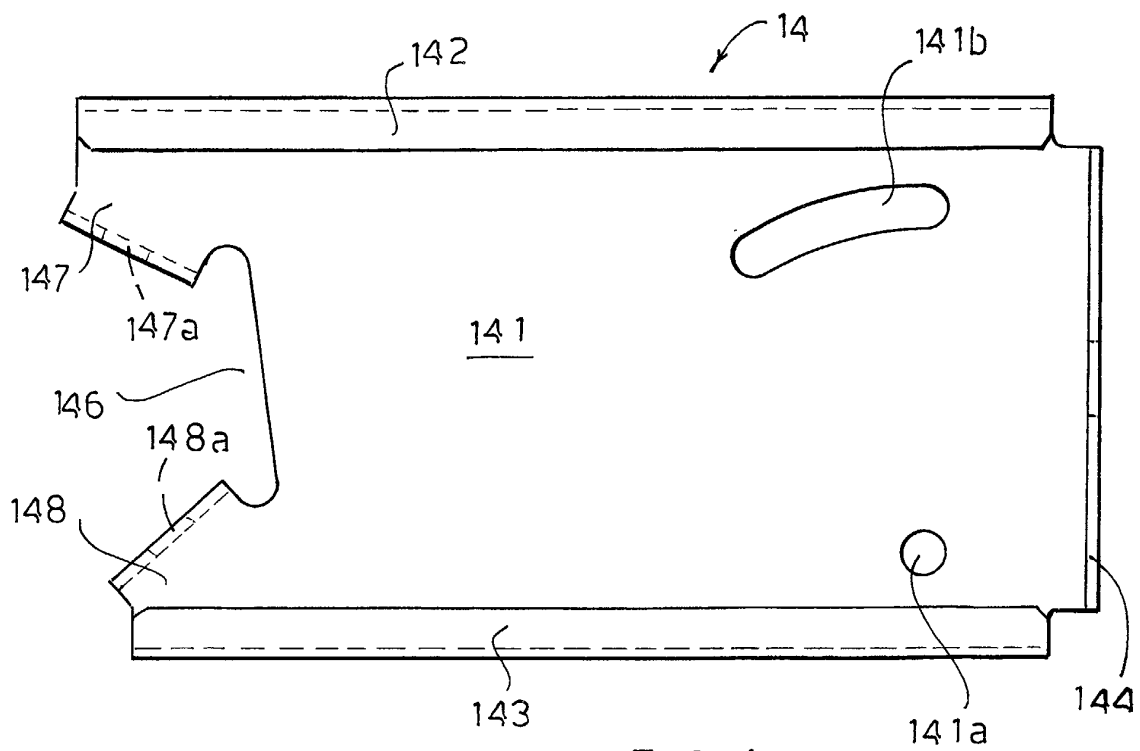


FIG. 4

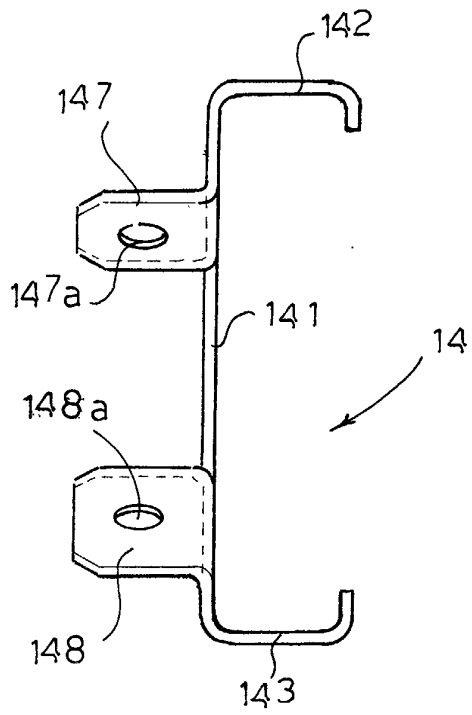


FIG. 5

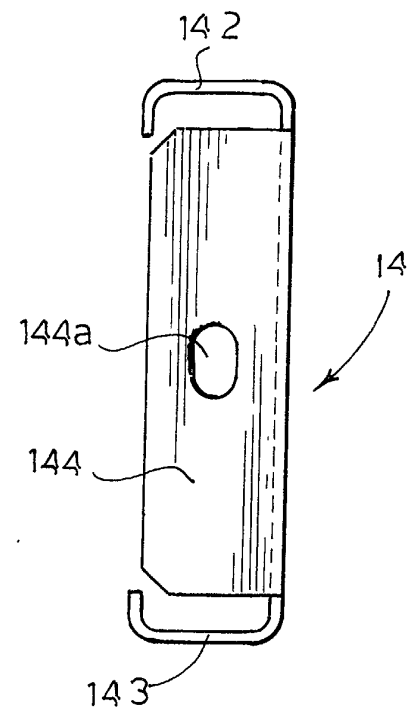


FIG. 6

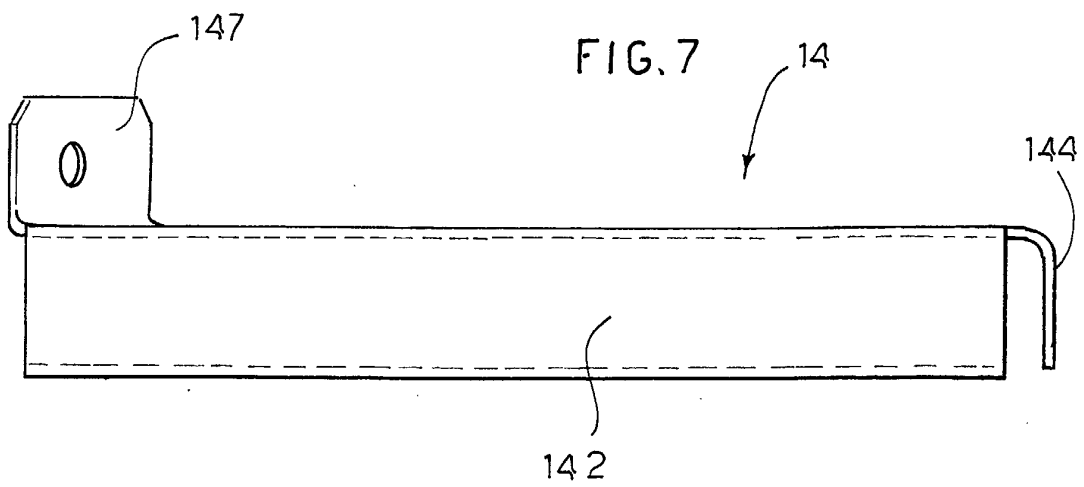


FIG. 7

