(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 428 097 B1**

(12) EUROPEAN PATENT SPECIFICATION

(45) Date of publication of patent specification: **30.03.94**

(51) Int. Cl.5: **E01D 19/10**, E01F 15/00

(21) Application number: **90121600.2**

(22) Date of filing: **12.11.90**

(54) Metallic safety barrier.

(30) Priority: **16.11.89 IT 6045089 U**

(43) Date of publication of application:
22.05.91 Bulletin 91/21

(45) Publication of the grant of the patent:
30.03.94 Bulletin 94/13

(84) Designated Contracting States:
AT BE CH DE DK ES FR GB GR IT LI LU NL SE

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EP 0 428 097 B1

Description

This invention concerns a metallic safety barrier for use, in particular, on bridges and viaducts. To be more exact, the invention concerns a barrier structurally suitable to ensure the strictest safety standards required on modern motorways and having at the same time weight features compatible with the usual types of structures employed in road construction.

The barrier of the invention can be employed on bridges of viaducts as a central traffic divider or as a rigid lateral edge but can also be applied in any other conditions which require safety devices possessing the necessary specific properties.

A plurality of apparatuses intended to improve the safety of driving on modern roads and motorways is known in the state of the art. Among these apparatuses a role of particular importance is played by the so-called guardrails.

As is known, these guardrails carry out the twofold task of showing the motorist clearly the path he has to follow and of hindering the departure of the vehicle from its carriageway in the event of an accidental change of course.

In particular the guardrails have to enable the following objectives to be achieved:

- great structural strength to hold and withstand heavy and light vehicles;
- great capability of preventing overturning onto the other carriageway;
- great capacity of absorbing energy (ductility).

Additional effects besides the above are required such as functional equipment (longlasting green hedges), drainage of the carriageway surfaces, etc.

Good results have been obtained by using barriers consisting of pre-fabricated reinforced-concrete elements of a known profile called "New Jersey".

These barriers, which have been in use in many countries for years now, have a surface inclined at their base and suitable to act directly on the steering systems of vehicles on a collision course and thus obtain the necessary return of the vehicles to their carriageway.

Moreover, attempts have been made to obviate the natural rigidity of this type of barrier by employing systems of a ductile kind for anchorage of the barriers to the ground. In other words the barriers are allowed to undergo residual deformations and movements which enable the deceleration imparted to a vehicle to be reduced to a minimum, thus making possible acceptable return trajectories to the correct carriageway together with very limited damage.

All of the above measures have overcome a great deal of the problems encountered on normal roads but not on bridges or viaducts. In fact, the heavy structure of the New Jersey type barriers is not compatible with the loads which can be withstood by the structures normally used.

Nowadays the usual guardrails consisting of steel strips are used on bridges and viaducts and entail well known limitations made even more obvious by the imperative need to prevent the outward escape of vehicles from such segments of the road.

The purpose of this invention is to overcome the problems of the state of the art by providing a barrier suitable for use on bridges or viaducts and having the necessary safety properties.

The invention is set forth in the main claim, while the dependent claims describe various features of the invention.

The barrier according to the invention is a modular metallic element which can be coupled to like adjacent elements so as to form the required safety infrastructures. This modular element is substantially hollow within and therefore forms a light structure especially suitable for use on bridges or viaducts.

The metallic structure, which is suitably shaped and reinforced, enables improved service to be achieved at the same time by the safety barrier, especially as regards the absorption of kinematic energy, which is converted into an action of deformation of the structure thus hit at the time of impact.

In this way the damage to occupants of a vehicle and to the vehicle itself is considerably lessened and at the same time the rebound of the vehicle towards the middle of the carriageway is limited.

According to a variant the inside of the safety barrier includes filler means suitable to disperse energy still further.

The modular element according to the invention consists of one or advantageously of a plurality of specially shaped metallic components connected to each other by suitable fixture means.

Each modular element includes its own means for anchorage to the ground, and these anchorage means may also be of a resilient type.

Connection of adjacent modular elements to each other is obtained advantageously by frontal coupling and fixture means, which are borne on the modular elements themselves or cooperate with suitably equipped portions of those elements.

The modular elements may also comprise specific coupling means for connection to already existing modular elements of another type.

These and other special features of the invention will be made clearer in the description that follows.

The attached figures, which are given as a non-restrictive example, show the following:

- Fig.1 is a diagram of a structure having metallic safety barriers according to the invention;
- Fig.2 is a front view of a metallic barrier according to the invention;
- Fig.3 is a front view of another type of embodiment of the metallic barrier of the invention;
- Fig.4 shows one type of connection between adjacent barriers;
- Fig.5 shows another type of connection between adjacent barriers;
- Fig.6 shows a particular type of anchorage of the barriers to the ground;
- Fig.7 is a diagram of a variant of the invention.

Fig 1 is a diagram of a safety barrier 10 consisting of a plurality of modular metallic elements 11 adjacent to each other and reciprocally connected. These elements 11 comprise also anchorage means 12 for anchorage to the ground.

The conformation of the elements 11 is like that of the New Jersey type and therefore includes the well-tried and advantageous features of the same.

Fig.2 shows a first embodiment of the modular metallic element 11 of a a central traffic divider type. In this example the element 11 consists of two shaped metallic sidewalls 17 and 117 respectively connected at the top 13 of the element 11.

The top connection 13 may be achieved, as shown, by superimposing the edges of the element 11 and coupling them together thereafter with bolts or by welding or with the front edges of the element 11 connected by means of bolted plates or in oher known ways.

Frontal plates 14 are secured to the two ends of each modular metallic element 11 so as to close the same, and in this way the element 11 is substantially hollow within.

In this example the frontal plates 14 include openings for the passage and fixture of reinforcements 15 arranged lengthwise within the elements 11 and having substantially the same length as the modular metallic elements 11. These reinforcements 15 are advantageously metallic sections and provide the structure with the required strength and rigidity.

The frontal plate 14 may also be continuous and thus will not include openings for the passage of reinforcements 15, which will therefore be secured, by welding for instance, to the inwardly facing side of the frontal plate 14.

A coupling means to couple or fix together the neighbouring modular metallic elements 11 may also be secured to the frontal plate 14.

Figs.2 and 3 show vertical stiffening means 16 which connect the upper horizontal tract to the lower horizontal tract.

Fig.3 shows a second embodiment of the modular metallic element 111 of a type employed for the lateral edges of a motorway. If two of the elements 111 are coupled and joined together as counterparts, it is possible to obtain the central traffic divider type element 11.

The second type of element 111 also consists of two shaped metallic sidewalls, 17 and 117 respectively, connected together at the top 13 of the element by means of a fixture plate 18 in this example.

Fig.4 shows from above a first type of possible coupling of two neighbouring elements 11; this coupling is obtained by a male/female joint, wherein one of the facing frontal plates 14 bears a male component 19, whereas the frontal plate 14 of the other neighbouring element 11 bears a female component 20.

Each frontal plate 14 of each element 11 bears on one face a male component 19 and on its other face a female component 20.

An element 11 is coupled to an already positioned coordinated element 11 by being inserted and caused to slide downwards in relation to the already positioned element 11.

Fig.5 shows another embodiment of the coupling of neighbouring elements 11. This coupling is obtained by means of sections 21-121 borne on the frontal plates 14, one section 21 being inserted within the other section 121.

The coupling of the two neighbouring elements 11 is completed by means of fixture plates 22 positioned, for instance, laterally against the sidewalls 17-117.

It is obvious that other types of coupling, even of a specific type, are possible, such as those required, for instance, at bends in the roads or other types of diversions.

Fig.6 is an enlarged diagram of a type of anchorage 12 of a modular metallic element 11 to the ground. Compartments 23 are provided along the lengthwise extent of each element 11 at the base 24 of the same.

On the base 24 are inserted metallic sheaths or tubes 25, for instance, which cooperate with holes 26 machined in the base 24; means for anchorage to the ground 28, for instance threaded bolts 27, are passed through the holes 26. These means 27 for anchorage to to the ground 28 may themselves be resilient or may cooperate with additional resilient means so as to enable the element 11 to have an extra capability of oscillation in relation to one or more vertical planes.

Fig.7 is a diagram of a variant of the invention, according to which resilient means referenced as

an indication with 29 are included in the space between the two sidewalls 17-117 of the element 11. These resilient means 29 may be of various types and origins such as springs, diaphragms plates or other means suitable to disperse energy.

In the same way some resilient filler material may be located in that space and may be, for instance, a plurality of empty cans or containers which can be compressed under a given load.

We have described here a preferred embodiment of the invention, but variants are possible for a person skilled in this field without departing thereby from the scope of the invention as defined in the attached claims.

Claims

1. Safety barrier for use, in particular, on bridges and viaducts, which is suitable for employment either as a central traffic divider or as a rigid lateral edge and comprises at least one side with a New Jersey type profile and is characterized in that it consists of a box-like metallic element (11) delimiting a substantially empty interior and includes sidewalls (17-117) made of one or more connected plates, and frontal walls (14), one of the frontal walls (14) being equipped with female positioning and coupling means, while the other frontal wall (14) is equipped with male positioning and coupling means, the side with a New Jersey type sidewall (17-117) consisting of a plate with a lower base segment substantially parallel to the ground, a first lower and substantially vertical segment, a second segment inclined towards the outside of the carriageway, a third upper and substantially almost vertical segment and a substantially horizontal upper segment, means (12) for anchorage of the element to the ground being included in the second inclined segment and in cooperation with, and in the vicinity of, the first vertical segment and with the lower base segment, first and second lengthwise reinforcement means (15) being also included within the box-like element (11) in the vicinity of the line of lengthwise union of the second inclined segment and the third almost vertical segment.

2. Safety barrier (10) as in Claim 1, in which resilient metallic filling means (29) are included in the space defined by the sidewalls (17-117).

3. Safety barrier (10) as in Claim 1 or 2, in which the connection between neighbouring modular metallic elements (11) is carried out by interconnecting matching male/female joint means (19-20) of adjacent elements.

4. Safety barrier (10) as in Claim 1 or 2, in which the connection between neighbouring modular metallic elements (11) is carried out with reciprocally insertible means (21-121) and fixture means (22).

5. Safety barrier (10) as in any claim hereinbefore, in which the means (12) for anchorage to the ground cooperate with resilient means fixed to the ground.

6. Safety barrier (10) as in any claim hereinbefore, which includes vertical stiffening means (16).

Patentansprüche

1. Sicherheitsplanke, insbesondere für die Verwendung auf Brücken und Viadukten, die für den Einsatz entweder als zentraler Verkehrsteiler oder als feste seitliche Begrenzung geeignet ist, und von der mindestens eine Seite ein New Jersey-Profil aufweist, **dadurch gekennzeichnet**, daß sie aus einem kastenartigen metallischen Element (11) besteht, das ein im wesentlichen hohles Inneres begrenzt, sowie daß sie aus einer oder mehreren miteinander verbundenen Platten bestehende Seitenwände (17-117) und Frontwände (14) aufweist, wobei eine der Frontwände (14) mit weiblichen Positionier- und Kuppelorganen, und die andere Frontwand (14) mit männlichen Positionier- und Kuppelorganen versehen ist, wobei ferner die Seite mit einer New Jersey-Seitenwand (17-117) aus einer Platte mit einem unteren Basissegment , das im wesentlichen parallel zum Boden verläuft, einem ersten unteren und im wesentlichen vertikalen Teil, einem zweiten Teil, der gegen die Außenseite der Fahrbahn geneigt ist, einem dritten oberen und im wesentlichen nahezu vertikalen Teil und einem im wesentlichen horizontalen oberen Teil besteht, wobei ferner Organe (12) für die Verankerung des Elementes am Boden im zweiten geneigten Teil und in Übereinstinmung sowie in Nachbarschaft mit dem ersten vertikalen Teil und mit dem unteren Basisteil vorgesehen sind und weiters erste und zweite Längsverstärkungsorgane (15) im kastenartigen Element (11) in Nachbarschaft der Längsverbindungslinie zwischen dem zweiten geneigten Teil und dem dritten nahezu vertikalen Teil angeordnet sind.

2. Sicherheitsplanke (10) nach Anspruch 1, bei der nachgiebige metallische Füllorgane (29) in dem durch die Seitenwände (17-117) bestimmten Raum angeordnet sind.

3. Sicherheitsplanke (10) nach Anspruch 1 oder 2, bei der die Verbindung zwischen benachbarten modularen metallischen Elementen (11) durch zueinander passende männlich/weibliche Verbindungsorgane (19-20) anschließender Elemente bewirkt wird.

4. Sicherheitsplanke (10) nach Anspruch 1 oder 2, bei der die Verbindung zwischen benachbarten modularen metallischen Elementen (11) durch gegenseitig einsetzbare Organe (21-121) und Fixierorgane (22) bewirkt wird.

5. Sicherheitsplanke (10) nach einem der vorstehenden Ansprüche, bei der die Organe (12) für die Verankerung am Boden mit nachgiebigen, am Boden verankerten Organen zusammenenwirken.

6. Sicherheitsplanke (10) nach einem der vorstehenden Ansprüche, die vertikale Versteifungsorgane (16) aufweist.

Revendications

1. Barrière de sécurité à utiliser en particulier sur des ponts et des viaducs, destinée à servir soit comme protection centrale pour le trafic, soit comme protection latérale rigide, comprenant au moins un côté à profil du type New Jersey, et caractérisée en ce qu'elle consiste en un élément métallique (11) en forme de caisson délimitant un espace interne sensiblement vide, et en ce qu'elle comprend des parois latérales (17-117) faites d'une tôle ou de plusieurs tôles assemblées, ainsi que des parois d'about (14), une des parois d'about (14) étant équipée de moyens femelles de positionnement et d'accouplement, tandis que l'autre paroi d'about (14) est équipée de moyens mâles de positionnement et d'accouplement, le côté muni d'une paroi latérale (17-117) de type New Jersey consistant en une tôle comprenant un segment de base inférieur essentiellement parallèle au sol, un premier seqment inférieur et sensiblement vertical, un deuxième segment incliné vers l'extérieur de la voie de circulation, un troisième segment supérieur et en substance quasi vertical, ainsi qu'un segment supérieur sensiblement horizontal, des moyens (12) d'ancrage de l'élément au sol étant inclus dans le deuxième segment incliné et coopérant avec le premier segment vertical et à proximité de ce dernier, ainsi qu'avec le segment de base inférieur, des premier et second moyens (15) de renforcement en longueur étant également inclus dans l'élément (11) en forme de caisson à proximité de la ligne qui unit longitudinalement le deuxième segment incliné et le troisième segment à peu près vertical.

2. Barrière de sécurité (10) selon la revendication 1, dans laquelle des moyens de remplissage métalliques résilients (29) sont inclus dans l'espace défini par les parois latérales (17-117).

3. Barrière de sécurité (10) selon la revendication 1 ou 2, dans laquelle la fonction entre des éléments métalliques modulaires voisins (11) est réalisée par l'assemblage de moyens d'accouplement appariés mâles/femelles (19-20) d'éléments adjacents.

4. Barrière de sécurité (10) selon la revendication 1 ou 2, dans laquelle l'assemblage entre des éléments métalliques modulaires voisins (11) est réalisé à l'aide de moyens (21-121) à insérer l'un dans l'autre et à l'aide de moyens de fixation (22).

5. Barrière de sécurité (10) selon l'une quelconque des revendications précitées, caractérisée en ce que les moyens (12) d'ancrage dans le sol coopèrent avec des moyens résilients fixés au sol.

6. Barrière de sécurité (10) selon l'une quelconque des revendications précitées, comprenant des moyens raidisseurs verticaux (16).

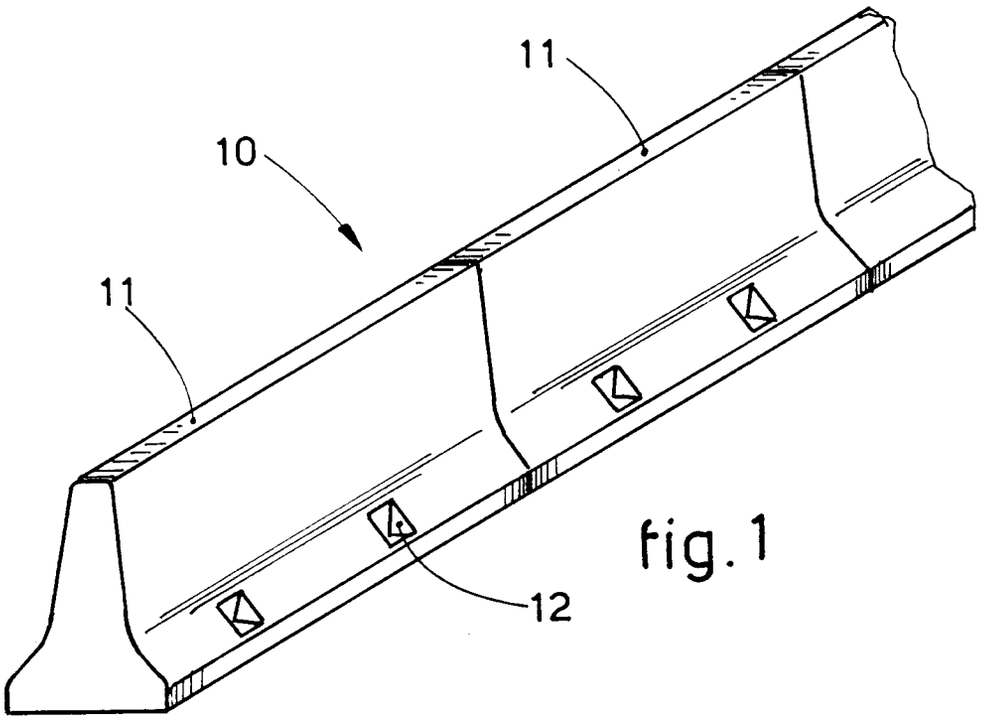

fig.1

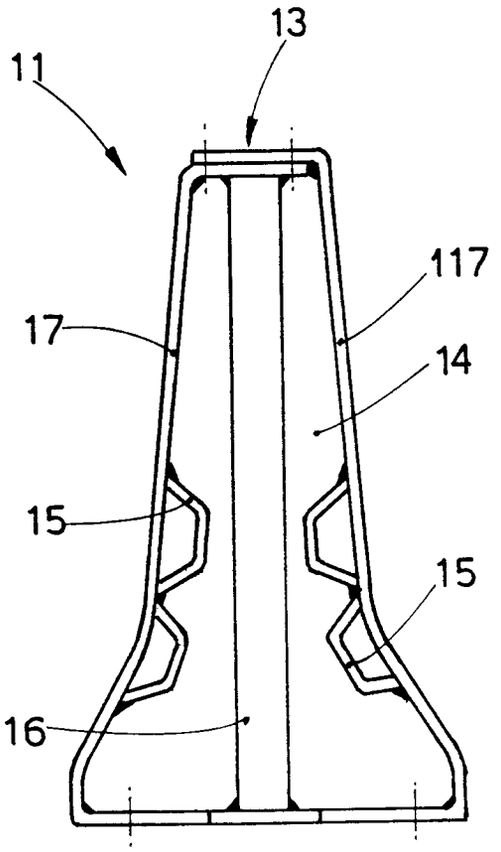

fig.2

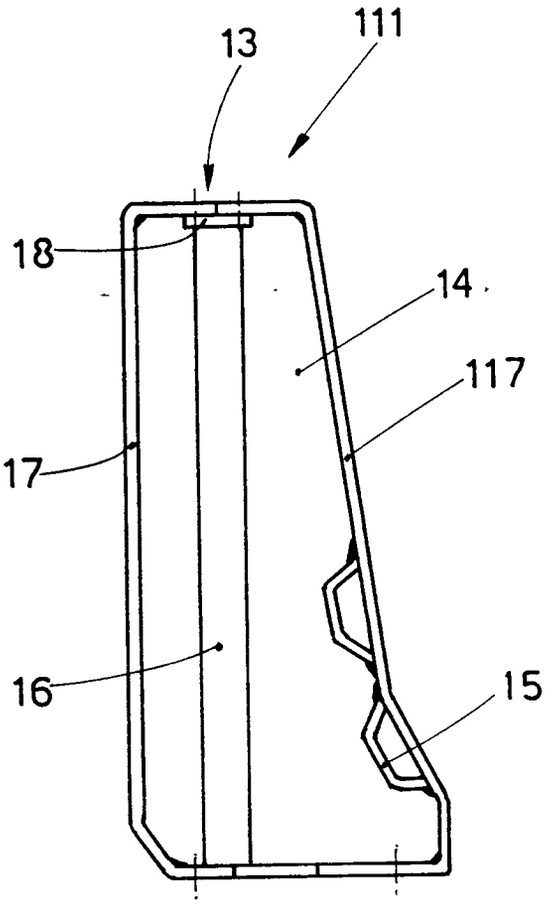

fig.3

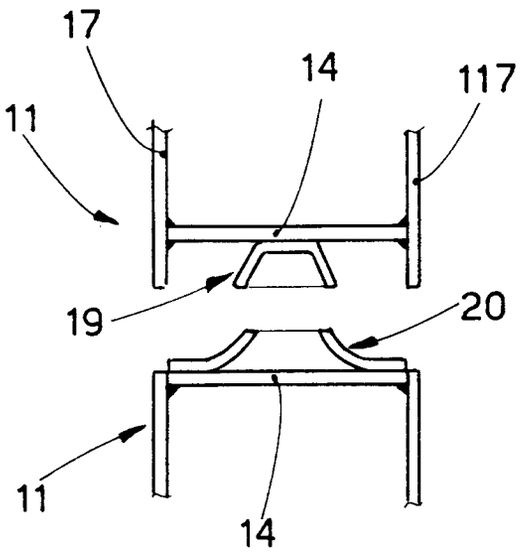

fig.4

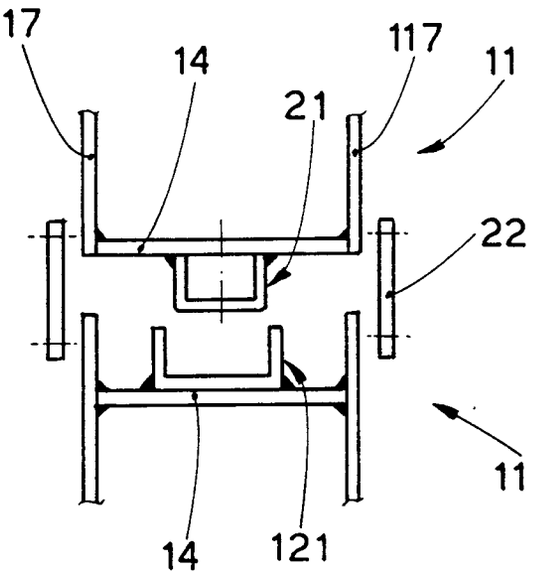

fig.5

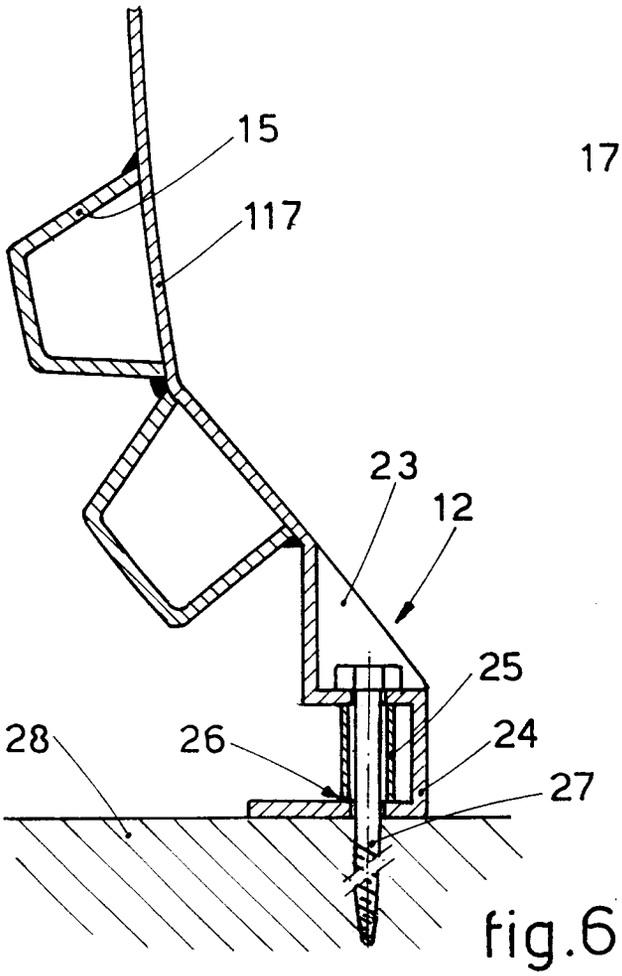

fig.6

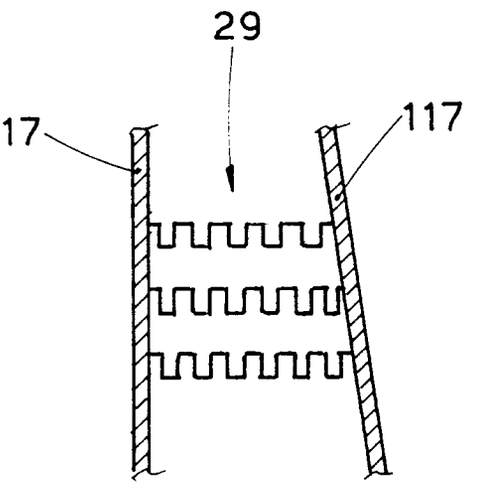

fig.7