

19



Europäisches Patentamt
European Patent Office
Office européen des brevets



11 Publication number:

0 677 615 A1

12

EUROPEAN PATENT APPLICATION

21 Application number: **94830497.7**

51 Int. Cl.⁶: **E01F 15/04**

22 Date of filing: **25.10.94**

30 Priority: **14.04.94 IT MI940715**

71 Applicant: **TUBOSIDER ITALIANA S.p.A.**
Corso Torino, 236
I-14100 Asti (IT)

43 Date of publication of application:
18.10.95 Bulletin 95/42

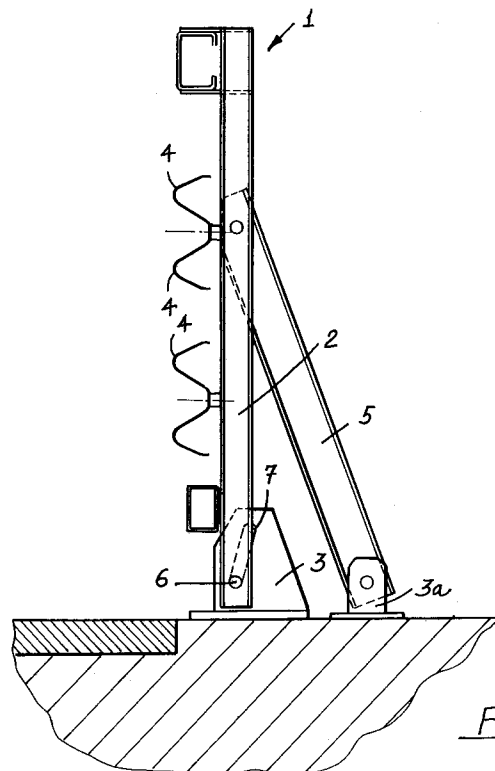
72 Inventor: **Bonifacino, Mario, Tubosider**
Italiana S.p.A.
Corso Torino, 236
I-14100 Asti (IT)

84 Designated Contracting States:
AT BE CH DE ES FR GB LI SE

74 Representative: **Cicogna, Franco**
Ufficio Internazionale Brevetti
Dott.Prof. Franco Cicogna
Via Visconti di Modrone, 14/A
I-20122 Milano (IT)

54 **Variable configuration road barrier with energy dissipating means.**

57 The present invention relates to a variable configuration road barrier, including energy dissipating means, characterized in that said barrier comprises a base plate (3), which can be affixed to the ground, and supporting an upright (2), pivoted on the base plate and provided with means for connecting a barrier. On the side of the upright opposite to the barrier, there is provided a strut which is in turn pivoted, at the top end portion thereof, to the upright and, at the bottom end portion, to the base plate (3A). The upright is provided, between the region thereof pivoted to the strut and the region thereof pivoted to the base plate, with means for varying the useful length (6,7) of the upright, in order to allow the upright to partially turn with respect to the base plate, toward the strut. Near the upright length varying means there are moreover provided energy dissipating means, operating against the upright length variation.



EP 0 677 615 A1

BACKGROUND OF THE INVENTION

The present invention relates to a variable configuration or geometry road barrier, including energy dissipating means.

As is known, for preventing motor vehicles from accidentally exiting the road, there are at present used barriers, called "guard-rails", which usually comprise metal section members, affixed to upright associated with the ground near the road edges.

These types of barriers, even if they are plastically deformable under impacts, are not adapted to sufficiently dissipate the impact energy or power and, accordingly, they transfer an undesired resilient reaction on the motor vehicle, with very dangerous consequences for the persons on the vehicle.

In order to solve the above mentioned problem, there have been already designed barriers having a construction assuring a better dissipation of the impact energy.

These barriers, however, are very complex construction-wise, and, accordingly, have been scarcely applied.

SUMMARY OF THE INVENTION

Accordingly, the aim of the present invention is to overcome the above mentioned problem, by providing a variable configuration road barrier, which is adapted to provide a high dissipation of the impact energy, so as to prevent the vehicle from being subjected to high elastic reaction forces.

Within the scope of the above mentioned aim, a main object of the present invention is to provide such a road barrier which can be assembled in a very simple and quick manner, which comprises a very reduced number of component parts, and which, moreover, is very reliable and safe in operation.

According to one aspect of the present invention, the above mentioned aim and objects, as well as yet other objects, which will become more apparent hereinafter, are achieved by a variable configuration road barrier, including energy dissipating means, characterized in that said barrier comprises a base plate, which can be affixed to the ground, said base plate supporting an upright pivoted to said base plate and provided, on the side thereof facing the ground surface, with means for coupling a barrier element, there being moreover provided a strut, arranged on the upright side opposite to said barrier and pivoted, at the top end portion thereof, to said upright and, at the bottom end portion thereof, to said base plate, said upright being moreover provided, between the region thereof

pivoted to said strut and the region thereof pivoted to said base plate, with means for varying the useful length of said upright, for allowing said upright to partially rotate with respect to said base plate, toward the strut; near said upright length varying means there being furthermore provided energy dissipating means which operate against the length variation of said upright.

BRIEF DESCRIPTION OF THE DRAWINGS

Further characteristics and advantages of the present invention will become more apparent hereinafter from the following detailed disclosure of two preferred, though not exclusive, embodiments of a variable configuration or geometry road barrier, including energy dissipating means, which are illustrated, by way of an indicative, but not limitative, example, in the figures of the accompanying drawings, where:

Figures 1 to 3 illustrate the first embodiment of the road barrier according to the present invention and, more specifically:

Figure 1 is a schematic view, in cross section, illustrating the variable configuration road barrier, under not stressed conditions thereof;

Figure 2 illustrates the road barrier of Figure 1 in the condition thereof assumed upon an impact;

Figure 3 illustrates an enlarged detail of Figure 1;

Figures 4 to 6 illustrate the road barrier, according to its second embodiment, and, more specifically:

Figure 4 is a cross sectional view illustrating the road barrier under not stressed condition thereof;

Figure 5 illustrates the road barrier of Figure 4 under the condition thereof assumed upon an impact;

and

Figure 6 illustrates an enlarged detail of Figure 4.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

With reference to the number references of the figures of the drawings, the first embodiment of the road barrier according to the present invention, which has been shown in Figures 1 to 3 and has been generally indicated at the reference number 1, comprises an upright 2, vertically extending and being pivoted, near the bottom end portion thereof, to a base plate 3 which is affixed to the ground.

The upright 2 is provided, on the side thereof provided for facing the road surface, with means for connecting at least a barrier element 4.

The road barrier assembly according to the present invention, further comprises a strut 5, which is arranged on the side of the upright 2 opposite to the road surface and being pivoted, at the top end portion thereof, to a middle region of the upright 2.

Moreover, said strut 5 is pivoted, at the bottom end portion thereof, to a base plate 3a which can be made as a single piece with the base plate 3 or, as is shown, it can consist of a separated element affixed, as the base plate 3, to the ground near the edges of the road.

Thus, the road barrier assembly, owing to the pivoting of the upright 2 to the strut 1 and the pivoting of the latter to the base plates 3 and 3a, will have the configuration of a three-hinge arch.

Notwithstanding this isostatic configuration of the barrier, it is possible to cause the upright 2 to partially rotate about the pivoting axis to the base plate 3, in the direction of the strut 5, in the case of impacts against the barrier coming from the road.

In fact, the barrier assembly comprises means for varying, upon an impact, the useful length of the upright 2 and, more specifically, these upright length changing means comprise a pivot pin 6 which pivotably connects the upright 2 to the base plate 3.

The pin 6 passes through a slot 7 which is provided through the base plate 3 and extends along a direction with a vertical component.

Thus, the sliding of the pin 6 and, accordingly, of the bottom end portion of the upright 2, along the slot 7, will provide a partial rotation of the upright about the axis of the pin 6, in the direction of the strut 5.

At the means for varying the useful length of the upright 2, there are moreover provided, according to one aspect of the invention, energy dissipating means, operating against this variation of the useful length of the upright.

More specifically, said energy dissipating means substantially comprise elements adapted to provide a narrowing, to a size less than the diameter of the pivot pin 6, of the slot 7 at the region not occupied by the pin 6, as the upright 2 is in a rest condition, that is as it vertically extends without impacts exerted thereon.

The narrowing means comprise a dissipating plate 8 which is affixed, for example by welding, to the base plate 3, at the slot 7.

The end portion of the dissipating plate 8 facing the pin 6, as the upright 2 is under not stressed conditions, is provided with a cut-out or beveled portion 9, adapted to prevent the pin from locking as a motor vehicle impacts against the barrier.

Moreover, the dissipating plate 8 can also be advantageously provided with a first portion 10 and a second portion 11 having mutually different thick-

nesses.

In particular, it is preferred that the first portion 10 has a thickness less than the thickness of the second portion 11, so as to provide an increasing energy dissipating effect, as the impact force increases.

The subject road barrier, in its second embodiment, shown in Figures 4 to 6, and generally indicated at the reference number 21, comprises an upright 22 which vertically extends and is pivoted, near its bottom, to a base plate 23, affixed to the ground.

The upright 22, likewise the upright 2 of the first embodiment, is provided, on the side thereof provided for facing the road surface, with means for coupling at least a barrier 24, and is pivoted, on the side thereof provided for facing the opposite portion, with respect to the road surface, to a strut 25.

In turn, the strut 25 is pivoted, at the top end portion thereof, to a middle region of the upright 22 and is pivoted, at the bottom end portion thereof, to a base plate 23a which can be made as a single piece, or as a piece separated from the base plate 23.

In the second embodiment of the road barrier, the means for varying the useful length of the upright 22, comprise two assembled pieces of the same upright 22.

More specifically, the upright 22 comprises a bottom portion 22a, pivoted to the base plate 23, and a top portion 22b, slidably associated, along a direction parallel to its longitudinal extension, with the bottom portion 22a.

The top portion 22b is connected to the bottom portion 22a by a pin 26, which is in turn coupled to the top portion 22b and passes through a slot 27, formed through the bottom portion 22a and extending along a direction with a vertical component.

The energy dissipating means, according to the second embodiment of the barrier, comprise, in a like manner to that disclosed for the first embodiment, means for narrowing or throttling the slot 27, which, any stresses on the upright 22 being absent, will limit the size of the slot 27 portion not engaged by the pin 26, to a size less than the diameter of said pin 26.

In particular, the above mentioned limiting or narrowing means, also in this second embodiment, comprise a dissipating plate 28, which is coupled to the bottom portion 22b of the upright 22, for example by welding, and being preferably constituted by two portions, indicated respectively at 30 and 31, having different thicknesses.

Thus, the first portion 30, starting from the position of the pin 26, in the absence of any stresses on the upright 22, presents, also in this case, a thickness less than that of the second

portion 31.

The end of the dissipating plate 28 facing the pin 26 is provided with a lead-in beveled portion.

The operation of the variable configuration or geometry barrier, including energy dissipating means, according to the present invention, is the following.

Upon an impact, the upright 2, respectively 22, will be caused to partially turn toward the outside of the road surface, and such an oscillation will be allowed exclusively by a variation of the useful length of the upright 2 respectively 22.

In particular, said variation of the useful length of the upright 2 or 22, can be performed, in the barrier, according to the present invention, only by causing the pin 6 or 26 to slide in the slot 7 or 27.

This sliding of the pin 6 or 26, however is hindered by the provision of the dissipating plate 8 or 28, which, as stated, will reduce the cross size of the slot 7 or 27 so as to render said size less than the diameter of the pin 6 or 26.

The sliding movement of the pin 6, or 26, which occurs under an impact effort, provided by a vehicle on the upright 2 or 22, will cause the dissipating plate 8 or 28 to be plastically deformed and, accordingly, said plate will absorb a great amount of the impact energy or power thereby preventing a high resilient reaction force from being transmitted from the barrier to the motor vehicle.

Moreover, the construction of the dissipating plate 8, which comprises several sequential portions of mutually different thicknesses, will allow the barrier to provide a different performance, depending on the impact forces applied to the upright 2 or 22.

In this connection it should be pointed out that the variable configuration or geometry safety barrier according to the present invention will fit its configuration or geometrical pattern depending on the impact energy, and will respond gradually by vertical and horizontal displacements which are controlled by the energy dissipating means associated to the barrier, which, after a dissipating operation, will operate as a safety limit means.

Thus, owing to the above disclosed features, the subject barrier will provide a preset pattern of the forces acting on the bottom fixing or anchoring means of the barrier itself.

From the above disclosure and from the observation of the accompanying drawings, it should be apparent that the variable configuration or geometry road barrier, including energy dissipating means, according to the present invention, fully achieves the intended aim and objects.

In particular, it is to be further pointed out that a variable configuration road barrier has been provided, which is specifically designed for preventing

motor vehicles from being resiliently rejected from the barrier upon accidental impacts.

Moreover, since an accidental impact against the subject barrier will increase the height thereof, it is also provided a greater safety.

The invention, as disclosed, is susceptible to several variations and modifications, all of which will come within the inventive idea scope.

Moreover, all of the details can be replaced by other technically equivalent elements.

In practicing the invention, the used material, as well as the contingent size and shapes, can be any, depending on requirements.

To the foregoing it is to be further added that the subject barrier is adapted to absorb the greatest portion of the impact kinetic energy, as an impact occurs against said barrier, and this by providing such a resilient resistance effective to slow down the motion of the vehicle in a gradual manner.

Thus, the above disclosed sliding means, upon achieving their limit position, will allow the subject barrier to provide a holding action on the motor vehicle preventing the latter from being ejected from the road.

Claims

1. A variable configuration road barrier, including energy dissipating means, characterized in that said barrier comprises a base plate, which can be affixed to the ground, said base plate supporting an upright pivoted to said base plate and provided, on the side thereof facing the ground surface, with means for coupling a barrier element, there being moreover provided a strut, arranged on the upright side opposite to said barrier and pivoted, at the top end portion thereof, to said upright and, at the bottom end portion thereof, to said base plate, said upright being moreover provided, between the region thereof pivoted to said strut and the region thereof pivoted to said base plate, with means for varying the useful length of said upright, for allowing said upright to partially rotate with respect to said base plate, toward the strut; near said upright length varying means there being furthermore provided energy dissipating means which operate against the length variation of said upright.
2. A road barrier, according to Claim 1, characterized in that said upright useful length varying means comprise a pivot pin pivotably connecting said upright to the base plate and passing through a slot provided through the base plate and having an elongated configuration, which extends along a direction with a vertical com-

- ponent, said energy dissipating means comprising, at a region of said slot not occupied by said pivot pin, with the upright in a not stressed condition, means for narrowing said slot to a size less than said pivot pin diameter; said narrowing or limiting means being adapted to be plastically deformed so as to allow said pivot pin to slide in said slot, as said upright is so stressed as to partially turn about said pivot pin in the direction of said strut.
3. A road barrier, according to the preceding claims, characterized in that said narrowing means comprise a dissipating plate, applied to said base plate, at said slot.
 4. A road barrier, according to one or more of the preceding claims, characterized in that said dissipating plate is provided with a lead-in beveled portion on the side thereof facing said pivot pin.
 5. A road barrier, according to one or more of the preceding claims, characterized in that said dissipating plate is provided, starting from the end thereof facing said pivot pin, with a first portion and a second portion, said first and second portion having different thicknesses.
 6. A road barrier, according to one or more of the preceding claims, characterized in that said second portion of said dissipating plate has a thickness which is greater than that of said first portion.
 7. A road barrier, according to Claim 1, characterized in that said means for varying said upright useful length comprise a pin, connected to a top portion of said upright, and being slidably associated, in a longitudinal direction, with a bottom portion of said upright pivoted to said base plate, said pin passing through a slot formed through said bottom portion and having an elongated slot along a direction with a vertical component, said energy dissipating means comprising, at a region of said slot not occupied by said pin as said upright is not stressed, means for narrowing said slot to a size less than the diameter of said pin, said narrowing means being adapted to be resiliently deformed in order to allow said pin to slide in said slot, as said upright is so stressed as to be caused to partially turn about said pin, in the direction of said strut.
 8. A road barrier, according to one or more of Claims 1 to 7, characterized in that said narrowing means comprise a dissipating plate, applied to the bottom portion of said upright at said slot.
 9. A road barrier, according to one or more of Claims 1 to 7, characterized in that said dissipating plate has a lead-in beveled portion on the side thereof facing said pin, and being connected to the top portion of said upright.
 10. A road barrier, according to one or more of the preceding Claims 1 to 7, characterized in that said dissipating plate is provided, starting from the end thereof facing said pin with a first portion and a second portion, said first and second portion having different thicknesses.
 11. A road barrier, according to one or more of the preceding Claims 1 to 7, characterized in that said second portion of said dissipating plate has a thickness greater than that of said first portion thereof.
 12. A road barrier according to any preceding claims, characterized in that the geometry of said road barrier changes depending on the impact energy, the energy dissipating means included in said barrier causing said barrier to perform gradual vertical and horizontal displacements depending on the energy of said impact, said energy dissipating means being also adapted to operate as limit safety means.
 13. A road barrier, according to any preceding claims, characterized in that said barrier is so designed that the forces applied on the bottom fixing means of said barrier will assume a preset pattern.

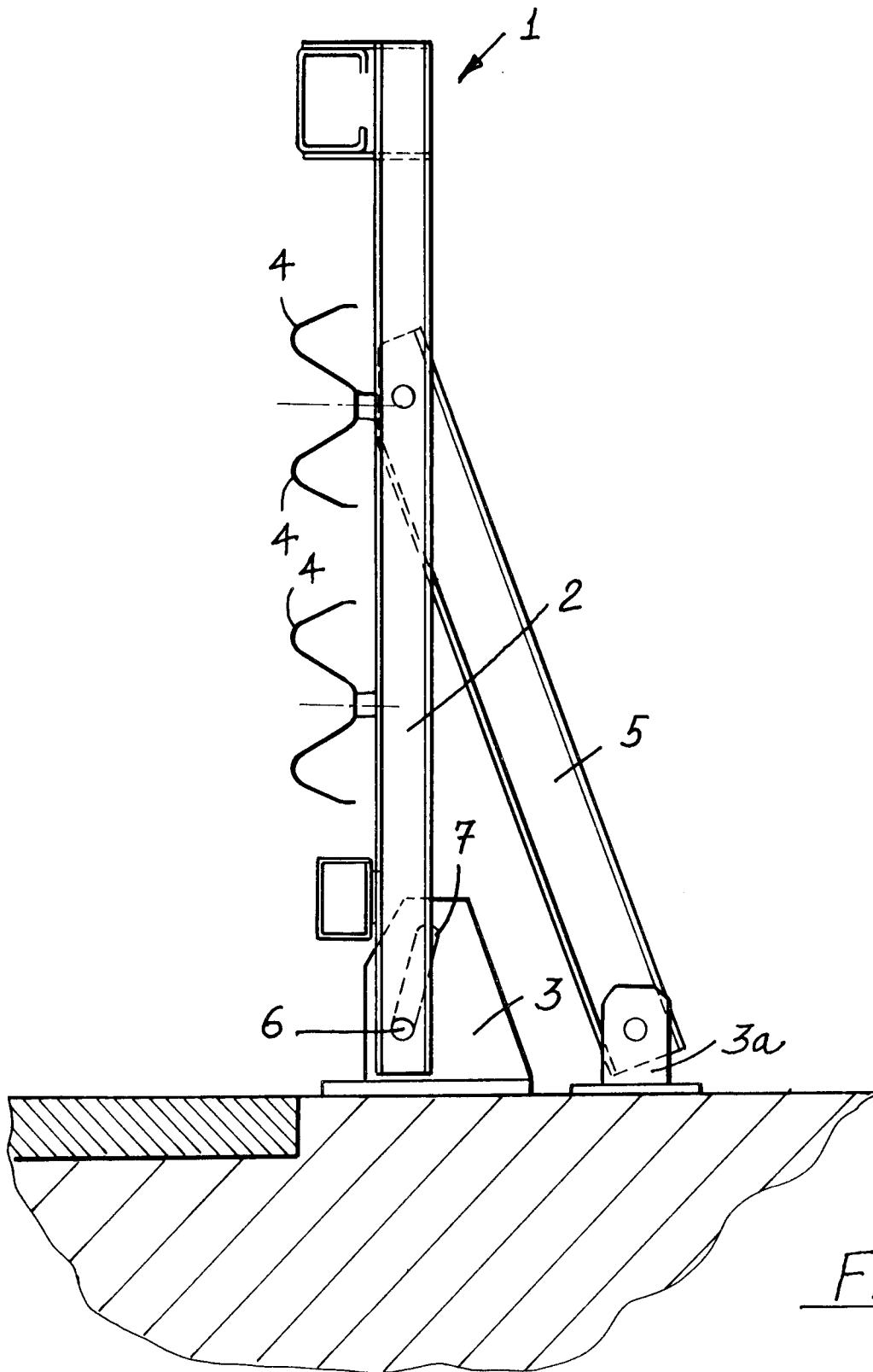


FIG. 1

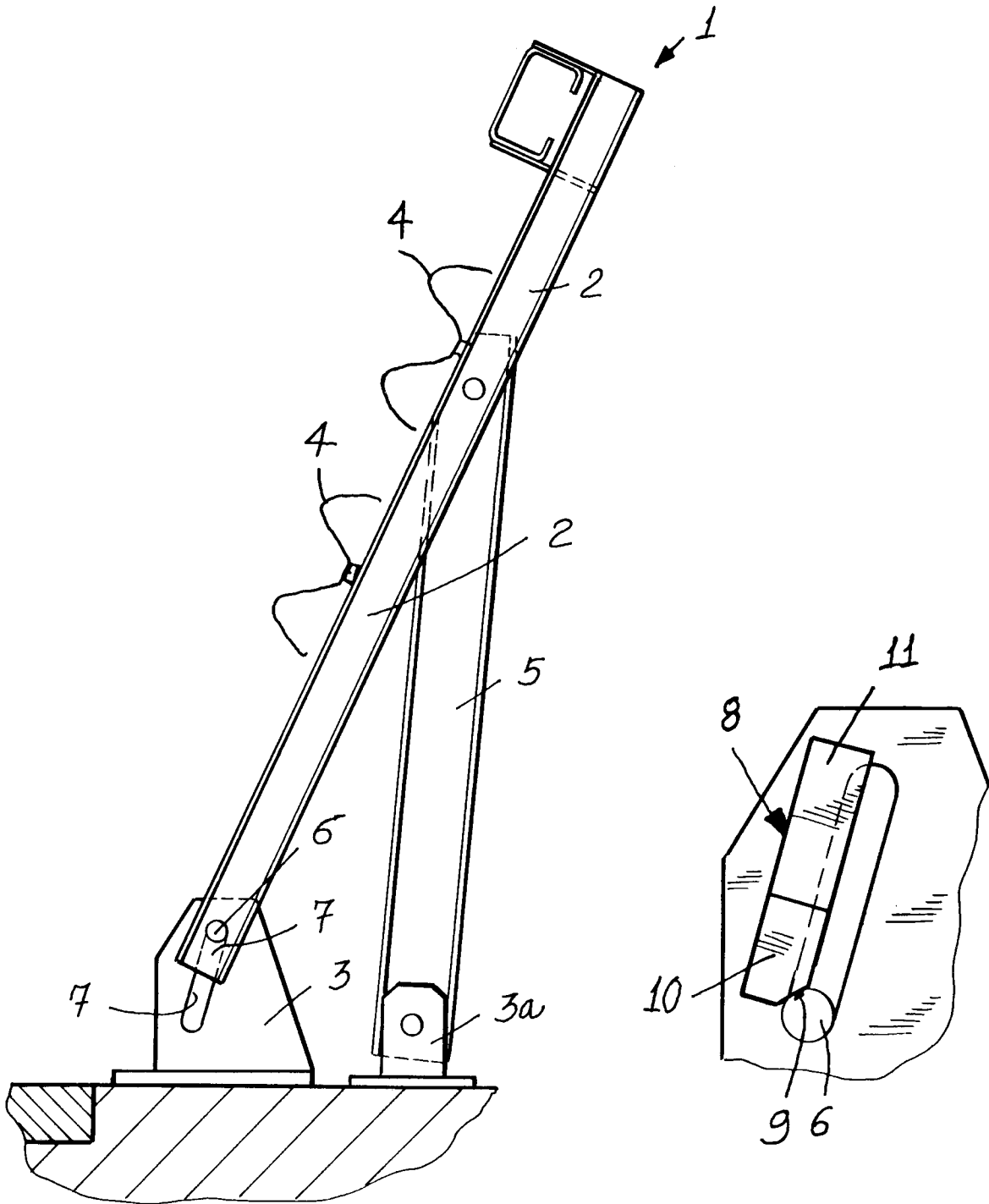


FIG. 2

FIG. 3

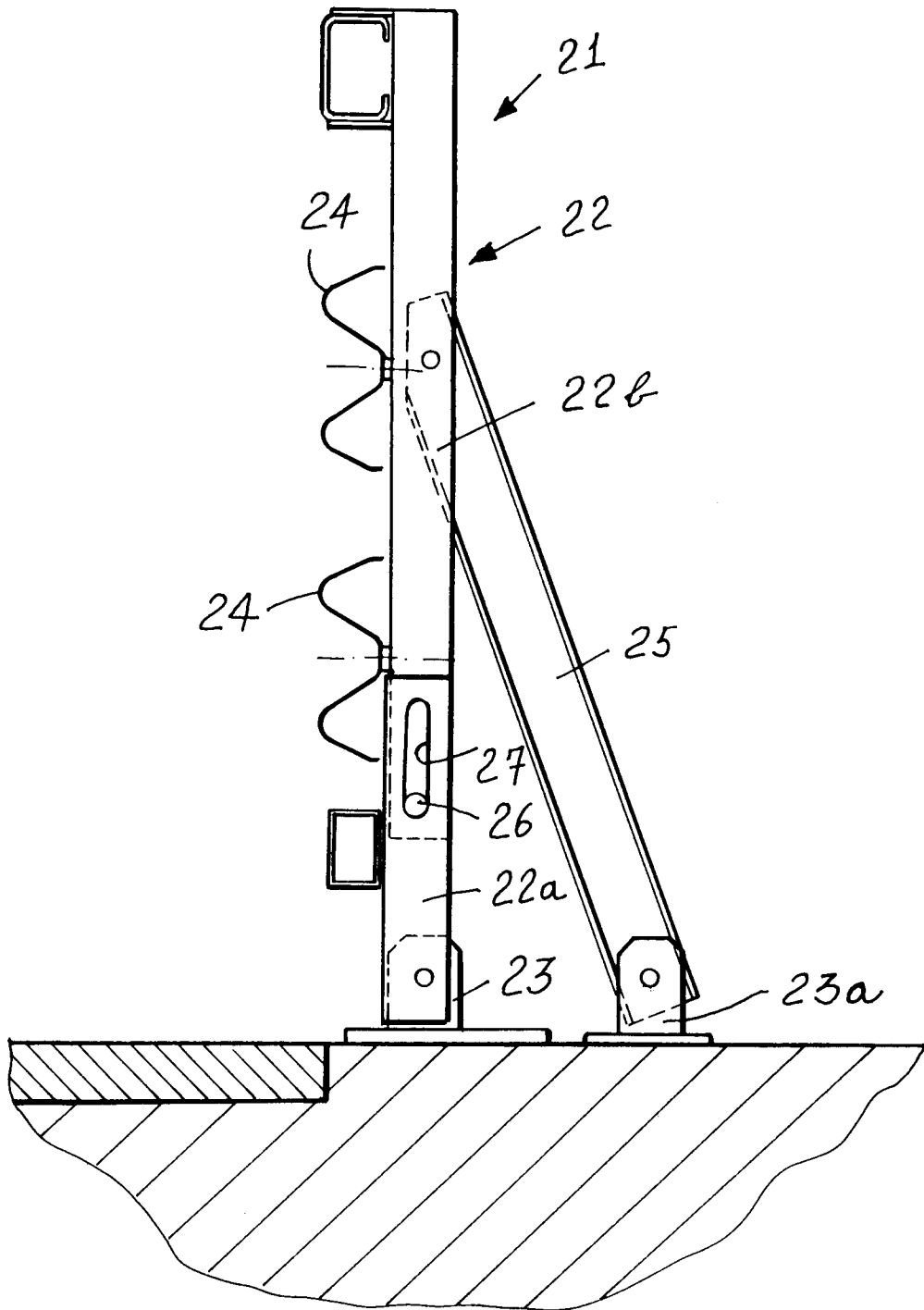


FIG. 4

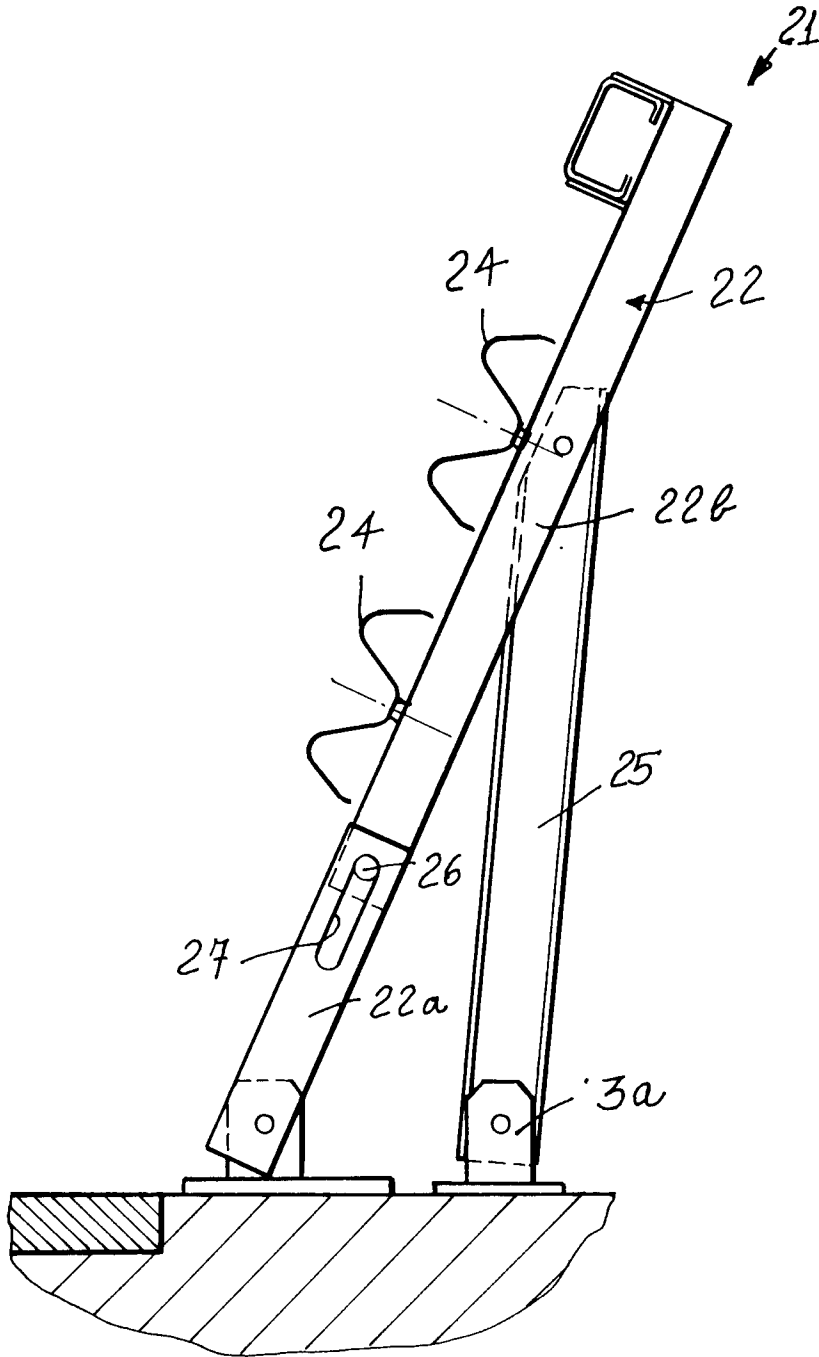


FIG. 5

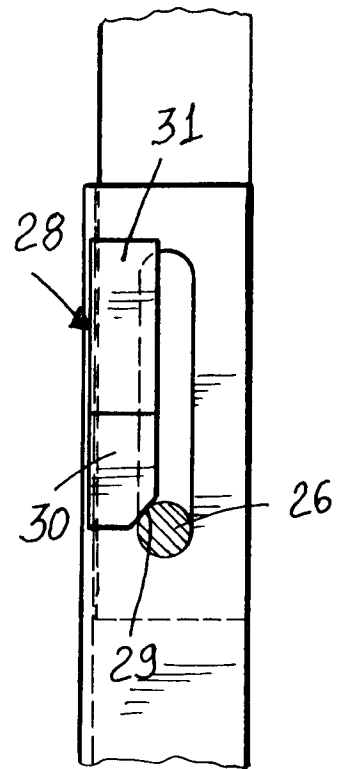


FIG. 6



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.6)
X	GB-A-1 066 988 (CHRISTIANI & NIELSEN) * page 3, line 104 - line 112; figure 5 * ---	1	E01F15/04
X	DE-B-12 95 581 (SIEGENER) * column 2, line 11 - line 51; figure 1 * ---	1	
A	AT-A-372 445 (VEREINIGTE METALLWERKE RANSHOFEN-BERNDORF) -----		
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			E01F
Place of search	Date of completion of the search	Examiner	
THE HAGUE	27 July 1995	Verveer, D	
CATEGORY OF CITED DOCUMENTS		I : 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	
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			