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**(54) Temporary passage for road median barrier**

(57) Protection device (10) to selectively close the passage between two carriageways of a road with several carriageways such as a motorway or suchlike, comprising a horizontal protection element (14) movable between an active position, wherein it performs a function as a crash barrier, and a passive position wherein it allows vehicles to pass between said carriageways; in the

passive position the protection element (14) is raised with respect to the active position, and actuation means are provided to vertically displace the protection element (14) between the active position and the passive position, while maintaining the protection element (14) substantially horizontal, in such a manner as to allow vehicles to pass below the protection element (14) when the protection element (14) is in the passive position.

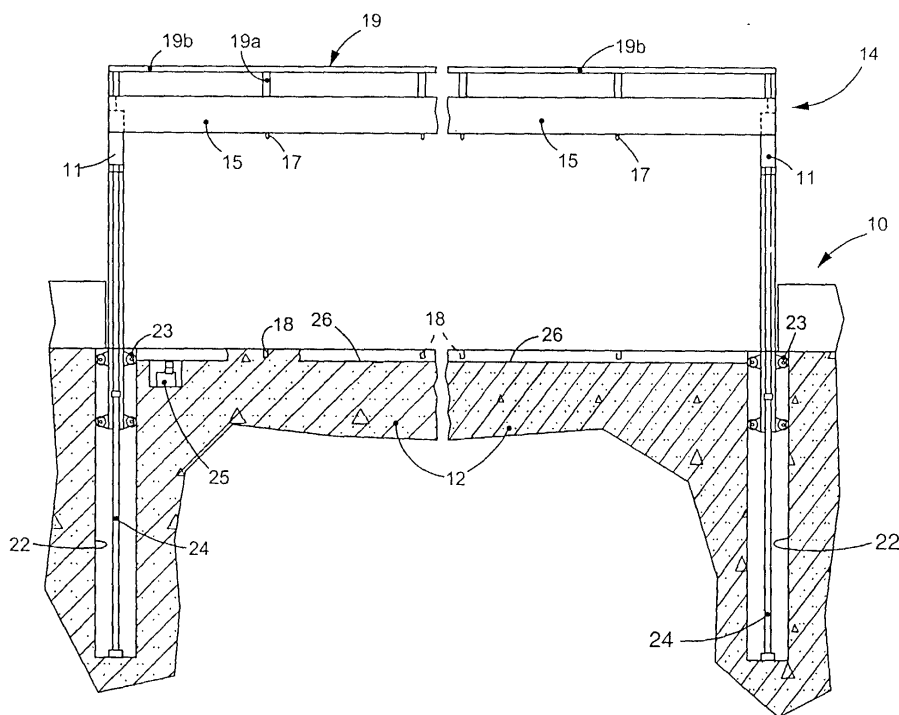


fig. 2

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## Description

### FIELD OF THE INVENTION

**[0001]** The invention concerns a protection device to selectively close the by-pass in the traffic-divider which separates the carriageways in roads with two carriageways, like a motorway or similar. To be more exact, the device comprises a central protection element, normally aligned with the fixed barriers, which can be raised up to a height so that the emergency services and first aid vehicles can pass underneath, to move from one carriageway to the other.

### BACKGROUND OF THE INVENTION

**[0002]** With reference to the central traffic-divider, the state of the art includes those interruptions in the safety barriers (guard-rails, "new jersey"), able to allow emergency services and service vehicles to pass; they also allow ordinary road-users to pass, in motorways or similar, in the event of serious accidents or work in progress.

**[0003]** The state of the art includes a safety device wherein the barrier comprises a metal structure formed by a series of blades, the lower ends of which pivot inside a cavity made in the road surface and partly covered by a grid. The other end of the blades pivots on a horizontal metal plate, which is as long as the entire passage. A second, intermediate metal plate, parallel to the first, also pivots on the blades, and is able to reinforce the barrier. The blades are normally in a vertical position (active position), in which the plates create an obstacle to the passage of the vehicles and are inclined, when necessary, until they are arranged substantially horizontal inside the cavity made in the ground, so as to allow the emergency services and first aid vehicles to pass (passive position).

**[0004]** This conventional device, however, has the disadvantage that its functioning is precarious and unreliable, especially because any type of material, such as sand, gravel, small size rubbish or otherwise, can be deposited in the cavity into which the barrier is positioned when the passage is open; in time this material becomes an obstacle to the movement of the command mechanisms. Another disadvantage is the ice which can form during winter inside the cavity, totally blocking the entire device.

**[0005]** Moreover, as regards safety, this type of barrier does not constitute an adequate obstacle for vehicles when, for various reasons, they hit the barrier violently. The series of metal blades, in fact, can easily be knocked down, especially by large vehicles, and this is a great danger for those travelling in the opposite direction.

**[0006]** The present Applicant has devised and embodied this invention to overcome these shortcomings of the state of the art, and to obtain further advantages.

### SUMMARY OF THE INVENTION

**[0007]** The invention is set forth and characterized in the main claim, while the dependent claims describe other innovative characteristics of the invention.

**[0008]** The main purpose of the invention is to achieve a protection device able to selectively close the passage between two carriageways with opposite directions, which will be safe for the user of any type of road, which will always be able to function effectively and which can be opened easily and quickly.

**[0009]** The protection device according to the invention comprises a horizontal protection element or barrier and one or more vertical supporting columns, advantageously made of metal, arranged at the two ends of the barrier.

**[0010]** The barrier is movable between an active position, wherein it operates as an obstacle for the passage of the vehicles, and a passive position, wherein it allows passage between the two carriageways; this variation in position is achieved by actuation means which maintain the barrier substantially horizontal and raise it in such a manner as to allow the emergency services to pass underneath.

**[0011]** The horizontal barrier is formed by a lower part and an upper part, advantageously both made of metal, and is as long as the interruption to be barred. The lower part of the barrier comprises a box-like structure made of sheet metal and has a section shaped like an upside-down T, similar to that already used in motorway installations, with a horizontal base and two vertical sides connected thereto. The internal structure of the lower part of the barrier comprises metal reinforcements able to absorb the horizontal impacts possibly caused by motor vehicles. From the base of the structure, a plurality of vertical pins extends downwards, able to be accommodated in corresponding seatings made in the ground and able to make the barrier even more solid with the ground when it is in the active position.

**[0012]** The upper part of the barrier is an open structure and comprises a series of vertical uprights and a horizontal bar, able to contrast considerable impacts both horizontal and vertical, yet without making the structure excessively heavy. The open structure also has the advantage that it provides a reduced surface of impact with the air, since it may be necessary to lift the barrier in windy conditions. The lateral ends of the barrier are constrained to the lateral supporting columns by means of pins, around which shock-absorber means are located able to absorb possible forces of impact, without transmitting them completely to the columns.

**[0013]** The vertical columns are generally monolithic but can be constructed in a telescopic version, when the ground does not allow excavations to be made of the due depth.

**[0014]** The actuation means of the barrier comprise one or more vertical movement assemblies, for example including a winch, with cable and counter-weights, a

rack, hydraulic cylinders, both simple and double effect, and hydraulic vices; all these assemblies may be automatic or manual drive. These mechanisms are associated with every column and are suitable to raise the entire barrier to a height which allows every vehicle of standard dimensions to transit.

**[0015]** The device according to the invention is able to be positioned in the by-passes of the traffic-dividers between carriageways with opposite directions in the following way.

**[0016]** The vertical columns are housed in cylindrical shafts, made in the ground at the ends of the passage. The columns are guided by groups of rollers sliding along the walls of the shaft so as to ensure that the vertical movement is rectilinear and that the columns are able to resist the horizontal thrusts due to the wind and other external agents.

**[0017]** The actuation means of each pillar are connected to each other by a suitable mechanical or hydraulic element which allows the perfect synchronism of the two columns in their ascending and descending movement.

**[0018]** The two columns are assembled at the ends of the horizontal barrier with which they form a single piece.

**[0019]** In the active position, the lower part of the horizontal barrier, with its particular shape, allows to exploit the mass of the impacting vehicle with a considerable reduction in the lateral thrust. In fact, thanks to this shape, the vehicle mounts the side of the lower part, with at least one wheel, even before it hits the upper structure with uprights or against the horizontal bar of the barrier. This causes the baricenter of the vehicle to be lifted, with a consequent absorption of energy and a reduction in the force of impact.

**[0020]** In the passive position, the barrier is raised vertically upwards, by the actuation means, so as to allow, in as short a time as possible, the vehicles to transit. The actuation devices, most of the time, are covered by the barrier itself, so that they are not subject to the deposit of materials or to atmospheric agents which can limit the functioning thereof.

**[0021]** The columns which support the barrier, apart from supporting the vertical load, are sized so as to contrast the action of the wind.

#### BRIEF DESCRIPTION OF THE DRAWINGS

**[0022]** These and other characteristics of the invention will be apparent from the following description of a preferential form of embodiment of the barrier for motorway by-pass, given as a non-restrictive example with reference to the attached drawings wherein:

Fig. 1 shows a protection device according to the invention with the barrier in the lowered position (the barrier is active);

Fig. 2 is a scale view of the barrier in Fig. 1 in the

raised position (the barrier is passive);

Fig. 3 is a view from above of the foundations of the device in Fig. 1;

Fig. 4 is a section from A to A of Fig. 1;

5 Fig. 5 is an enlarged detail of Fig. 1;

Fig. 6 is a view from above of a detail from Fig. 5;

Fig. 7 is a first variant of the device in Fig. 1;

Fig. 8 is a second variant of the device in Fig. 1.

#### 10 DETAILED DESCRIPTION OF A PREFERENTIAL FORM OF EMBODIMENT

**[0023]** With reference to Figs. 1 and 2, a protection device 10 to selectively divide the passage between two carriageways in a road with two carriageways, such as a motorway or similar, according to the invention, comprises a horizontal protection element or barrier 14, comprising a lower part 15 and an upper structure 19, able to selectively pass, with the aid of a pair of hydraulic cylinders 24, from an active position which creates an obstacle to the passage of the vehicles (Fig. 1) to a passive position which, on the contrary, allows the vehicles to pass (Fig. 2) underneath.

**[0024]** The lower part 15 is preferably made of sheet metal, and is formed by a horizontal box-like structure, with shaped sides 28 and a supporting base 27. Inside the box-like part 15 reinforcement ribs 16 are welded, made of steel and able to confer greater resistance to lateral impacts. The lower part 15 also has, on the supporting base 27, a series of pins 17 able to be inserted into corresponding seatings 18 made in the road surface 12 at a distance of about 3m from each other.

**[0025]** The upper structure 19 is arranged above the lower part 15 and is composed of a series of vertical tubular uprights 19a and an upper element 19b; both are able to support great horizontal and vertical loads and to maintain the structure of the barrier 14 itself relatively light.

**[0026]** The upper structure 19 is attached to the bearer columns 11 by means of pins 20 associated with shock-absorber means 21, able to attenuate the impacts, and consequently the deformations, which would otherwise reverberate from the barrier 14 onto the columns 11.

45 **[0027]** The columns 11 move inside two vertical shafts 22 made in the ground and lined with a steel tube; they are guided by two assemblies of four guide rollers 23 solid with the column.

**[0028]** The vertical movement of the barrier is driven by two fluid-dynamic cylinders 24, assembled coaxially inside the columns 11. The cylinders 24 are fed from a fluid-dynamic station 25, located in an inspection shaft. The movement of the two cylinders is synchronized by means of conventional synchronization valves. The connection tubes of the two cylinders are located in a horizontal duct 26 below the barrier 14.

**[0029]** The barrier 14, shown in Fig. 1, is in the so-called active position since it is resting on the ground

with the purpose of dividing the two carriageways and to physically obstruct the passage of the vehicles. The particular shape of the section of the lower part 15 confers great safety on the barrier 14, since, as shown in Fig. 4, the wheel of the vehicle hitting the barrier 14 tends to mount the side 28 of the lower part 15 of the barrier 14 before colliding with the structure 19. This causes the baricenter of the vehicle to be raised, with a consequent absorption of energy and a reduction in the horizontal impact component.

[0030] To put the barrier 14 in the passive position, as shown in Fig. 2, it is lifted vertically by means of the two fluid-dynamic cylinders 24, equipped with synchronized movement, thus allowing vehicles or emergency services which need to change carriageway to pass.

[0031] This vertical displacement occurs in a few seconds, since the simple movement, associated with the light weight of the barrier 14, allows to do all the necessary operations in a short time and in total safety.

[0032] According to a variant, instead of the fluid-dynamic cylinders 24, the movement means comprise two lifting devices, each comprising a motor 33 able to make a pinion 32 rotate on which a rack 31, attached to a relative column 11, is engaged (Fig. 7).

[0033] According to another variant, the vertical movement is effected by an assembly of winches with a cable 30, driven manually, and aided by counter-weights 29 (Fig. 8).

[0034] According to yet another variant, a motorized drive is associated with the manual drive.

[0035] It is obvious however that modifications and additions can be made to the device to rapidly and selectively open and close by-passes in the central traffic-divider of a motorway or other road with two carriageways 10 as described heretofore without departing from the spirit and scope of the invention.

[0036] It is also obvious that, although the invention has been described with reference to specific examples, a skilled person in the art shall certainly be able to achieve many other equivalent forms of device to open and close by-passes in the central traffic-divider of a motorway or other road with two carriageways, all of which shall come within the field and scope of this invention.

## Claims

1. Protection device to selectively close the passage between two carriageways of a road with several carriageways such as a motorway or suchlike, comprising at least a horizontal protection element (14) movable between an active position, wherein it performs a function as a crash barrier, and a passive position wherein it allows vehicles to pass between said carriageways, **characterized in that** in said passive position the protection element (14) is raised with respect to said active position and that actuation means are provided to vertically displace

said protection element (14) between said active position and said passive position, while maintaining said protection element (14) substantially horizontal, in such a manner as to allow vehicles to pass below said protection element (14) when said protection element (14) is in said passive position.

2. Device as in claim 1, **characterized in that** said actuation means comprise at least fluid-dynamic actuators associated with column elements (11) able to guide any vertical movement of said protection element (14).

3. Device as in claim 2, **characterized in that** said column elements (11) are of the telescopic type.

4. Device as in claim 1, **characterized in that** said actuation means comprise at least a motor (33) able to rotate at least a pinion (32) thereof, on which is engaged a rack (31) which is in turn associated with the base of said horizontal protection element (14).

5. Device as in claim 1, **characterized in that** said actuation means comprise winch means (30) cooperating with balancing counter-weights (29).

6. Device as in claim 5, **characterized in that** said actuation means comprise at least a manual device with a crank or lever.

7. Device as in claim 1, **characterized in that** said protection element (14) comprises a lower part (15) with a transverse section substantially shaped like an upside-down T.

8. Device as in claim 7, **characterized in that** said lower part (15) comprises a substantially horizontal supporting base (27) able to rest on the ground (12) and vertical lateral sides (28) connected to said supporting base (27).

9. Device as in claim 8, **characterized in that** said lower part (15) comprises reinforcement beams (16) welded to said supporting base (27) and to said lateral sides (28).

10. Device as in claim 7, **characterized in that** said lower part (15) comprises pins (17) which extend downwards, able to engage in corresponding seatings (18) made in the ground or road surface (12).

11. Device as in claim 1, **characterized in that** said protection element (14) comprises an upper part (19) made with a structure including uprights (19a) attached to said lower part (15) and a substantially horizontal element (19b) attached to said uprights (19a).

12. Device as in claim 11, **characterized in that** said horizontal element (19b) comprises two ends, associated with shock-absorber means (21) able to absorb, at least partly, the impacts of any vehicles against said protection element (14) when said protection element (14) is in said active position. 5
13. Device as in claims 2 and 11, **characterized in that** said horizontal element (19b) is attached at the two ends to said column elements (11). 10

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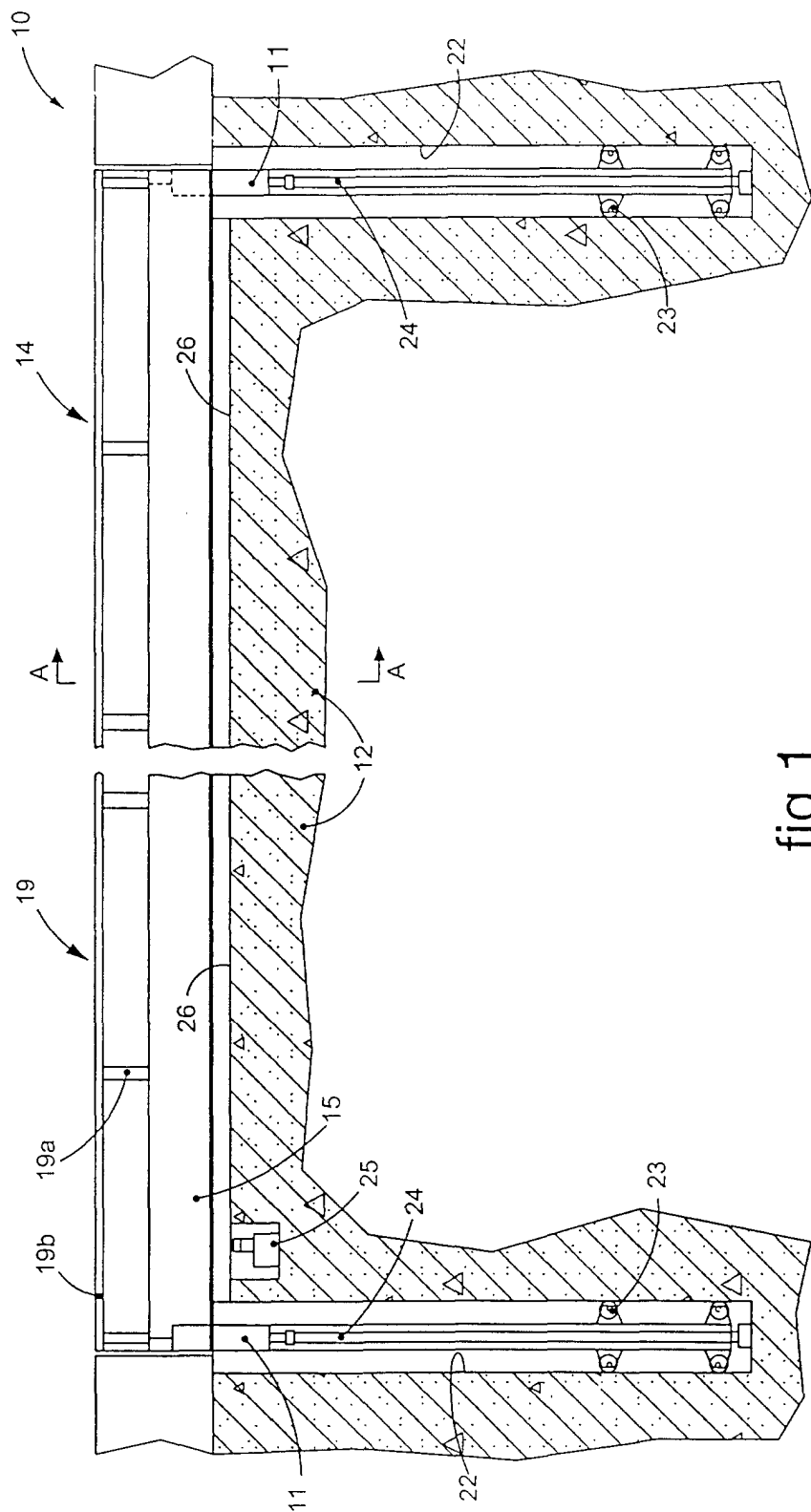


fig. 1

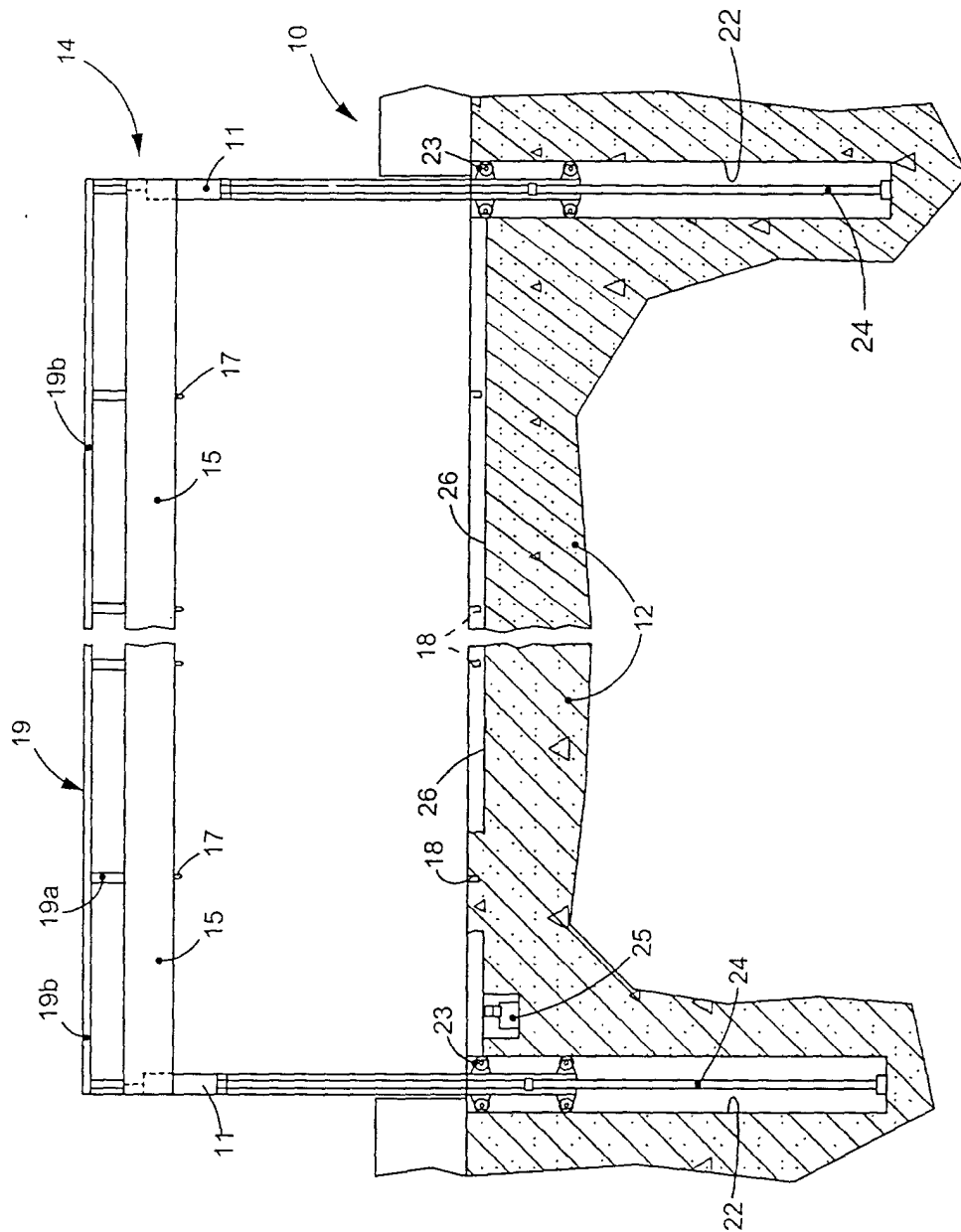


fig. 2

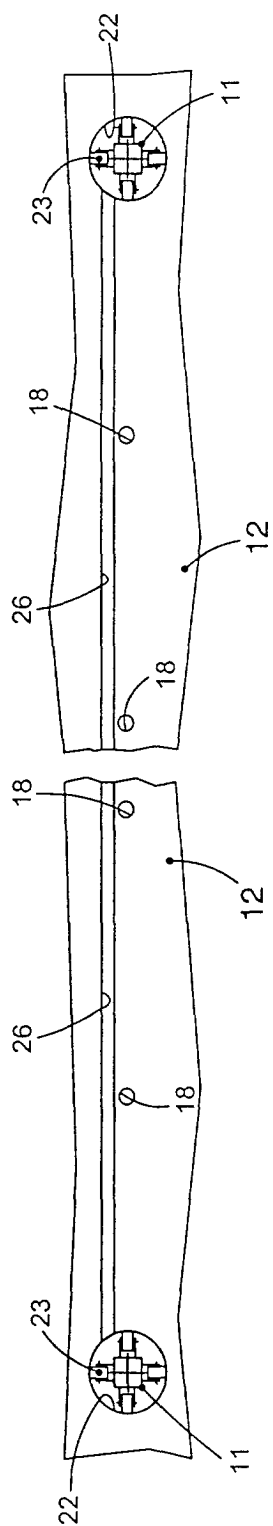


fig. 3

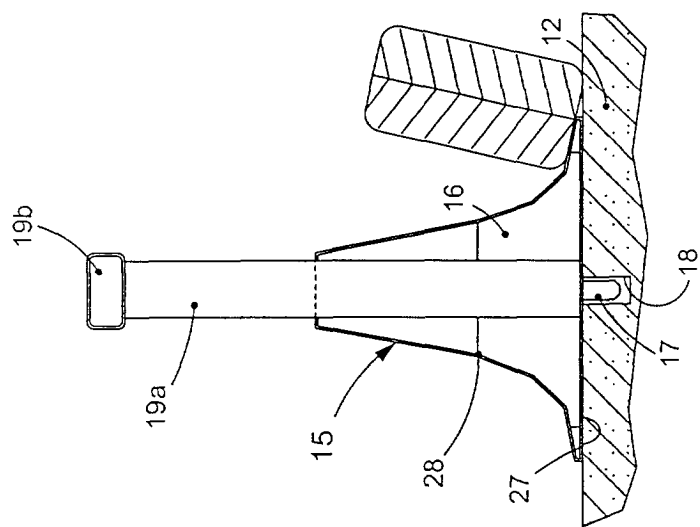


fig. 4

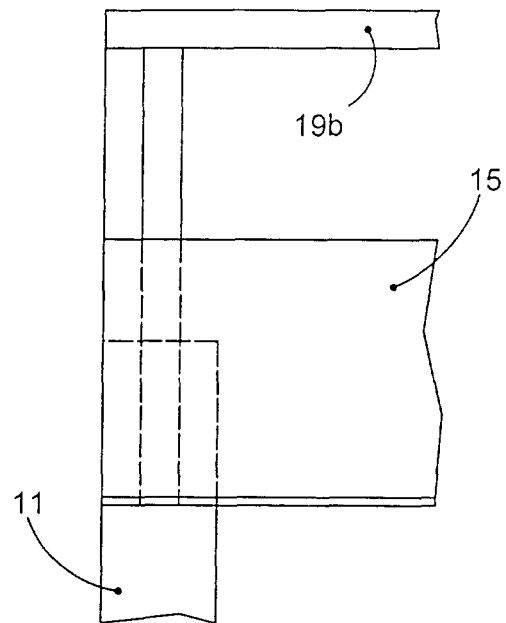


fig. 5

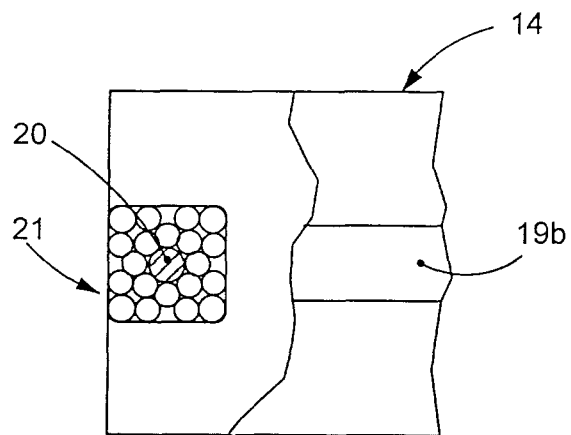


fig. 6

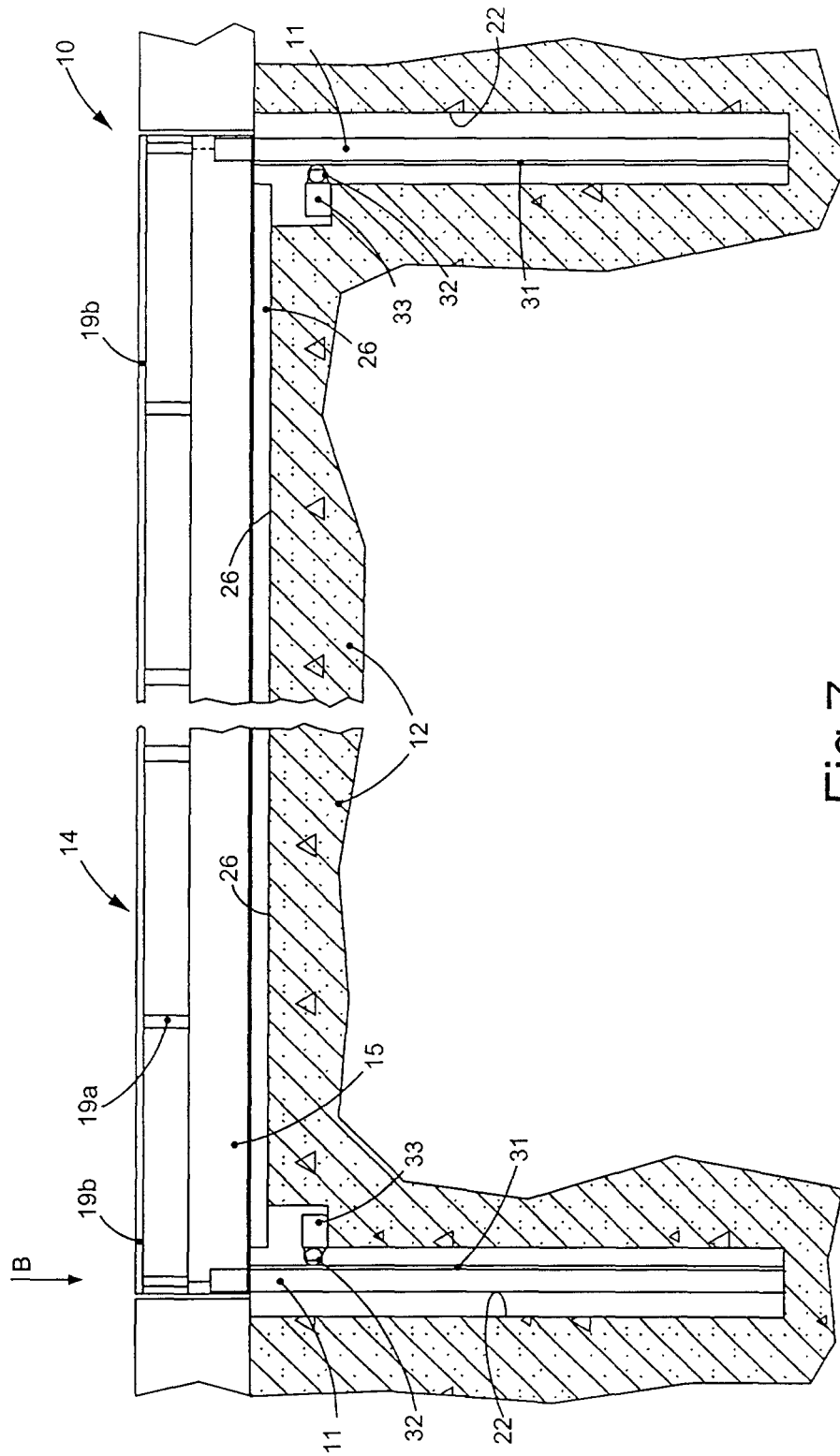


Fig. 7

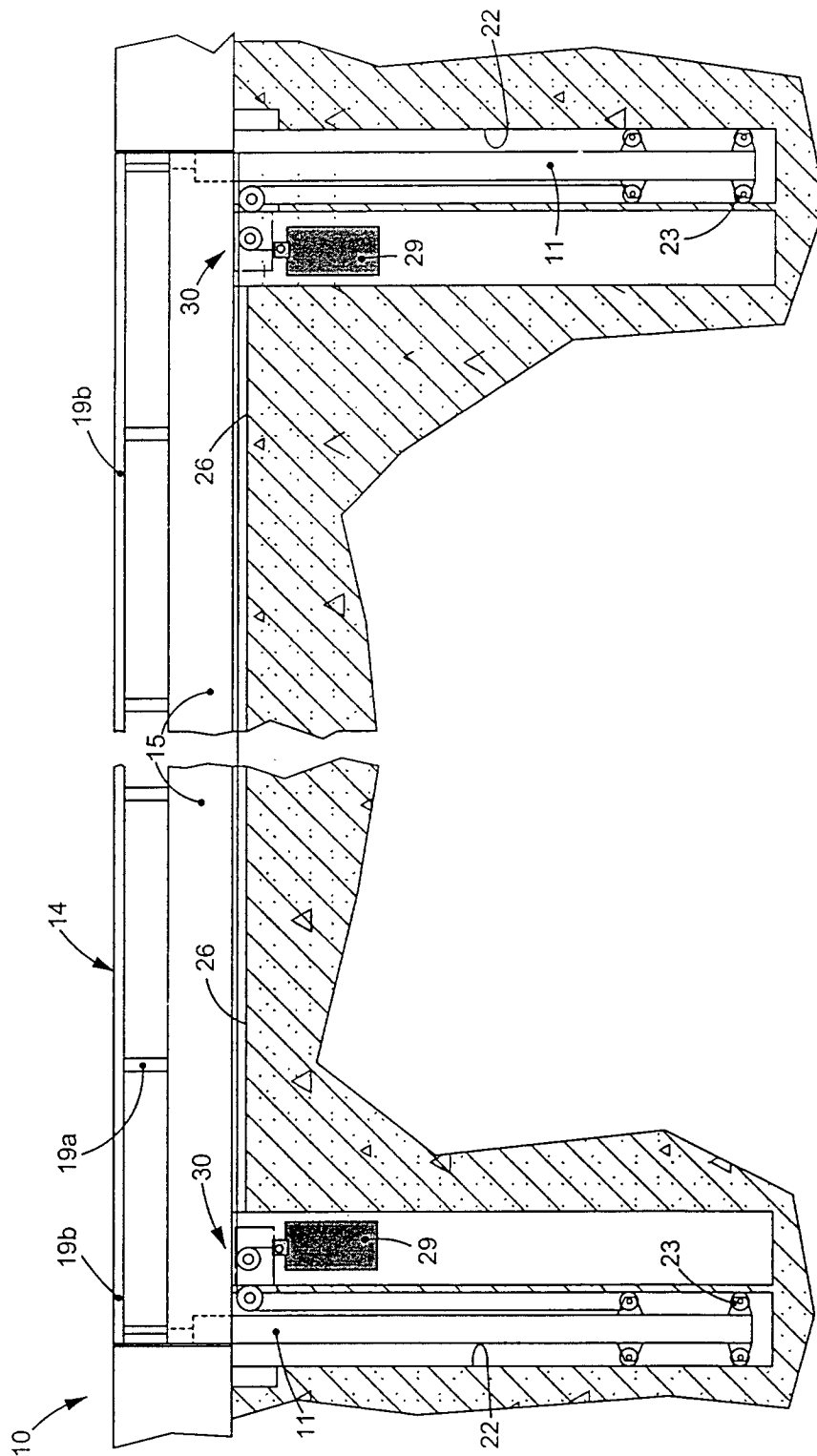


fig. 8