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### (54) Hinge for connecting adjacent modules of a metallic barrier for road carriageways

(57) A hinge member (4) for metal traffic barriers (1) of the New Jersey type comprises a base (10) and a vertical upright (11), together defining an overall profile corresponding to the profile of the mantle (3) of the barrier. The upright (11) is realised as a one-piece metal

sheet folded and cut so as to define a plurality of guide members (21) which together with similar members (21) provided on a complementary hinge member (4) on an adjacent module, define a seat for housing the hinge member pivot.

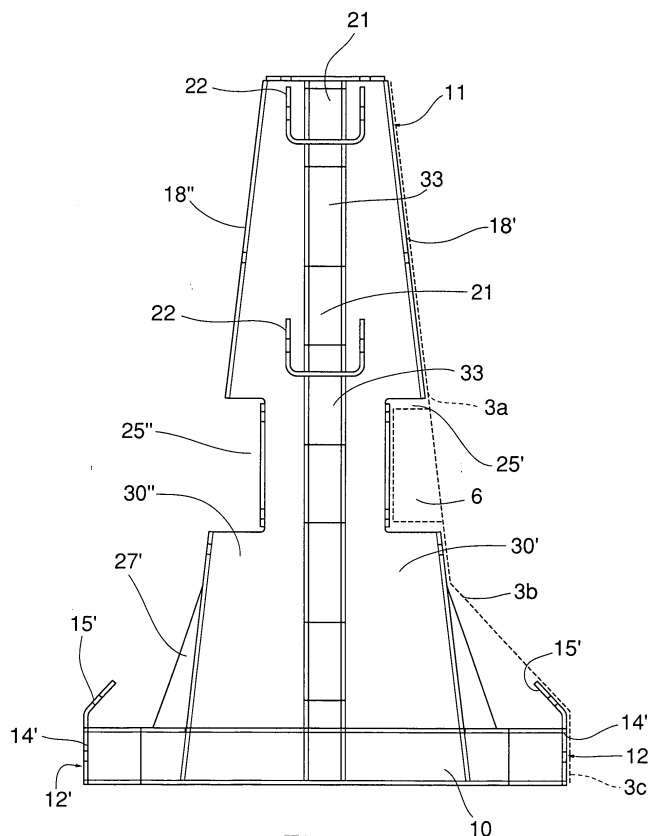


Fig. 2

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## Description

**[0001]** The present invention relates to (safety) metal traffic barriers for roadways, particularly of the type known as "New Jersey barrier", and more specifically is directed to a hinge device for connecting adjacent modules in one of such barriers.

**[0002]** A New Jersey barrier is made up of a plurality of modules or modular members connected to one another at their ends, each module having a (cross-section) profile substantially shaped like two superimposed trapezia (or double trapezium), the width of which increases going towards the module base, while the lower portion profile exhibits a change of the inclination that widens the module supporting base whereby the barrier acts onto the steering wheels of an impacting vehicle so as to redirect it along its proper travel direction.

**[0003]** In the case of metal barriers, especially employed when a light weight is important, the single modules are made up of a metal plate or sheet, also called mantle, forming the surface adapted to withstand the bumps and anchored to a number of (usually equally spaced apart) upright members.

**[0004]** The barrier shape needs to change for fitting to the curves of the roadway, and therefore the connection means will generally include hinges or hinge devices easily allowing such fitting.

**[0005]** According to the invention, there is provided a hinge device for these traffic barriers that ensures an effective and strong connection and has good flexibility of employment.

**[0006]** The above objects are achieved thanks to the fact that each of the two parts or members of the hinge device associated to respective barrier modules comprises guide members for the hinge pivot, such members being integrally formed with a vertically extending upright member of said hinge member, and that said upright member is formed as a metal sheet folded and cut so as to form both said guide members and the void spaces separating subsequent (adjacent) guide members, as well as a front wall for securing at least one portion of the barrier mantle.

**[0007]** Advantageously, in a plan view, said upright (member) provides for a U-shaped portion defining guide members with an channel open on a side facing the module end opposed to that on which the respective hinge member is provided, and at least one side of such U-shaped portion is twice folded substantially at right angles to define said front wall and at least one side wall portion orthogonal to it.

**[0008]** It is another object of the invention to provide a barrier that uses the above hinge device.

**[0009]** For a better understanding of the invention reference is made to the attached drawings, illustrating an exemplary non-limiting embodiment of the invention, in which:

- Fig. 1 is a schematic perspective view of a (roadway

divider) traffic barrier incorporating a hinge device according to the invention;

- Fig. 2 is a side view of one of the two members forming the hinge device according to the invention, taken from the side facing the inside of the module;
- Figs. 3 and 4 are a front view and a top view of the member of the hinge device of Fig. 2, respectively;
- Figs. 5 and 6 are a top view and a bottom view, respectively, of the upright of the hinge device member of Fig. 2; and
- Fig. 7 is a view similar to Fig. 3, relating to the other of the two members forming the hinge device according to the invention.

**[0010]** For clarity sake, it is pointed out that in the description and in the attached claims, the term "front" of the barrier (or of one of its components) means a part facing the mantle. The term "side" is used for parts facing towards an adjacent module or towards the inside of the module.

**[0011]** As schematically shown in Fig. 1, a metal traffic barrier of the New Jersey type, indicated as a whole by the reference 1, comprises a plurality of modules 2, hingedly connected at their ends so that two adjacent modules can be disposed to form an angle in order that the barrier can follow the curves of the roadway. At the two ends of each module 2 there are provided hinge members of complementary construction, each being adapted to cooperate with the complementary member provided on the adjacent module. Such hinge members are the object of the invention and will be described in the following with more details, with reference to figures 2 to 7. In the Figure the trace of one of the hinge members has been indicated by 4, on a side of a module, whereas reference 7 indicates the trace of the hinge pin between the two modules shown in the figure.

**[0012]** Each module 2 is built in a conventional manner by a metal sheet or mantle 3, particularly a galvanised sheet-iron, forming the surface bound to cushion the impacting vehicles, and is secured to a plurality of upright members, not shown in the drawings since they are not part of the invention. In case uprights are provided at the ends of the modules 2, the hinge members are designed to be anchored to such end uprights.

**[0013]** The module mantle 3 is shaped in such a way that the cross-section profile of a module, as it is typical in these barriers, is substantially shaped as two superimposed trapezia (isosceles trapezia in traffic barriers to be located along the road centre line as a divider as the one shown in the Figure, or rectangle trapezia in case of side barriers) with such a profile widening downwards and providing in the lower half portion a change of inclination that widens the barrier supporting base so that this latter is adapted to act onto the steering wheels of an impacting vehicle for redirecting it into the travel direction. The mantle portion forming the inclined or oblique side of the upper trapezium is indicated by 3a, and the portion forming the inclined side of the lower trape-

zium is indicated by 3b. Openings or cuts 5 are formed in the portion 3b for the passage of anchor means for fixing the module to the road. Below the portion 3b there is provided a substantially vertical portion 3c reaching the ground and adapted to fit a road seat, if any.

**[0014]** Longitudinal stiffening members 6 are associated to the mantle in the portion 3a, for providing the barrier with the desired resistance against the impacts of heavy vehicles.

**[0015]** Figures 2 to 7 show with more details a hinge member 4 for connecting to one another the modules of a central traffic barrier such as the one shown in Fig. 1.

**[0016]** The member 4 (hereinbelow also called "half-hinge") substantially comprises a base 10 and a vertical upright 11 carried by the base 10. The general profile of the half-hinge 4, as seen sideways or in a vertical transverse cross-section, corresponds to the profile of the mantle 3, the trace of which is drawn with dashed lines on the right side of Fig. 2, together with that of the stiffening member 6.

**[0017]** As shown in Figures 3 and 4, the base 10 comprises a box-like member having a height corresponding to that of the vertical portion 3c of the mantle, open on three sides and with a substantially U-shaped profile in vertical cross-section, resting on one of the side arms. The concavity of the U faces the outside of the module on which the hinge member is disposed, i.e. faces the adjacent module. The upright 11 is fitted into a recess 40 at the opening of the U.

**[0018]** On the closed side of the base 10 there are fixed, for example welded, a pair of angled plates or brackets 12', 12" for anchoring the portions 3b, 3c of the mantle, one plate being located at each of the two ends of the base. The plates 12', 12" comprise a side portion 13', 13" secured to the base 10, and a front portion projecting outwards of the base 10. This front portion includes in turn a vertical portion 14', respectively 14", substantially coplanar with the corresponding front face of the base 10, and an extension 15', respectively 15", projecting above the base 10 and inclined towards the upright 11, with an inclination corresponding to that of the portion 3b of the mantle. In the vertical portion 14', 14" and in the extension 15', 15" there are formed holes 16 (which can be seen only in Fig. 3) and holes 17', 17" for bolts or similar devices for securing the half-hinge to the portions 3c, 3b of the mantle.

**[0019]** It is pointed out that in the view of Fig. 3 the references indicating components that are frontally disposed are without apexes since the upright is symmetrical and the Figure can refer to one any of the two module walls 18', 18".

**[0020]** Returning to Fig. 2, the vertical cross-section of the upright 11 is substantially shaped like an isosceles trapezium, with the inclination of the oblique sides corresponding to that of the portion 3a of the mantle. Therefore this portion can be made adherent to the front walls 18' and 18" (defined by said oblique sides) of the half-hinge. Holes 19 (see Fig. 3) allow for the passage of

bolts or similar devices for fixing the mantle.

**[0021]** In the lower half, the front walls are formed with a recess 25', respectively 25", with a vertically extending bottom wall, for accommodating the stiffening member 6 of the mantle 3. Holes 26 (see Fig. 3) for the passage of bolts for securing the members 6 are provided in the vertical wall of the recesses 25', 25".

**[0022]** Triangularly-shaped reinforcement fins 27', 27" connect the lower part of the upright 11 with the base 10. These fins are disposed at a common edge formed by a front portion and a side wall of the upright 11, as better shown in Fig. 4, and they are secured to the upright 11 and to the base 10 along two sides.

**[0023]** As shown in Fig. 3, on the side 20a facing the adjacent module, the upright 11 provides for a plurality of guide members 21, equally spaced along the height of the upright 11. Together with similar guide members on the half-hinge 4 of the adjacent module 2, the guide members 21 provide a seat for the hinge pivot 7 (see Fig. 1).

**[0024]** A comparison between Figures 3 and 7 shows that the guide members 21 of the half-hinges associated to opposite ends of a module are vertically staggered whereby, when two modules 2 are approached to be joined together, the guide members 21 of a module fit into the void spaces 33 between the guide members 21 of the adjacent module.

**[0025]** For example, in the case of uprights equipped with four guide members 21 as shown in the Figures, the upper guide member of the upright of the right-side half-hinge of a module (referring to Fig. 1) is substantially at the level of its top, and the lower guide member is at a given distance from the base 10, as shown in Fig. 3. On the other hand, the lower guide member of the left-side upright, shown in Fig. 7, is substantially at the ground level, and the upper guide member is at a given distance from its top.

**[0026]** To the side 20b facing the inside of the module there are further fixed horizontally projecting members 22 (e.g. C-shaped sections) to anchor the half-hinge 4 to an end upright of the module. To this purpose the members 22 are equipped with holes 23 for the passage of bolts or the like.

**[0027]** As better shown in Figures 4 to 6, the upright 11 is formed by a single piece of a metal sheet or plate, suitably folded and cut so as to define the guide members 21 and the (void) spaces 33 separating them. As seen in a plan view, this member provides for a central U-shaped portion forming the guide members 21, that define channels 31 open towards the inside of the module. The sides of this U are twice folded at substantially right angles, so as to form the two front walls 18', 18" and the side surfaces of the upright, the profile of which is shown at 20a and 20b in Fig. 3. This double folding produces two external (also U-shaped) portions in the upper part of the upright as shown in Fig. 6, or C-shaped external portions in the lower part of the upright as shown in Fig. 7, connected to the central portion and

with a concavity opposite to that of the central portion. On the side 20b, the side surface is therefore formed by a pair of symmetrical members 30', 30", shaped like a right-angled trapezium, separated by a constant-width channel comprising the channels 31, and providing a plurality of openings in correspondence of the spaces 33 (Figures 2, 3) between the guide members 21. Of course a complementary disposition will be provided on the side 20a.

**[0028]** The upper section of the upright is closed by a plate 34, that can be fixed by bolts passing through the holes 35.

**[0029]** The above disclosed hinge device ensures a strong and effective connection between two adjacent modules. The particular outline of the upright 11 brings about a high resistance to impacts. The sturdiness of the connection is partially due to the fact that the hinge member is secured to the mantle over a large area of the mantle surface, particularly over the whole portion 3a and the portion 3c, and can be anchored to a barrier upright. Moreover its employment is flexible since it can be used either together with an upright of the barrier, or alone.

**[0030]** It is clear that the above disclosure has been supplied only as a non-limiting example and that modifications and changes are possible within the scope of the invention. Particularly, although it has been described and illustrated a hinge member providing for a symmetrical upright 11, adapted to be secured to both sides of the mantle, as required in central barriers used as roadway dividers, the invention can also be used in side barriers, providing for a mantle on a single side. In this case, the side view of the upright 11 will be a right-angle trapezium, with the guide members 21 in correspondence of the vertical side, and only one side of the upright central U (referring to a plant view thereof) will provide for the above disclosed double folding. Additionally, a single bracket 14 and a single reinforcing fin 27 will be provided for. Also this feature adds to the flexibility of use of the invention.

## Claims

1. A hinge device for connecting adjacent modules (2) of metal traffic barriers (1) with a New Jersey profile, comprising a first and a second hinge members (4) disposed on facing ends of said modules (2), each of said hinge members comprising guide members (21) for a pivot of the hinge device that are disposed along the height of the corresponding module (2) and staggered for the two hinge members (4), whereby upon connecting two modules the guide members (21) on a module (2) will be positioned between the guide members (21) of the adjacent module, **characterized in that** said guide members (21) are integrally formed with a vertical upright (11) of said hinge member (4), said upright being formed

by a metal sheet folded and cut so as to form both said guide members (21) and void spaces (33) separating subsequent guide members (21), as well as a front wall (18'; 18") for fixing at least a portion (3a) of the barrier mantle.

2. A hinge device as claimed in claim 1, **characterized in that** said metal sheet forming said upright (11) is folded so as to have, in a plan view, a U-shaped portion defining guide members (21) with a channel (31) open at a side facing the end of the module (2) opposite to that on which the corresponding hinge member (4) is provided, at least one side of said U-shaped portion being twice folded at substantially right angles to define said front wall (18'; 18") and at least one side wall portion (30'; 30") orthogonal to said wall.
3. A hinge device as claimed in claim 1 or 2, **characterized in that** the profile of said side wall (30'; 30") is that of a trapezium, with the longer base at the bottom, and **in that** an oblique side of said trapezium that defines said front wall (18'; 18") is inclined with respect to a vertical plane by an angle corresponding to that of said at least one portion (3a) of said New Jersey profile.
4. A hinge device as claimed in claim 3, **characterized in that** for the connection of modules (2) of a barrier (1) to be disposed at a side of a roadway, said profile of the side wall (30'; 30") is that of a right-angled trapezium and that the metal sheet forming said upright (11) is folded so that said guide members (21) are located in correspondence of the vertical side of said right-angled trapezium.
5. A hinge device as claimed in claim 3, **characterized in that** for the connection of modules (2) of a barrier (1) to be disposed at the centre of a roadway, said profile of the side wall (30'; 30") is that of an isosceles trapezium, and that the metal sheet forming said upright (11) is folded so that said guide members (21) are located in correspondence of the vertical centre or median line of said trapezium.
6. A hinge device as claimed in any of the preceding claims, **characterized in that** said front wall (18'; 18") is provided with a recess (25'; 25") for housing a stiffening member (6) associated to said mantle (3).
7. A hinge device as claimed in any of the preceding claims, **characterized in that** said upright (11) is associated with means (22, 23) for anchoring the upright (11) to a vertical support of the barrier (1), said anchor means being secured to the upright (11) along one side (20b) facing the end of the module (2) that is opposite to that on which the correspond-

ing hinge member (4) is provided.

8. A hinge device as claimed in any of the preceding claims, **characterized in that** said upright (11) is further equipped with an upper closing plate (34). 5
9. A hinge device as claimed in any of the preceding claims, **characterized by** further providing a base (10) in which a lower end of said upright (11) is fitted. 10
10. A hinge device as claimed in claim 9, **characterized in that** to said base (10) at least one bracket (12'; 12") is secured, said bracket having a front portion (14', 15'; 14", 15") provided with an upwards and backwards projecting inclined extension (15'; 15"), with respect to a front side of the base (10), with an inclination corresponding to the portion of maximum inclination in said New Jersey profile. 15
11. A hinge device as claimed in claim 9 or 10, **characterized in that** said front portion (14', 15'; 14", 15") of said at least one bracket (12'; 12") laterally projects toward the outside of the base (10) and provides for a lower portion (14', 14") which is substantially coplanar with said front side of the base (10), for fixing a lower portion (3c) of the mantle. 20 25
12. A hinge device as claimed in any of claims 9 to 11, **characterized by** further providing at least one support fin (27'; 27") connected to the lower portion of said upright (11) and to the base (10), and which projects from an edge of the upright towards said at least one bracket (12'; 12"). 30
13. A hinge device as claimed in anyone of claims 5 and from 9 to 12, **characterized by** comprising a pair of said brackets (12', 12"), disposed at opposite ends of said base (10), and a pair of said support fins (27', 27"). 35 40
14. A hinge device as claimed in anyone of claims 9 to 14, **characterized in that** said base (10) is formed by a member having a substantially U-shaped vertical cross-section resting on one side and open on three sides. 45
15. A hinge device as claimed in claim 14, **characterized in that** said upright (11) is connected to the base (10) in correspondence of the opening of said U. 50
16. A hinge device as claimed in claim 14 or 15, **characterized in that** said bracket (12'; 12") or said brackets (12'; 12") is fixed or are fixed to the base (10) in correspondence of the base of said U. 55
17. A metal traffic barrier (1) for roadways, of the New Jersey type, comprising a plurality of modules (2)

connected to one another, **characterized in that**, at least in correspondence of a curved section of the roadway, adjacent modules are connected through a hinge device according to anyone of the preceding claims, each module providing for said first hinge member at one end and said second hinge member at the opposite end.

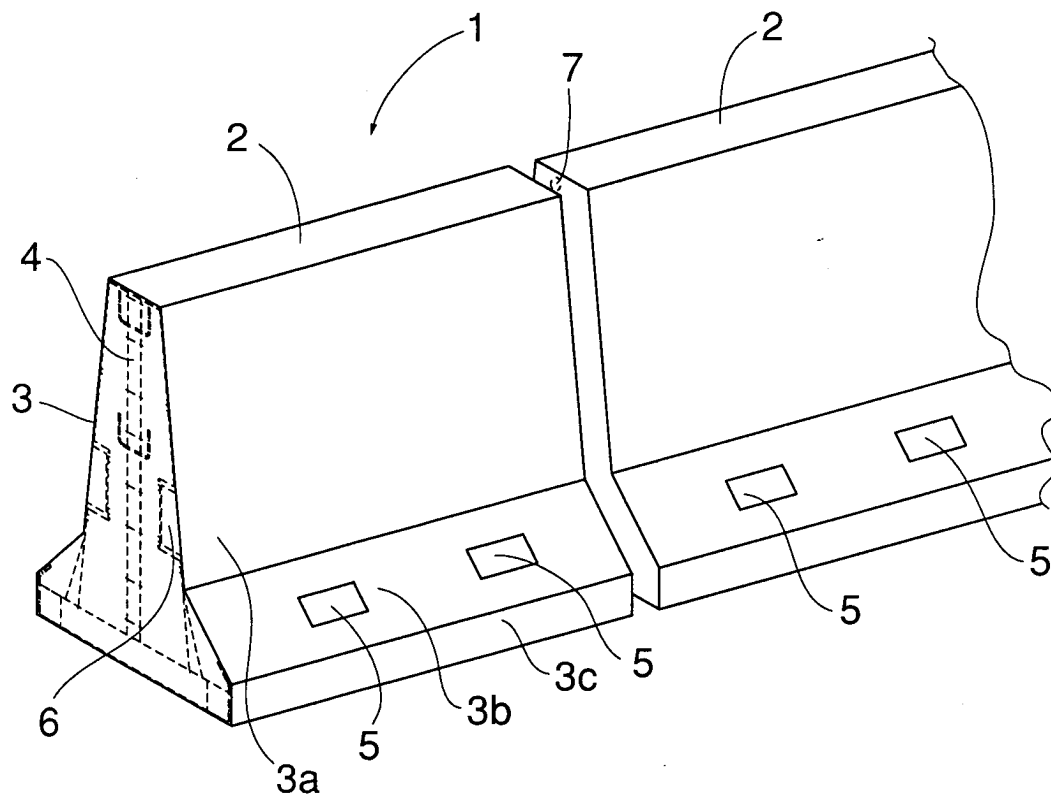


Fig. 1

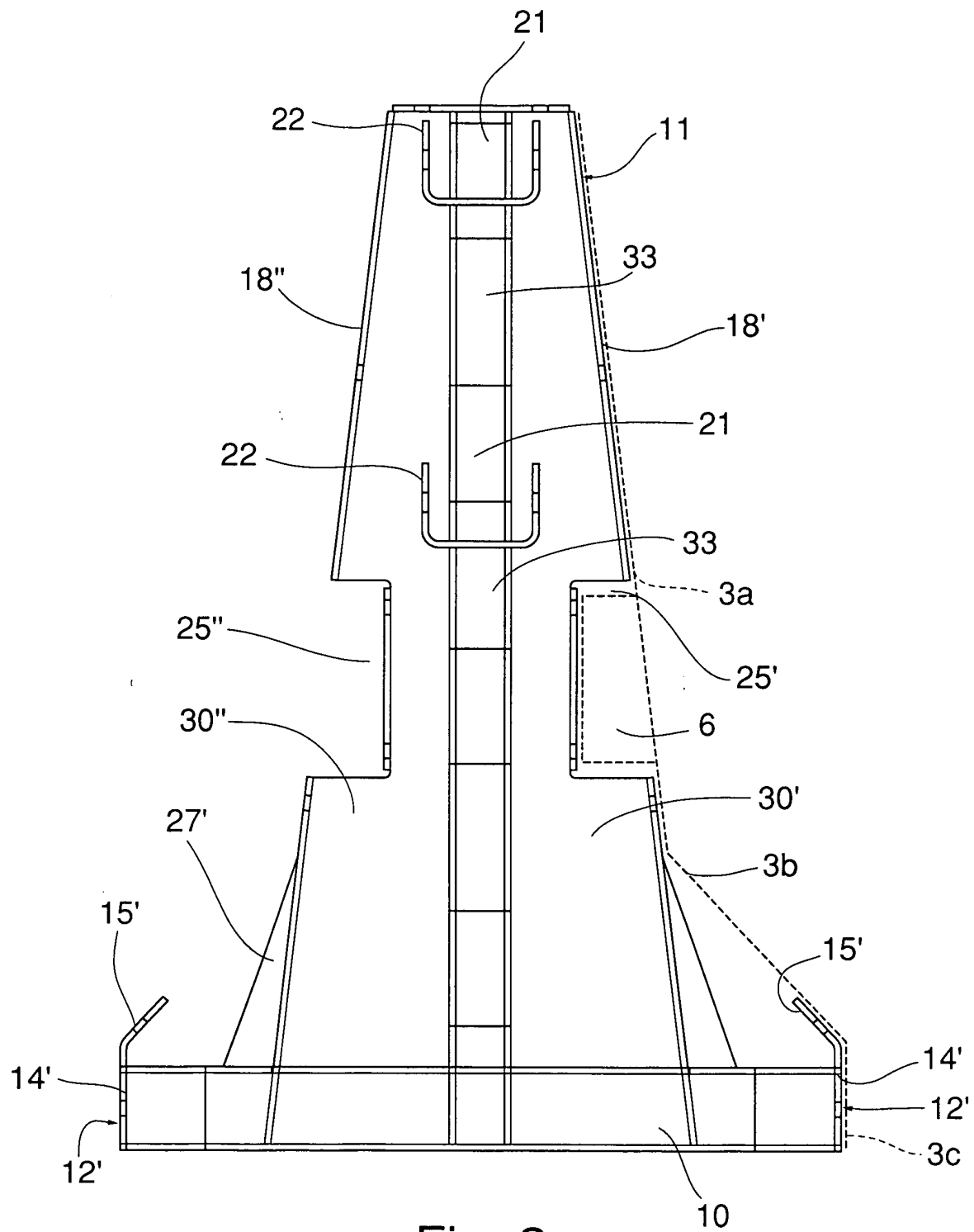


Fig. 2

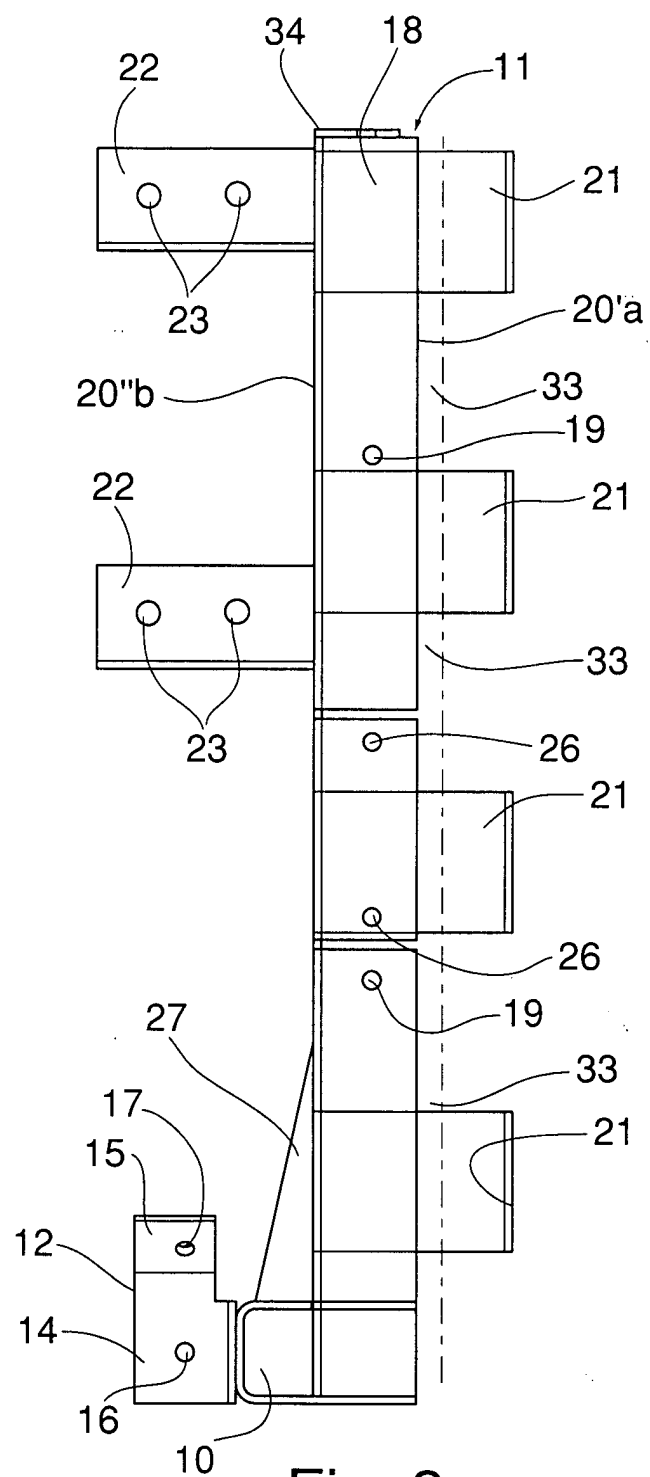


Fig. 3

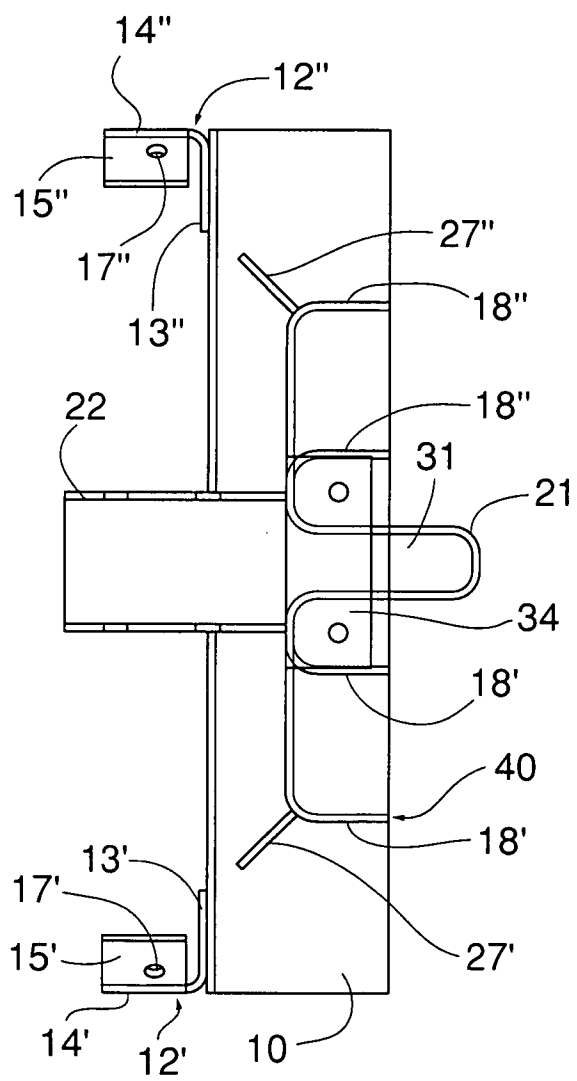


Fig. 4

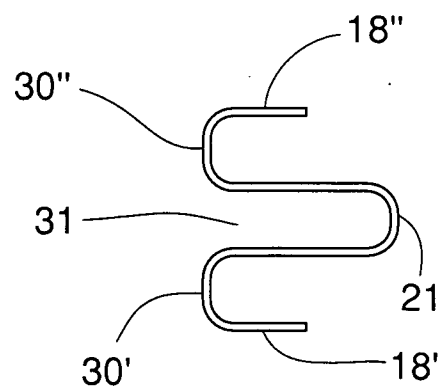


Fig. 5

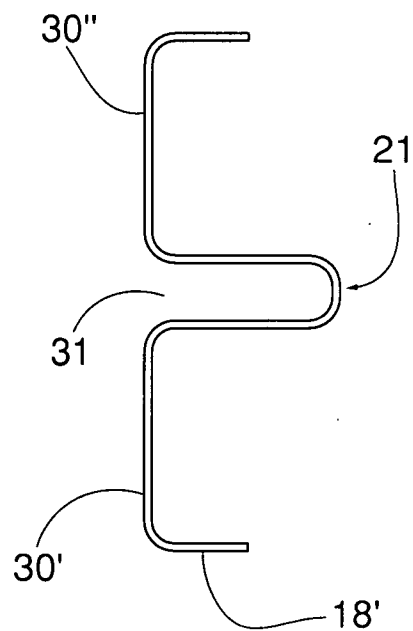


Fig. 6

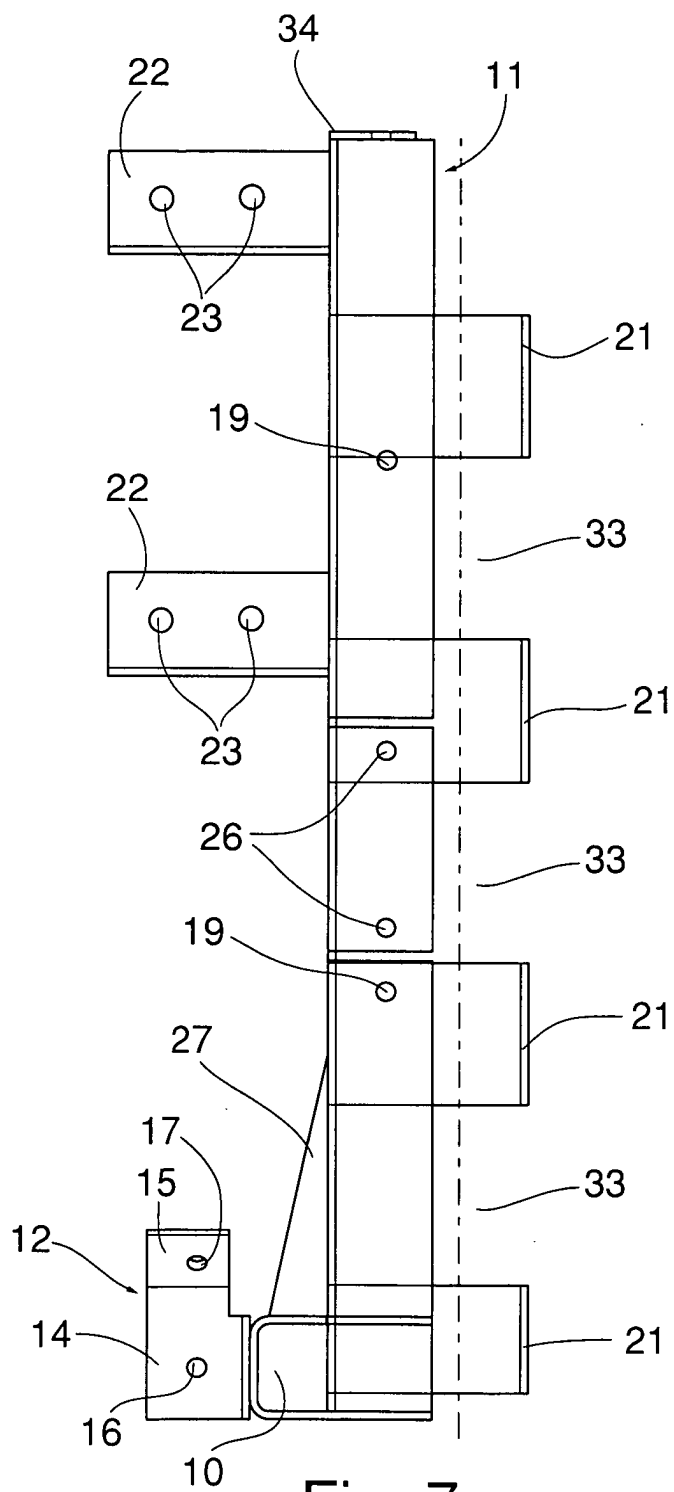


Fig. 7