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(54) **Device for guiding a piece of fabric**

(57) Device for guiding a fabric, especially designed to be used with retractable screens like for example pleated anti-mosquito screens, which includes two vertical rigid elements facing each other, one of them fixed (2) and the other one mobile (1) and the latter being able to slide from a starting position where it is in contact with the fixed element or near this fixed element, to a final position, moving farther away from the fixed element. The mechanism that allows opening the screen also includes the upper flexible element (4), which is connected to the fixed part (2) and an intermediate flexible element (5) that is in turn connected to a lower flexible element (6) that attaches to the fixed element (2). The mechanism is linear, which simplifies the assembling of the device. It also easily adapts to openings of different sizes, which are to be protected with the retractable screen.

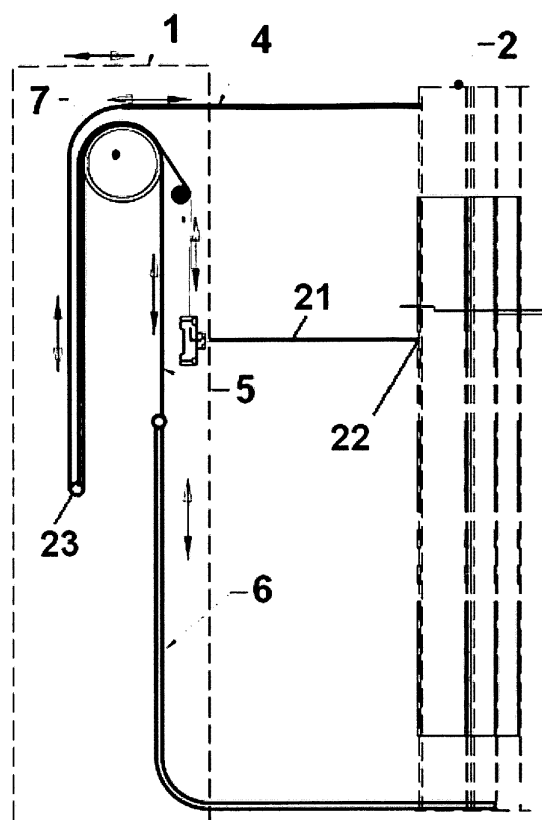


FIG. 2

Description

[0001] This invention is included within the framework of devices that allow guiding a fabric by using a retractable screen. It refers to devices that allow opening or closing the screen.

[0002] These devices must be easy to install in order to facilitate the assembling. Also, they must be able to adapt to the size of the opening that wants to be protected with the retractable screen. It must also be easy to remove.

PRIOR STATE OF THE ART

[0003] Retractable screens, like for example pleated anti-mosquito screens are devices that allow extending a fabric to close an opening, which allows retracting the fabric to its initial position. The fabric is arranged between two rigid elements, with one of the rigid elements being mobile.

[0004] Patent EP-1903175 describes a pleated screen that includes a fixed piece and a mobile piece and the movement of the mobile piece is achieved using two chain guide pieces, where one of them is larger than the other so that during the opening of the screen, the mobile piece partially slides within the larger dimensions.

[0005] Document EP-1905944 also describes a pleated screen device that includes two guides of the proper size in order for one to slide inside the other on the fixed piece.

[0006] Patent EP-0999335 is a device used on screens and describes the chain links that allow the screen to move. These links are comprised of a plurality of connected rigid units that have a pair of side walls, a cross-beam section and stoppers associated to them that allow maintaining the rigidity of a chain portion that is extracted from the screen's assembly frame.

[0007] Other documents are also known from the state of the art in the field of this invention such as JP-2009-04694, EP-1688582 or JP-2002-339230 that also reference devices that are designed to be used with retractable screens.

[0008] One of the main disadvantages of these screens is the complex mechanism of cables required for maintaining the fixed part and the mobile part parallel to each other. This complex requirement makes the assembling of the device much more expensive and makes it difficult to adjust the height of the device once it is manufactured because if the device is cut, then different mechanisms of the device must be readjusted. To prevent cables from connecting to fixed points, these cables are replaced with chains, making assembling these devices complicated and a difficult task, requiring a verification and adjustment of each device upon completion of the assembling.

DESCRIPTION OF THE INVENTION

[0009] The main purpose of this invention is to propose a device for guiding a fabric that will be applied to retractable screens in order to prevent the limitations of the aforementioned devices.

[0010] This device incorporates a new operating principle that facilitates assembling and allows adapting the size without having to perform large tasks.

[0011] The mechanical elements required for operating the device are arranged linearly, which simplifies the assembling. The adjustment of the size of the device is simply achieved by cutting the device and readjusting the system at a single point.

[0012] The device includes two vertical rigid elements facing each other, with one of them fixed and the other one mobile, so parting from a starting position where both elements are in contact or very close to each other, the mobile element moves away from the fixed element. The mobile element is guided by a lower flexible element and an upper flexible element.

[0013] The lower flexible element and the upper flexible element have one of their ends joined to the fixed element. Its other ends are respectively joined to the ends of an intermediate flexible element. This intermediate flexible element slides via two vertical rails that are located on the inner part of the mobile element, which is an element that is rigid and vertical. As the intermediate flexible element slides, it causes the lower and upper flexible elements to follow it, which can also slide on the inner part of the mobile element's vertical rails.

[0014] In a preferred embodiment of the invention, the intermediate flexible element is made of the same material as the upper flexible element.

[0015] The intermediate flexible element runs along the inner part of the mobile element where it moves inside the vertical rails of said mobile element, which is rigid and vertical; switching from one rail to another at a turning point that is also located on the inner part of said mobile vertical rigid element. The two vertical rails located inside the mobile element, in which the intermediate flexible element circulates are shared for retracting the upper flexible element and the lower flexible element.

[0016] The upper flexible element and intermediate flexible element are comprised of one or several curved transversal section sheets. In a preferred embodiment of the invention, these sheets will be made of metal and will be covered with a corrosion resistant coat.

[0017] The lower flexible element may include a flat sheet and bend limiting elements that allow bending the flat sheet in only one direction, and not in the other. In another embodiment of the invention, the lower flexible element may be a chain with rigid links that are joined together by means of horizontal pivot points.

[0018] The described device also allows using auxiliary drive guide cables for fabrics that require them. In other words, among other things, it may install pleated fabrics that fold on themselves like an accordion, or fab-

rics on roll-up devices that retract the fabric inside a roller when the device is closed. In addition to the aforementioned, disassembling of the device for possible repairs and/or maintenance is easy.

[0019] When the mobile element is in the start position, in other words, in contact or near the fixed element, the lower flexible element and the upper flexible element are retracted inside the mobile element, each one in their corresponding vertical rail. As the mobile element separates from the fixed element, the upper and lower flexible elements are extracted from the mobile element. Since the lower flexible element and the upper flexible element are mechanically joined to the intermediate flexible element by one of their ends, the length of the extracted lower flexible element is always equal to the length of the upper flexible element. The same thing occurs when the upper and lower flexible elements are retracted inside the mobile element. This way, the parallel movement of the mobile vertical element is assured with respect to the fixed vertical element.

[0020] Throughout the description and claims, the word "encompasses" and its synonyms do not intend to exclude other technical characteristics, additions, components or steps. For experts in the field, other objectives, advantages and characteristics of this invention will in part be derived from the description and in part from placing the invention into practice. The following examples and drawings provide an illustration and are not intended to limit this invention. Additionally, this invention covers all the possible combinations of particular and preferred embodiments indicated herein.

BRIEF DESCRIPTION OF THE DRAWINGS

[0021]

FIG. 1 shows an exploded view of the device described in this invention.

FIG. 2 shows a functional diagram of the invention.

FIG. 3 shows an upper flexible element, comprised of a curve transversal section sheet coming out of the mobile vertical rigid element.

FIG. 4 shows a perspective view of a flexible element like the one in figure 3.

FIG. 5 shows a sectional view of a flexible element.

FIG. 6 shows a lateral section of a lower flexible element comprised of a flat sheet and bend limiting elements.

FIG. 7 shows a perspective view of a lower flexible element comprised of a flat sheet and bend limiting elements.

FIG. 8 shows a sectional view of a lower flexible element like the one shown in figure 6.

FIG. 9 shows a bend limiting element of a lower flexible element.

FIG. 10 shows a joined rigid link of a lower flexible element comprised of joined rigid links.

FIG. 11 shows a perspective view of a lower flexible

element comprised of joined rigid links.

References:

- [0022]** 1: Mobile vertical rigid element; 2: Fixed vertical rigid element; 3: Horizontal pivot point; 4: Upper flexible element; 5: Intermediate flexible element; 6: Lower flexible element; 7: Pivot point; 8: Flat sheet; 9: Bend limiting elements; 10: Link; 11: First vertical rail; 12: Second vertical rail; 13: Protuberance; 14: Protuberance, 15: Surface of the bend limiting element; 16: Surface of the bend limiting element; 17: Surface of the bend limiting element, 18: Surface of the link; 19: Surface of the link, 20: Surface of the link; 21: Auxiliary cable; 22: End of the auxiliary cable; 23: End of the auxiliary cable; 24: Surface of the bend limiting element; 25: Surface of the bend limiting element; 26: Surface of the bend limiting element.

DETAILED DESCRIPTION OF THE APPLICATION METHODS

[0023] The device for guiding a fabric proposed by this invention includes two vertical rigid elements that are facing each other, of which one of them is a fixed vertical rigid element (2) while the other one is a mobile vertical rigid element (1) that can slide from a starting position of being in contact with the fixed element (2) or near the fixed vertical rigid element (2) to a final position, getting farther away from the fixed element (2), with the mobile vertical rigid element (1) including two vertical rails, which are a first vertical rail (11) and a second vertical rail (12), and with its sliding guided by an upper flexible element (4) and a lower flexible element (6) that slide along two vertical rails (11, 12) of the mobile vertical rigid element (1), characterized in that the upper flexible element (4) is connected by one of its ends to the fixed vertical rigid element (2) and by its other end, inside a vertical rail (12) to one end of the intermediate flexible element (5), with the lower flexible element (6) connected by one of its ends to the fixed vertical rigid element (2) and by the other free end of the intermediate flexible element (5) in such a manner that it forms a push-pull system and this intermediate flexible element (5) moves inside the vertical rails (11, 12) turning about a pivot point (7) that is included in the mobile vertical rigid element (1).

[0024] The union between the upper flexible element (4) and the intermediate flexible element (5) is an adjustable type union so the distance to the end of the intermediate flexible element (5) to which the end of the upper flexible element (4) is attached, can be adjusted using a screw, so the parallelism between the mobile vertical rigid element (1) and the fixed vertical rigid element (2) can be adjusted. The union between the end of the intermediate flexible element (5) and the end of the lower flexible element (6) is a fixed union.

[0025] In a preferred embodiment of this invention, the union between the upper flexible element (4) and the fixed vertical rigid element (2) is fixed. In a preferred em-

bodiment of this invention, the union between the lower flexible element (6) and the fixed vertical rigid element (2) is also fixed.

[0026] When the mobile vertical rigid element (1) is in the start position, in other words, in contact or near the fixed vertical rigid element (2), the lower flexible element (6) as well as the upper flexible element (4) will for the most part be retracted inside the mobile vertical rigid element (1), each one in their corresponding vertical rail (11, 12). As the mobile vertical rigid element (1) is being separated from the fixed vertical rigid element (2), the upper (4) and lower (6) flexible elements are extracted from the mobile vertical rigid element (1). The length of the extracted upper flexible element (4) is always equal to the length extracted from the lower flexible element (6), since both elements are jointly attached to each one of the ends of the intermediate flexible element (5). The same thing occurs when retracting the upper (4) and lower (6) flexible elements inside the mobile vertical rigid profile (1). This way, the parallel movement of the mobile vertical rigid element (1) is assured with respect to the fixed vertical rigid element (2).

[0027] The upper flexible element (4) is comprised of one or several curved transversal section sheets. In a preferred embodiment of this invention, where several sheets are used, these sheets are joined by their longitudinal central axis. This union may be the result of random unions spaced apart or one continuous longitudinal union. It must be taken into account that the type of union must not prevent the ability to bend the sheets.

[0028] In an embodiment of the invention, the lower flexible element (6) is comprised of a flat sheet (8) and bend limiting elements (9) that allows bending the flat sheet (8) in only one direction, and not in the other.

[0029] The intermediate flexible element (5) may be a cable, a flexible element sheet or tubular section or a link chain.

[0030] The bend limiting elements (9) are positioned consecutively below the flat sheet, (8) which are attached using protuberances (13, 14) made in the bend limiting element (9) itself so it comprises a regular chain over a flat sheet (8). The protuberance (13) prevents the flat sheet (8) from separating from the bend limiting element (9), but still allowing it to bend; the protuberance (14) prevents the flat sheet (8) and the bend limiting element (9) from sliding. The protuberance (14) is cylindrical. Each bend limiting element (9) has a surface (15, 16, 17) that limits the rotating movement of each element (9) with respect to the previous one, in all directions except one. Surfaces (16), (17), (25) and (26) are vertical and prevent the bend limiting elements (9) from moving horizontally or from rotating with respect to the vertical or longitudinal axis. Surfaces (15) and (25) are horizontal and prevent the bend limiting elements (9) from rotating with respect to each other and downward with respect to the transversal axis, but allow upward rotation.

[0031] In another possible embodiment of the invention, the lower flexible element (6) is comprised of a chain

with rigid links (10) that are joined together by means of horizontal pivot points (3). Also, each element of the link chain (10) has surfaces (18, 19, 20) that along with the horizontal pivot point (3) limit the rotation of each element (10) with respect to the previous in all directions except one.

[0032] The device described in this invention allows including, in one of its embodiments, auxiliary cables (21) which have one of its ends (22) connected to the fixed vertical rigid element (2) and its other end (23) connected to the intermediate flexible element (5), where the upper flexible element is connected. These auxiliary cables (7) are used as guides when pleaded fabrics are used that fold on themselves like an accordion, or fabrics on roll-up devices, that retract the fabric inside a roller when the device is closed. The union between auxiliary cables (7) and the fixed vertical rigid element (2) may be rigid, elastic or an adjustable rigid union.

Claims

1. Device for guiding a fabric that includes two vertical rigid elements that are facing each other, of which one of them is a fixed vertical rigid element (2) while the other one is a mobile vertical rigid element (1) that can slide from an initial position of being in contact with the fixed vertical element (2) or near the fixed vertical rigid element (2) to a final position, getting farther away from the fixed vertical rigid element (2), with the mobile vertical rigid element (1) including two vertical rails (11, 12), and with its sliding guided by an upper flexible element (4) and a lower flexible element (6) that retract as the device is closed, sliding along two vertical rails (11, 12) of the mobile vertical rigid element (1), with the upper flexible element (4) connected by one of its ends to the end of the fixed vertical rigid element (2), with the lower flexible element (6) connected by one of its ends to the fixed vertical rigid element (2) and the device is **characterized in that** the upper flexible element (4) and the lower flexible element (6) are connected by their ends to the ends of an intermediate flexible element (5) in such a manner that these upper (4) and lower (6) flexible elements (4) push or pull on the intermediate flexible element (5), which moves inside the vertical rails (11, 12) turning about a pivot point (7) that is included in the mobile vertical rigid element (1).
2. Device in accordance with claim 1 where the upper flexible element (4) is comprised of at least one curved transversal section sheet.
3. Device in accordance with claim 1 where the lower flexible element (6) includes a flat sheet (8) and bend limiting elements (9) configured to allow bending the flat sheet (8) in only one direction, and prevent it from

being bent in the opposite direction.

4. Device in accordance with claim 1 where the lower flexible element (6) is comprised of a chain with rigid links (10) that are joined together by means of horizontal pivot points (3). 5
5. Device in accordance with claim 1 where the intermediate flexible element (5) is joined in an adjustable manner to the upper flexible element (4) and is joined in a fixed manner to the lower flexible element (6). 10
6. Device in accordance with claim 1 where the upper flexible element (4) is comprised of a chain with rigid links (10) that are joined together by means of horizontal pivot points (3). 15
7. Device in accordance with claim 1 that includes auxiliary cables (7) that have one of their ends connected to the fixed vertical rigid element (2) and its other end is connected to the intermediate flexible element (5), where the upper flexible element (4) is connected. 20
8. Device in accordance with claim 6 where the union between auxiliary cables (7) and the fixed vertical rigid element (2) may be rigid, elastic or an adjustable rigid union. 25
9. Device in accordance with claim 1 where the union between the upper flexible element (4) and the fixed vertical rigid element (2) may be rigid, elastic or an adjustable rigid union. 30
10. Device in accordance with claim 1 that when the mobile vertical rigid element (1) is in the start position, the upper flexible element (4) is inside a second vertical rail (12) of the same mobile vertical rigid element (1) as well as the lower flexible element (6) is inside the first vertical rail (11) of the mobile vertical rigid element (1). 35
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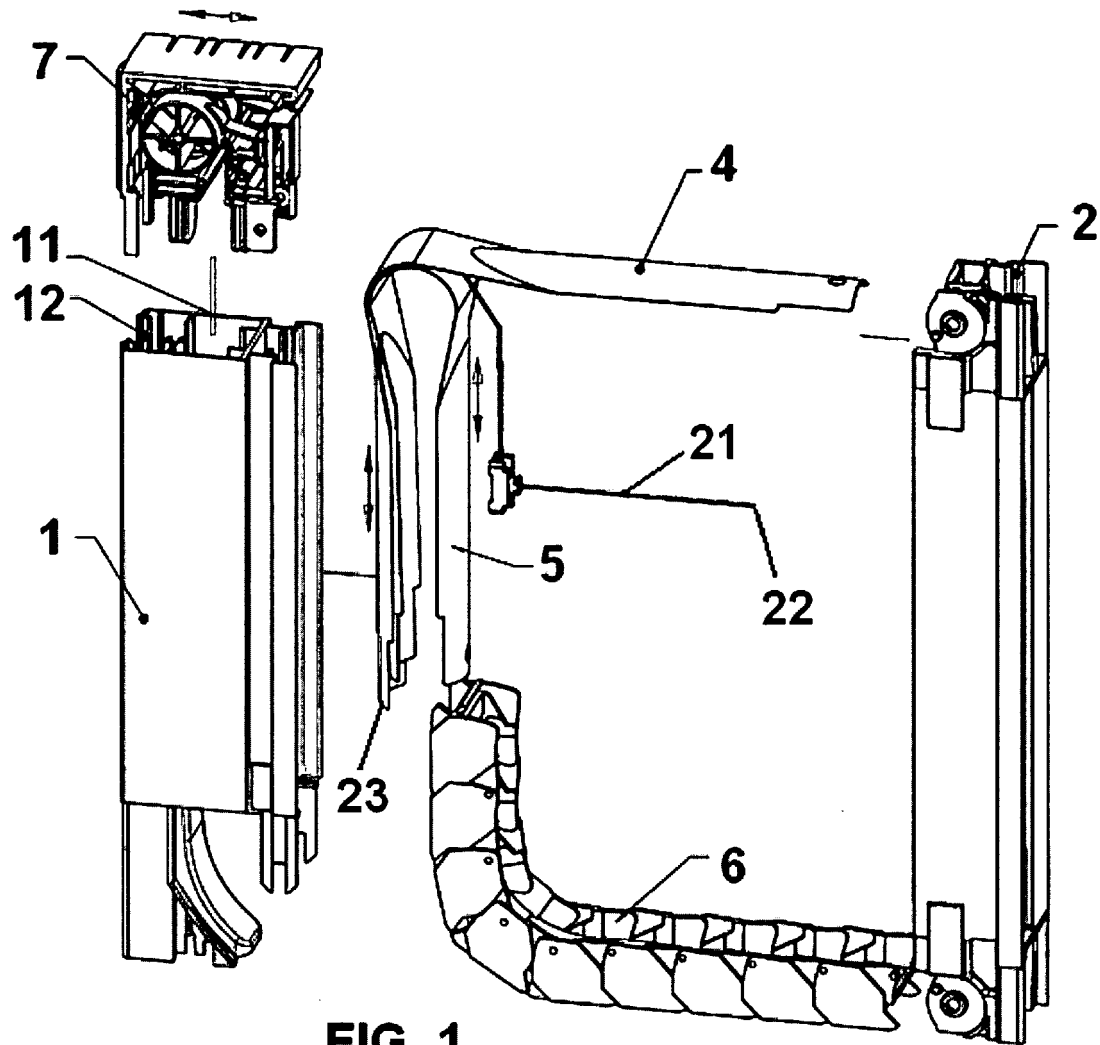


FIG. 1

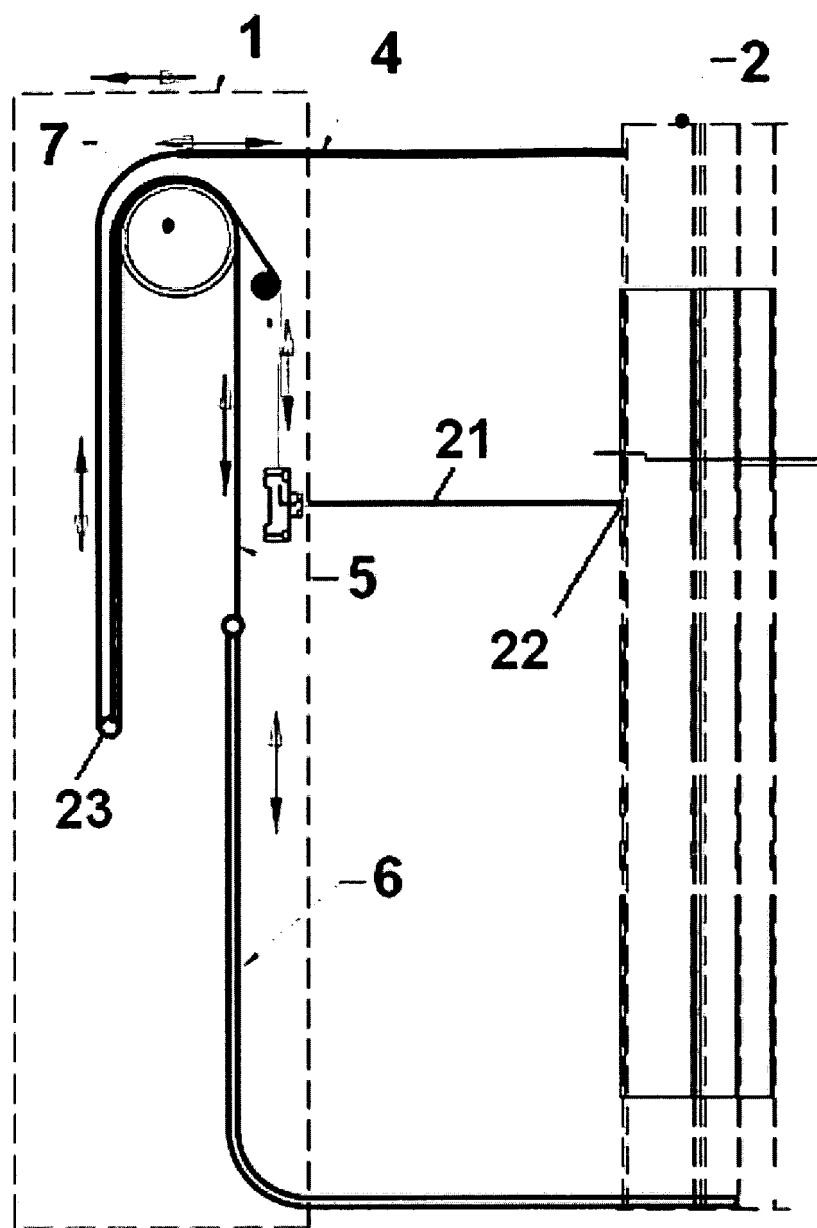


FIG. 2

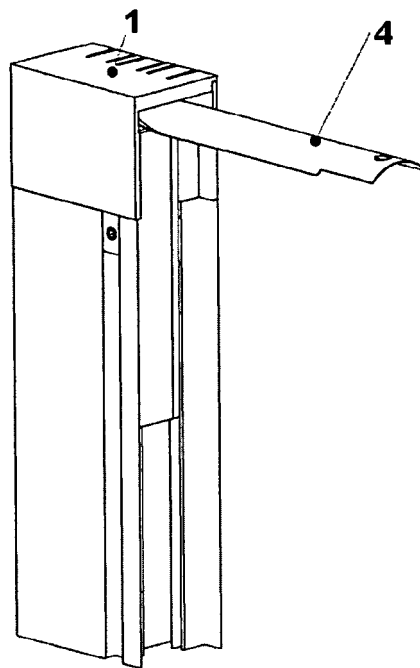


FIG. 3

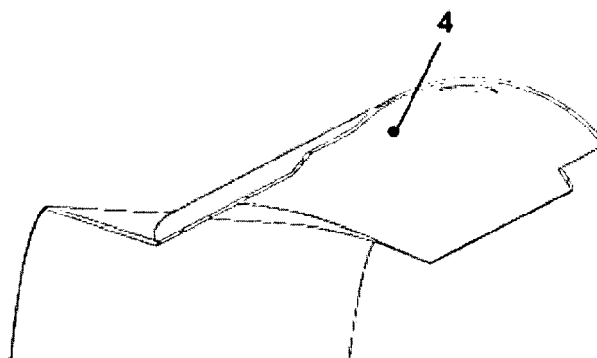


FIG. 4



FIG. 5

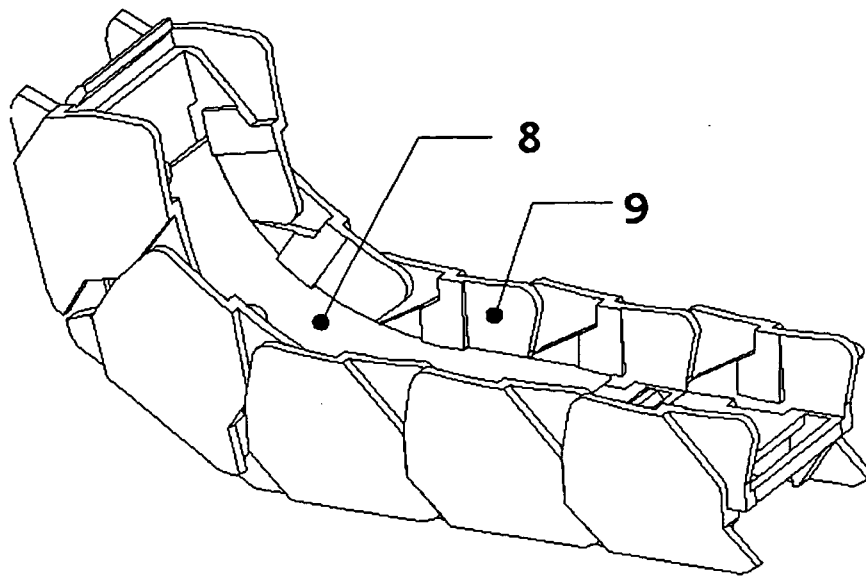


FIG. 6

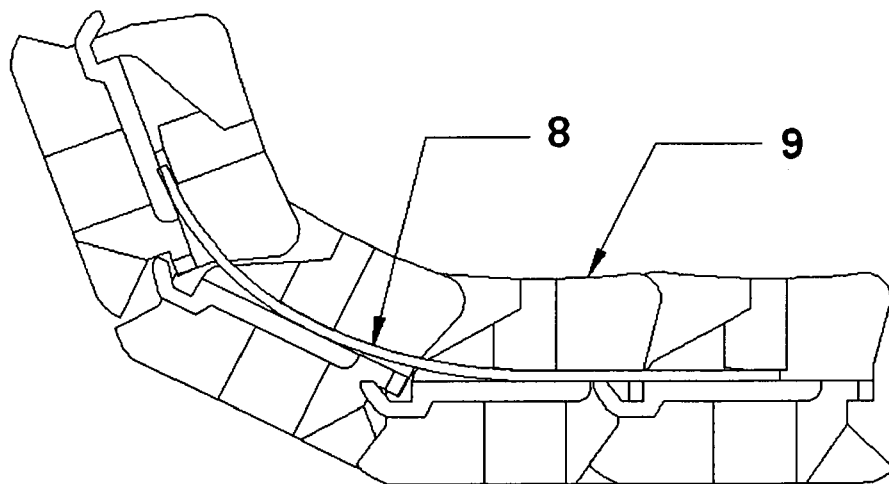


FIG. 7

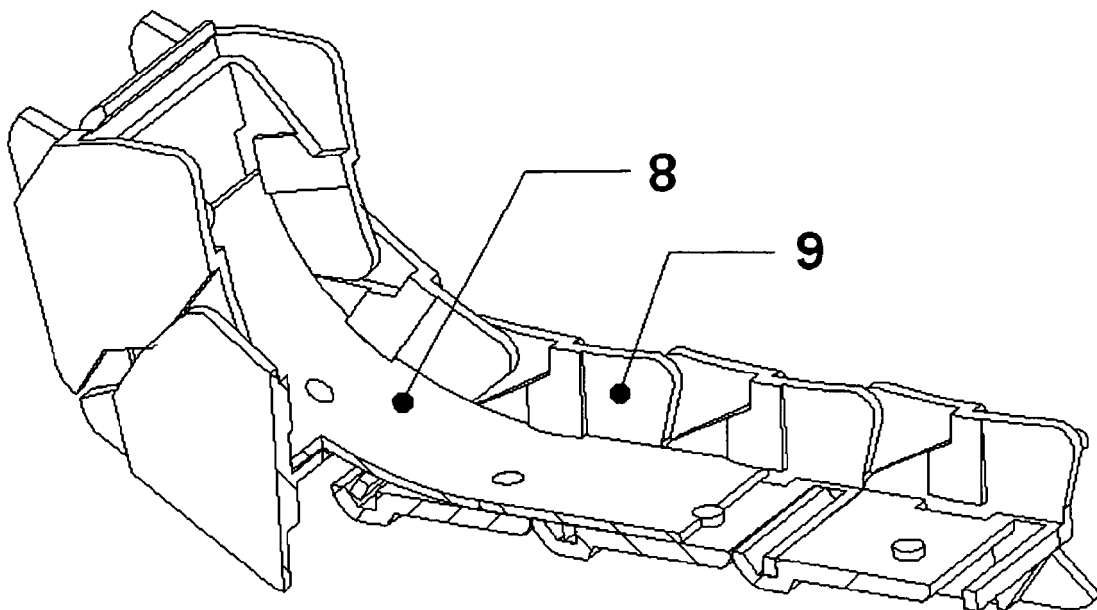


FIG. 8

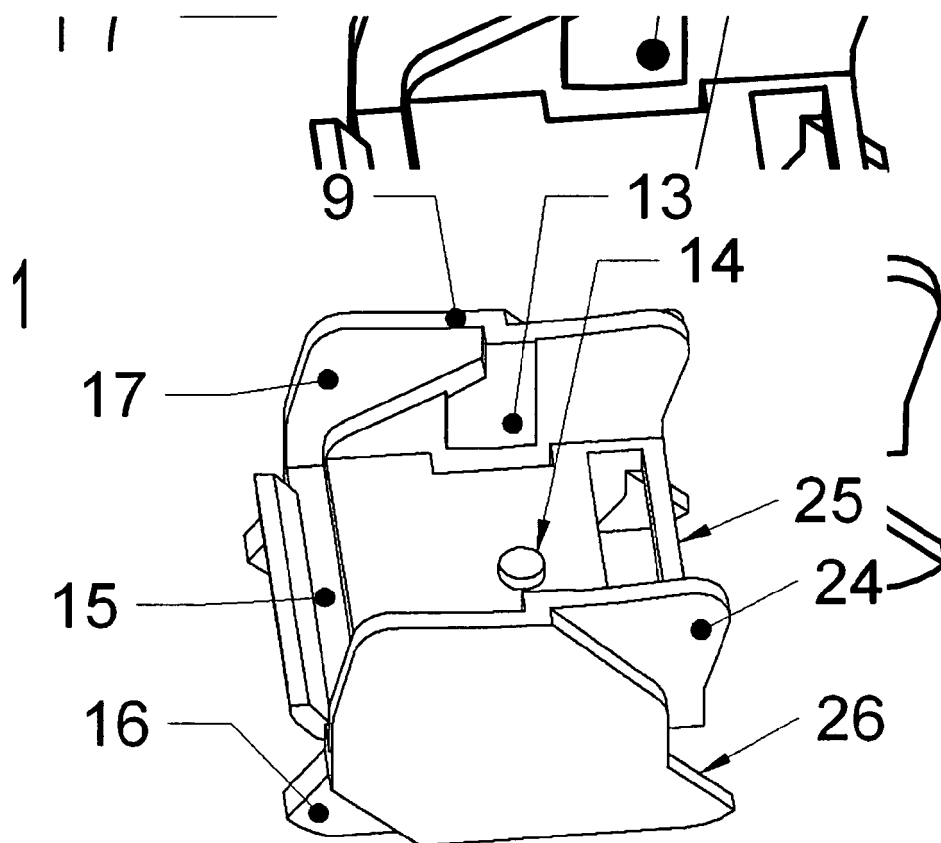


FIG. 9

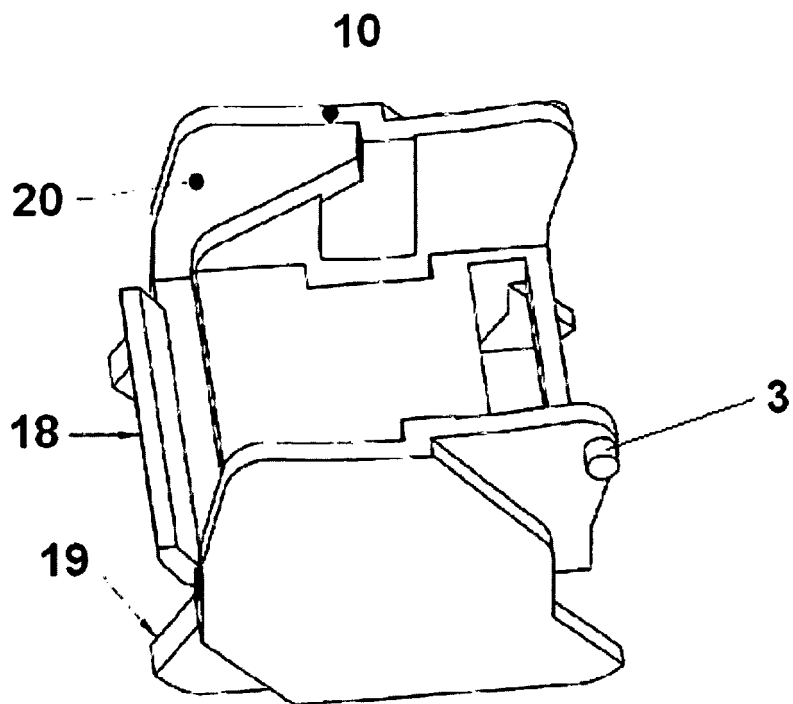


FIG. 10

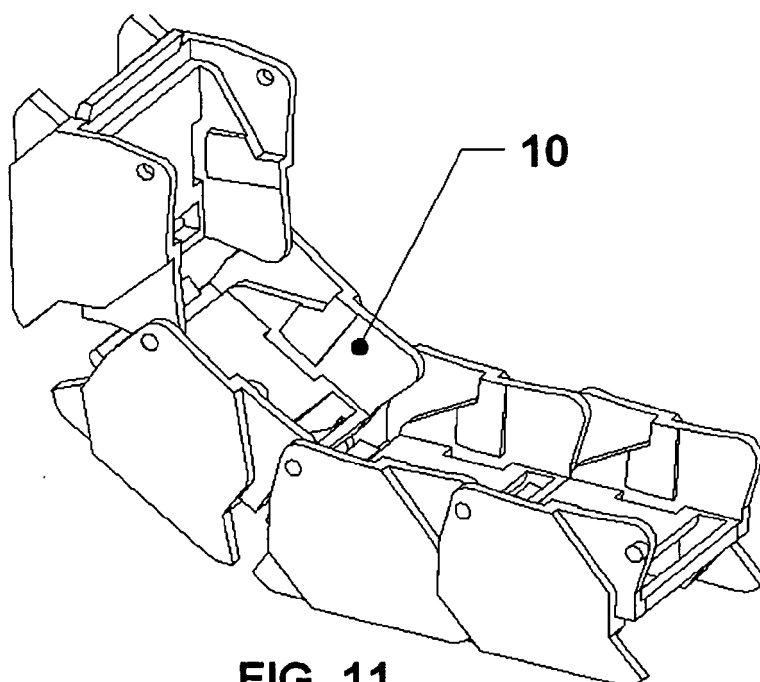


FIG. 11

REFERENCES CITED IN THE DESCRIPTION

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