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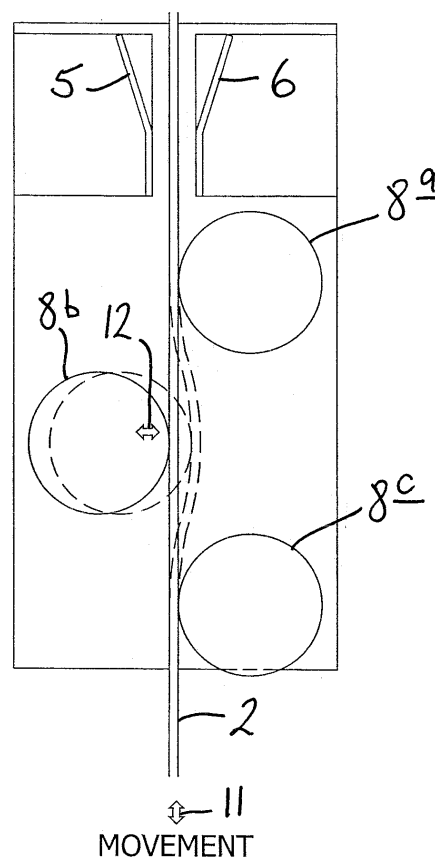
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(54) **Wind restraint for a roller door curtain**

(57) A restraint for mounting in or on a side frame element (1, 1a) of a door opening in which a curtain (2) is mounted comprises a bracket (4) mounting at least first and second rollers (8a, 8b) upon respective first and second spindles below an opposed pair of guide plates (5, 6) which define a gap through which, in use, an edge margin of the door curtain (2) is guided in a generally vertical plane. The spindles (9, 9a) mounting the rollers (8a, 8b) extend generally parallel to each other at positions which lie at opposite sides of the plane of the curtain (2) in use so that the rollers mounted thereby contact opposing surfaces of the curtain. The spindles also extend at positions one above the other, ie, at a respective upper and lower level. The second spindle (of roller 8b) is mounted so as to be adjustable in position relative to the first spindle (of roller 8a) so that the position of the second roller (8b) can be adjusted to deflect the curtain (2) from its otherwise generally vertical plane when extending through the restraint.

Figure 4



Description

[0001] The present invention concerns a wind restraint for a roller door curtain.

[0002] Roller doors of sheet material are widely used in many commercial premises. The door curtain is typically made of heavy duty plastics material or non-woven textile fabric, side edges of which are guided in channel form side frame elements of a door opening when being raised and lowered by known mechanisms. The curtain may be subject to gusts of wind or steady airflow from one or both directions when it is closed or partially closed or during closure and opening operations. This results in deflection and bowing of the curtain with a risk of dislodging the side edges and disrupting tracking.

[0003] To counter this problem at least one wind bar is commonly provided, usually at the side of the door remote from the most likely direction of any wind current. Such a wind bar extends horizontally across a middle region of the curtain when closed. Respective ends of the wind bar are slidably mounted in respective additional elongate tracks or guides mounted to the side frame elements of the door. The bar is raised and lowered along with the curtain by means of one or more tapes which extend from upper corners of the door frame and are looped around the bar. Such an arrangement is not ideal. The wind bar creates noise as it tends to rattle in its tracks and this can disturb nearby workers. Also, the wind bar can be damaged by impact, which is quite common when forklift trucks and similar vehicles are moving around in commercial premises, with resultant potential for problems in raising and lowering the entire curtain and requirement for repair.

[0004] An object of the present invention it is to provide an alternative wind restraint mechanism which does not have these disadvantages.

[0005] According to the present invention a wind restraint for a roller door curtain for mounting in or on a side frame element of a door opening in which the curtain is mounted is provided, said restraint comprising a bracket mounting at least first and second rollers upon respective first and second spindles below an opposed pair of guide plates which define a gap through which, in use, an edge margin of the door curtain is guided in a generally vertical plane, in which respect the spindles mounting the rollers extend generally parallel to each other at positions which lie at opposite sides of the plane of the curtain in use so that the rollers mounted thereby contact opposing surfaces of the curtain, and said spindles also extend at positions one above the other, i.e. at a respective upper and lower level. Moreover, at least one of the spindles is mounted so as to be adjustable in position relative to the other of the spindles, at least in a lateral direction, that is to say in a direction generally perpendicular to the plane of the curtain, so that the position of the first mentioned roller can be adjusted to deflect the curtain from its otherwise generally vertical plane when extending through the restraint.

[0006] Contact between the curtain edge margin and at least two rollers at two different levels and at different sides of the curtain inhibits the curtain edge margins from being pulled out of the side frame elements of the door, but with at least one spindle additionally adjusted to deflect the curtain from its vertical plane the region of contact between the door curtain edge margin and the respective rollers is considerably increased so the restraining action of the rollers is correspondingly increased.

[0007] Further features which may be provided to enhance the restraining action are provision of a third spindle mounting a third roller, said third spindle extending from the bracket generally parallel to the first and second spindles and at a position substantially directly below either the first or the second spindle so that the third roller mounted thereby also contacts the respective surface of the curtain in use, and even provision in a similar manner of a fourth spindle mounting a fourth roller. The third spindle, or one or both of the third and the fourth spindle, when four are provided, may also be mounted so as to be adjustable in position relative to the other spindles so that the position of the third roller and/or the position of the fourth roller can also be adjusted to deflect the curtain from its otherwise generally vertical plane when extending through the restraint.

[0008] Other features which may enhance the restraining action of a wind restraint in accordance with the invention are provision of the rollers or at least one of the rollers with a surface layer of enhanced grip material, or with a releasable adhesive coating. The respective edge margins of the door curtain may be provided with corresponding or complementary surface layers or coating. These measures are designed to increase the friction or adhesion between the rollers and the door curtain edges to counter any force, as by wind action against one side of the curtain, tending to pull the respective curtain edge margins away from engagement with the rollers, yet not impeding smooth tracking of the curtain edge margins during opening and closing of the door curtain.

[0009] An alternative feature which may enhance the restraining action of a wind restraint in accordance with the invention is provision of the rollers or at least one of the rollers with a surface layer of a releasable fastening material, and respective edge margins of the door curtain then being provided with corresponding or complementary material. Suitable materials would be well known barb and loop fastening materials, such as those sold under the trade name 'Velcro'.

[0010] Yet another feature which may enhance the restraining action of a wind restraint in accordance with the invention is provision of the rollers or at least one of the rollers with surface formations, such as bumps or dimples, such as to enhance the grip of the curtain material which is guided there around.

[0011] Embodiments of the invention may also be provided wherein at least one of the rollers is of frusto-conical configuration. Such configuration may also provide enhanced restraint of the curtain edge margins as such roll-

ers may tilt to provide additional frictional contact between ends of such roller and the curtain. Moreover the frusto-conical shape in itself will cause deflection of the door edge margin in such a way as to reduce slippage between them axially of the mounting spindle. Furthermore, such frusto-conical rollers may be mounted on their spindles so as to be axially movable along said spindles so as to move along with the curtain edge as it is pulled outwards yet at the same time increase nipping action to restrain it from further outward movement. However, where conventional cylindrical rollers are used these may also be mounted on their spindles so as to be axially movable, optionally in combination with one of the other aforementioned features of the surface layer.

[0012] In the case of such axially movable rollers it is possible in some embodiments that these could be threadedly mounted on their respective spindles so as automatically to move outwards, and increase gripping action accordingly, upon rotation of the rollers as the door curtain is lowered to its closed position.

[0013] Features described in conjunction with any particular embodiment or example of the invention are to be understood to be applicable to any other embodiment or example described herein unless incompatible therewith.

[0014] The invention will be described further, by way of example, by reference to the accompanying drawings, in which:

Figure 1 is a fragmentary perspective view illustrating a first practical embodiment of the wind restraint of the present invention mounted in a side frame element of a roller curtain door;

Figure 2 is a perspective view of the embodiment shown in figure 1 on its own;

Figure 3 is a front view of the embodiment shown in figure 2;

Figure 4 is an enlarged diagrammatic front view of the same embodiment (shown in figures 1 to 3) illustrating its use;

Figure 5 is a top plan view corresponding to figure 4;

Figure 6 is a fragmentary perspective view illustrating a second practical embodiment of the wind restraint of the present invention mounted in a side frame element of a roller curtain door;

Figures 7 to 10 are views of the second embodiment similar to the views in figures 2 to 5 for the first embodiment;

Figure 11 is a fragmentary perspective view illustrating a third practical embodiment of the wind restraint of the present invention mounted in a side frame element of a roller curtain door; and

Figures 12 to 15 are views of the third embodiment similar to the views in figures 2 to 5 for the first embodiment.

[0015] With reference to Figures 1 to 5, a first practical embodiment 3 of the wind restraint of the invention comprises three rollers 8 mounted upon respective spindles 9 which extend generally parallel to each other, and therefore all generally perpendicular to a mounting bracket 4 in the form of a back plate. Also mounted to the bracket 4, above the rollers 8, in the orientation in which the device is used, are a pair of opposing guide plates 5,6 which are spaced apart to define a gap through which an edge margin of a door curtain 2 is guided in use, as shown in Figure 1. The guide plates 5, 6 include upper sloping portions to define a tapering upper margin to the gap so as to ensure "capture" of the curtain edge margin upon lowering of the curtain (in the direction indicated by arrow 11) for guidance through the restraint device 3.

[0016] The first and third rollers 8a, 8c are mounted directly one above the other to fixedly mounted spindles 9 at a common side of the plane of the curtain 2 in use. The second roller 8b is mounted at a level vertically substantially equidistant between the first and third rollers 8a, 8c, but at a laterally offset location which is at the other side of the generally vertical plane of the curtain 2 in use. Also, the spindle 9b mounting the second roller 8b is mounted by a flanged sub-bracket 7 to the plate 4 so as to be laterally adjustable along an elongate mounting slot 14 in the direction indicated by arrow 12 in figures 3, 4 and 5. In this respect, a spindle mount (not visible) at the other end of the spindle 9b, adjacent the plate 4, is connected to a threaded adjustment rod 10, which extends through a side flange 16 of the sub-bracket 7 to engage with a nut 18. The connection between the spindle mount and the rod 10 is such as to hold the end of the latter captive while permitting rotation of the rod. Therefore, rotation of the nut 18 serves by threaded engagement to move the rod 10 axially so that the spindle 9b and the roller 8b move in a generally horizontal direction towards the alignment of the other two upper and lower rollers 8a, 8c (see figure 4).

[0017] A typical size for the rollers 8a, 8b, 8c is 10 cm in length and 6.5 cm in diameter, but of course the size chosen may vary.

[0018] In use, the restraint device 3 is mounted into a side frame element 1 of a door opening of a roller curtain door. As shown in Figure 1, the frame element 1 may have a hingedly connected portion 1a which can be swung back to permit installation of the restraint 3. A similar restraint will be mounted in mirror image fashion at a similar height in the opposed frame element of the door so that the respective edge margins of the door curtain 2 are guided through respective restraints 3 in the direction indicated by arrow 11 in figures 1, 3 and 4. As is evident, particularly by reference to Figures 1 and 4, the door curtain edge margin 2 is guided between the sloping guide plates 5, 6 and then between the first and third

rollers 8a, 8c on the one side, and the second roller 8b, at intermediate level, on the other side in a generally vertical plane, as by suspension of the curtain 2 under its own weight. The rollers 8 rotate freely in the direction indicated by arrow 13 in figure 3.

[0019] The spacing between the spindles 9a and 9c on the one hand and the intermediate level spindle 9b, on the other hand, and the diameters of the rollers 8a, 8b, 8c are chosen so that in this condition the curtain 2 extends therebetween and is contacted by the surface of each of the rollers 8, as shown in solid lines in Figure 4.

[0020] The position of the second roller 8b is then laterally adjusted by means of the rod 10, as already described. This serves to deflect the line of the curtain edge 2 from the vertical. This deflection may be by as little as 2mm to 6mm from the vertical plane. (In other words, the spindle 9b may be moved sideways by this extent). However, it is sufficient to increase the area of contact between the curtain edge 2 and all of the rollers 8a, 8b, 8c. The contact therebetween, i.e. grip and friction, reduces the tendency for the curtain edge 2 to be pulled axially of the rollers/spindles 8, 9 (in the direction indicated by arrow 15 in figure 5) upon wind currents from the either side of the door curtain 2.

[0021] The restraints 3 may be positioned at each side of the door about midway up/down the respective side frame elements 1. Of course, there may be more than one such restraint mounted at each side, so there could be one near the top and a further one midway down or slightly below midway at each side, or any other suitable number and positioning to achieve effective wind restraint in any particular circumstances of installation.

[0022] The rollers 8 or any one or more of the rollers 8a, 8b, 8c may additionally include features to enhance grip ability and friction between same and the curtain edge, namely a surface layer of enhanced grip material or a releasable adhesive coating (the respective edge margins of the door curtain optionally being provided with corresponding or complementary surface layers or coating), or a surface layer of a releasable fastening material, such as those sold under the trade name 'Velcro' for example, (and respective edge margins of the door curtain then being provided with corresponding or complementary material), and/or provision of surface formations, such as bumps or dimples on one or more rollers, such as to enhance the grip of the curtain material which is guided there around.

[0023] Figures 6 to 10 illustrate a second practical embodiment 23 of a curtain edge restraint of the invention. Compared to the first embodiment just described this includes a fourth roller 28d mounted on a fourth spindle 29d, directly below the second roller/spindle 28b/29b and in a similar laterally adjustable manner, by a further flanged sub bracket 47 and adjustment rod 50, as already described in relation to the second roller/spindle 29b. The inclusion of such a fourth roller 28d increases the overall contact area between the curtain margin and the rollers 28 and this is further enhanced by the deflection of the

curtain edge 22 upon adjustment of the roller 28d, as best shown in Figure 9.

[0024] The fourth roller 28d on its adjustable mounting 47,50 may be mounted on a separate plate 44, adjacent the plate 24, as shown in figure 6.

[0025] In all other respects this second embodiment is the same as the first embodiment already described above so the description is not repeated and comparable parts and arrows are designated by reference numerals increased by 20 compared to those allocated in Figures 1 to 5.

[0026] The same optional roller and curtain edge surface provisions are also applicable to this embodiment.

[0027] Figures 11 to 15 illustrate a third practical embodiment 123 of a curtain edge restraint of the invention. Compared to the second embodiment just described all the four rollers 128a,b,c,d are of frusto-conical form and are axially slidable on their respective mounting spindles 129a,b,c,d. Typical sizes for these frusto-conical rollers 128 are 6 to 7 cm long and tapering from a maximum diameter 6 cm to the minimum diameter of 4 cm, but, of course, other sizes are possible.

[0028] In all other respects the structure of this third embodiment is the same as the second embodiment so detailed description is not repeated and comparable parts and arrows are designated by the reference numbers used in Figures 6 to 10 but increased by 100 compared thereto. The rollers 128 are axially shorter than those of the first and second embodiments 8, 28, but axially slidable on their spindles as mentioned. Accordingly, whenever wind gusts deflect the curtain and tend to bow it and pull the edges thereof sideways in a direction out of the side frame elements (arrow 135 in figure 15), these rollers 128, which grip the curtain edge margins 122 tend to move with the curtain 122, axially of their spindles 129 to maintain and even increase grip (owing to closer approach of the frusto conical surfaces) and prevent the curtain edge pulling out completely.

[0029] The same optional roller and curtain edge surface provisions are also applicable to this embodiment.

[0030] The foregoing is illustrative and not limitative of the scope of the invention and variations in detail are possible in other embodiments, particularly as already mentioned herein (such as threaded engagement between rollers and their spindles to bring about automatic axial movement) and as fall within the scope of the appended claims.

[0031] Another possibility is that one or more of the rollers may be of polygonal shape in cross-section, for example octagonal or dodecagonal, to provide enhanced wind restraint effect.

[0032] Yet another possibility is that one or more of the rollers may have its periphery formed with a series of grooves extending in axial direction, so that in cross section it has the appearance of a sprocket, and corresponding ribs which can fit therein are provided on the edge margin of the curtain. Again enhanced contact area and wind restraint effect would result.

[0033] Also in further embodiments the wind restraint rollers may be provided directly in or on the side frame elements without any mounting bracket(s) or without adjacent guide plates.

Claims

1. A wind restraint for a roller door curtain (2; 22; 122) for mounting in or on a side frame element (1, 1 a; 21; 21 a; 121; 121 a) of a door opening in which the curtain is mounted, said restraint comprising a bracket (4; 24; 124) mounting at least first and second rollers (8a, 8b; 28a, 28b; 128a, 128b) upon respective first and second spindles (9, 9b) below an opposed pair of guide plates (5, 6; 25, 26; 125, 126) which define a gap through which, in use, an edge margin of the door curtain is guided in a generally vertical plane, in which respect the spindles (9, 9b; 29; 129) mounting the rollers (8a, 8b; 28a, 28b; 128a, 128b) extend generally parallel to each other at positions which lie at opposite sides of the plane of the curtain (2, 22; 122) in use so that the rollers (8a, 8b) mounted thereby contact opposing surfaces of the curtain (2, 22; 122), and said spindles (9, 9b; 29; 129) also extend at positions one above the other, i.e. at a respective upper and lower level, and at least the second spindle (9b) is mounted so as to be adjustable in position relative to the first spindle (9) so that the position of the second roller (8b; 28b; 128b) can be adjusted to deflect the curtain from its otherwise generally vertical plane when extending through the restraint.
2. A wind restraint according to claim 1 further comprising a third spindle (9; 29; 129) mounting a third roller (8c, 28c; 128c), said third spindle extending from the bracket (4; 24; 124) generally parallel to the first and second spindles and at a position substantially directly below either the first or the second spindle so that the third roller (8c; 28c; 128c) mounted thereby also contacts the respective surface of the curtain (2; 22; 122) in use.
3. A wind restraint according to claim 2 further comprising a fourth spindle (29; 129) mounting a fourth roller (28d; 128d), said fourth spindle extending from the bracket (44; 124) generally parallel to the first, second and third spindles (29; 129) and at a position substantially directly below either the first or the second spindle so that the fourth roller (28d; 128d) mounted thereby also contacts the respective surface of the curtain in use.
4. A wind restraint according to claim 2 or claim 3 wherein the third spindle and/or the fourth spindle is/are mounted so as to be adjustable in position relative to the other spindles so that the position of the third roller (28c; 128c) and/or the position of the fourth roller (28d; 128d) can be adjusted to deflect the curtain from its otherwise generally vertical plane when extending through the restraint.
5. A wind restraint according to any preceding claim wherein at least one of the rollers has a surface layer of enhanced grip material.
6. A wind restraint according to any of claims 1 to 4 wherein at least one of the rollers has a releasable adhesive coating.
7. A wind restraint according to any of claims 1 to 4 wherein at least one of the rollers is provided with a surface layer of a releasable fastening material.
8. A wind restraint according to any of claims 1 to 4 wherein at least one of the rollers has surface formations, such as bumps or dimples, such as to enhance the grip of the curtain material which is guided there around.
9. A wind restraint according to any of claims 1 to 4 wherein at least one of the rollers (128c; 128d) is of frusto-conical configuration.
10. A wind restraint according to any of claims 1 to 4 or 9 wherein at least one of the rollers is mounted on its spindle so as to be axially movable along said spindle.
11. A wind restraint according to claim 10 wherein at least one of the rollers is threadedly mounted on its spindle.

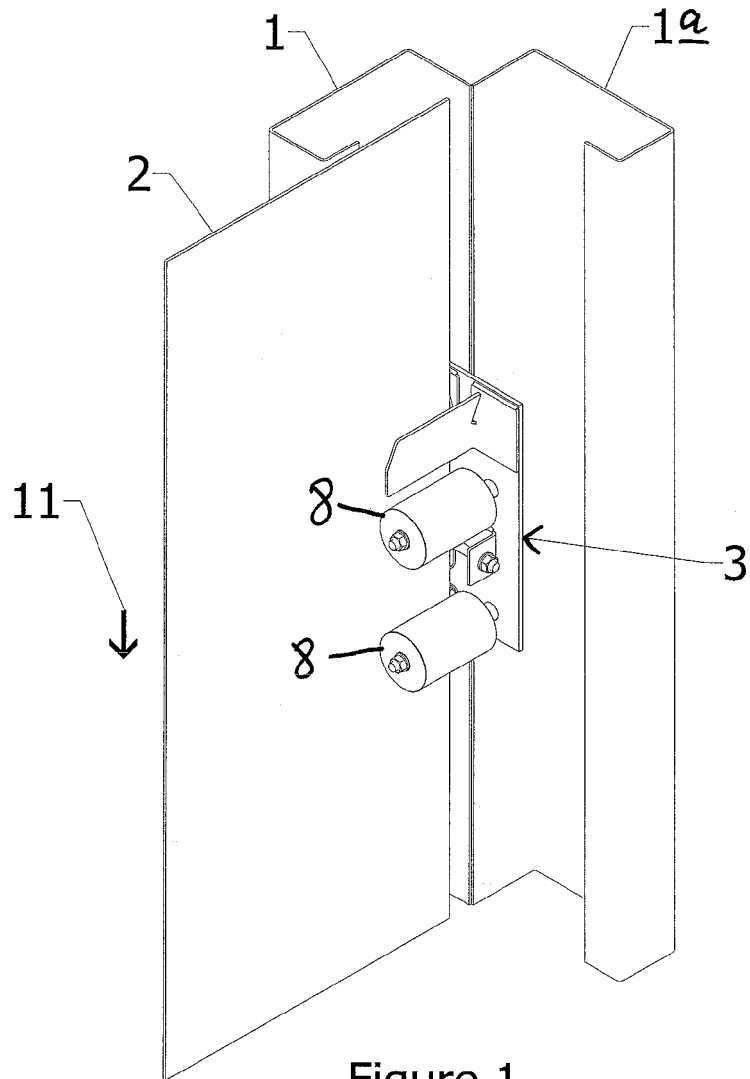


Figure 1

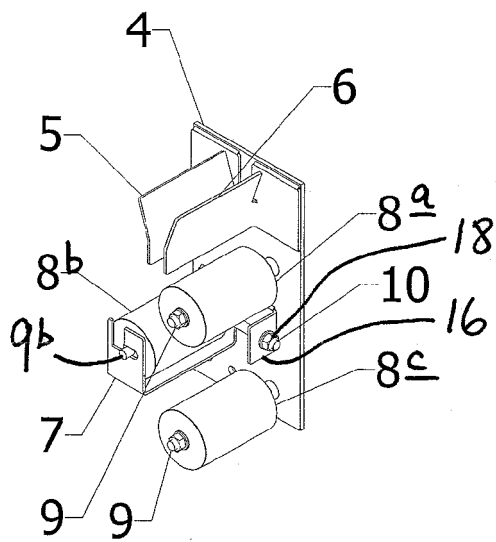


Figure 2

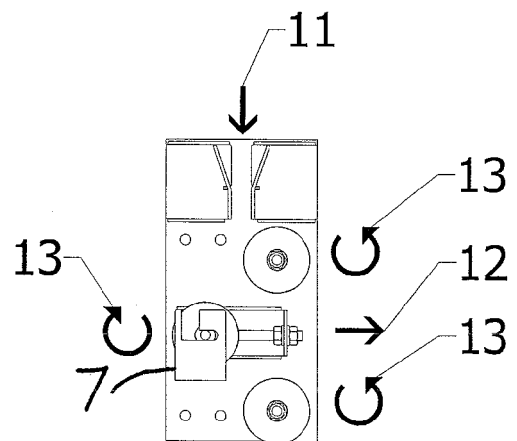


Figure 3

Figure 4

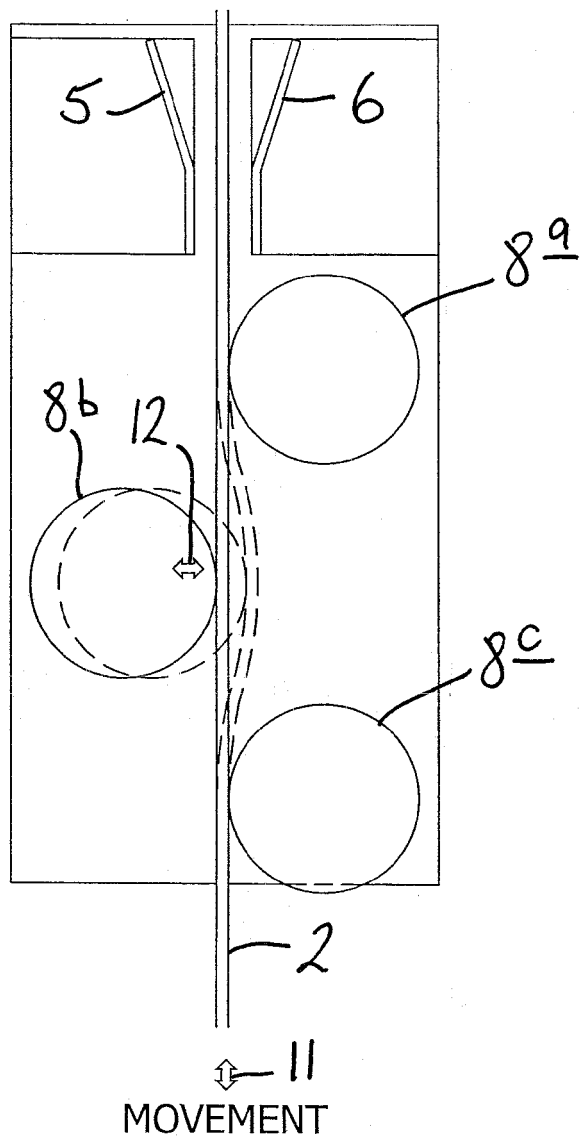
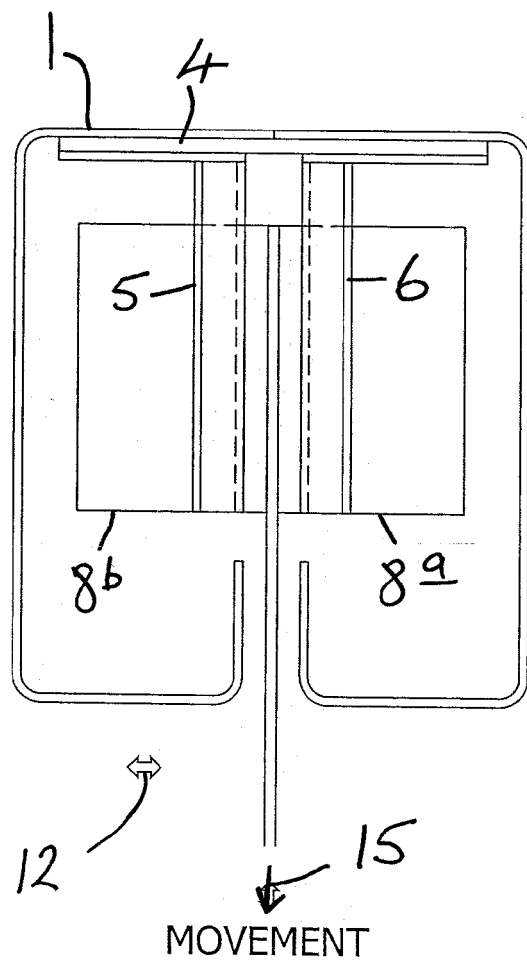


Figure 5



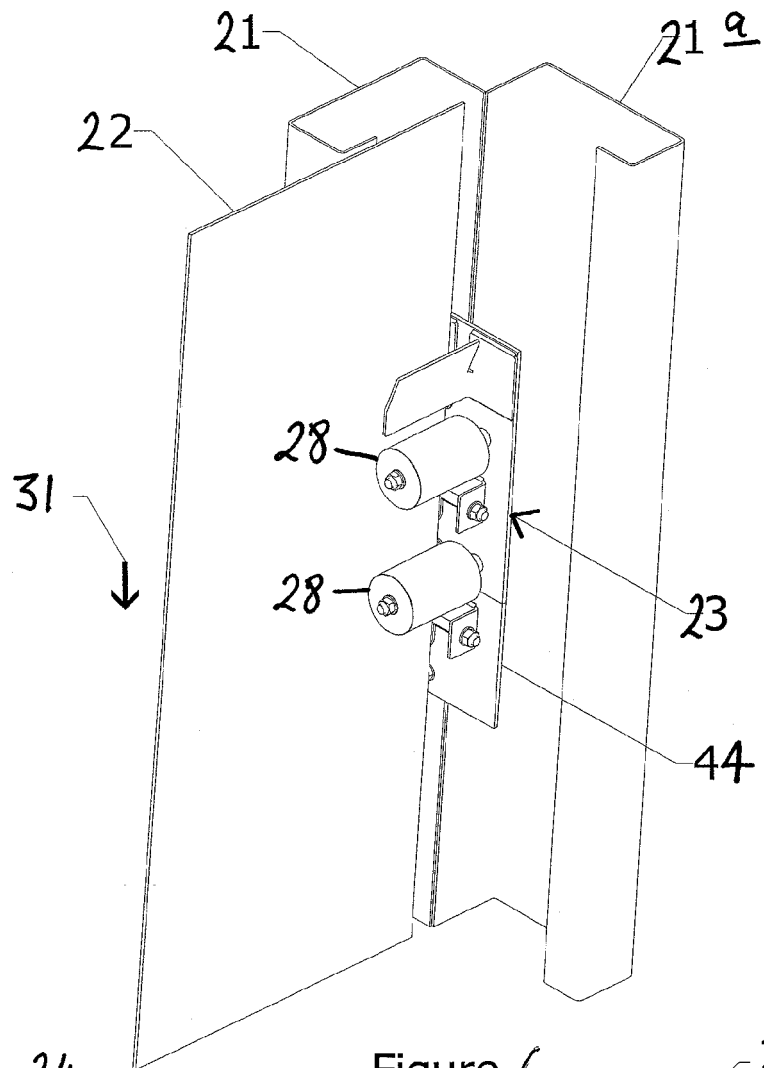


Figure 6

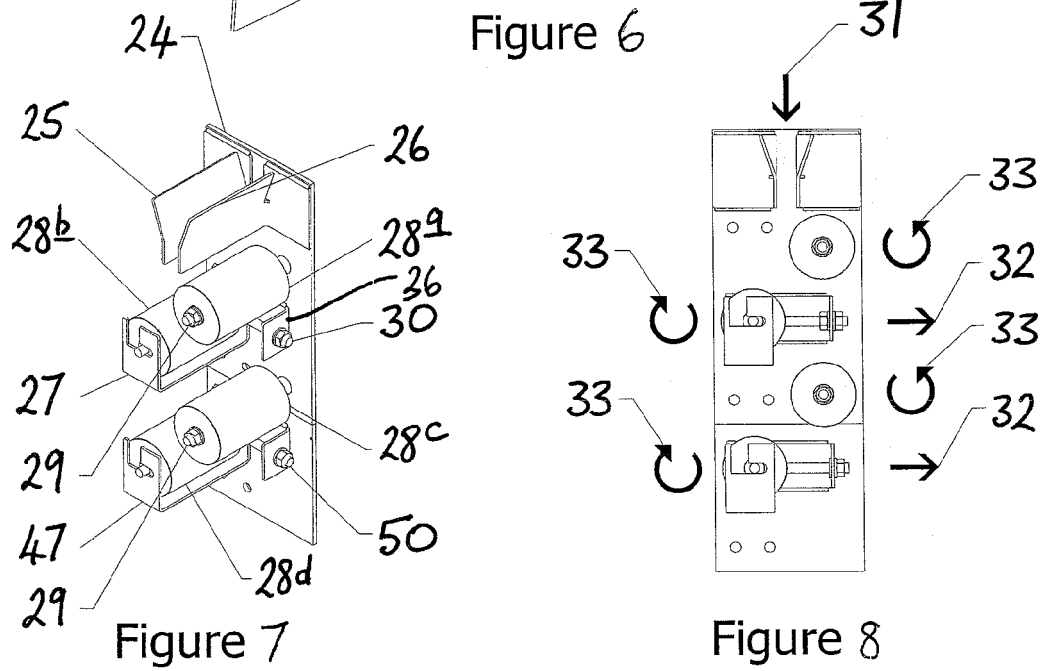


Figure 7

Figure 8

Figure 9

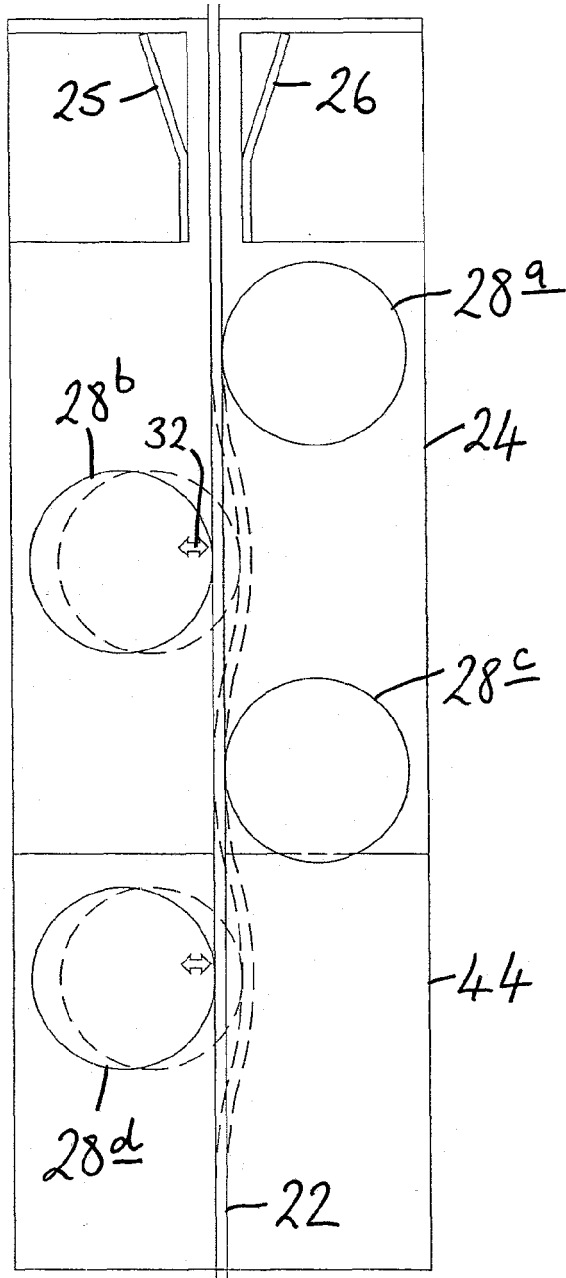
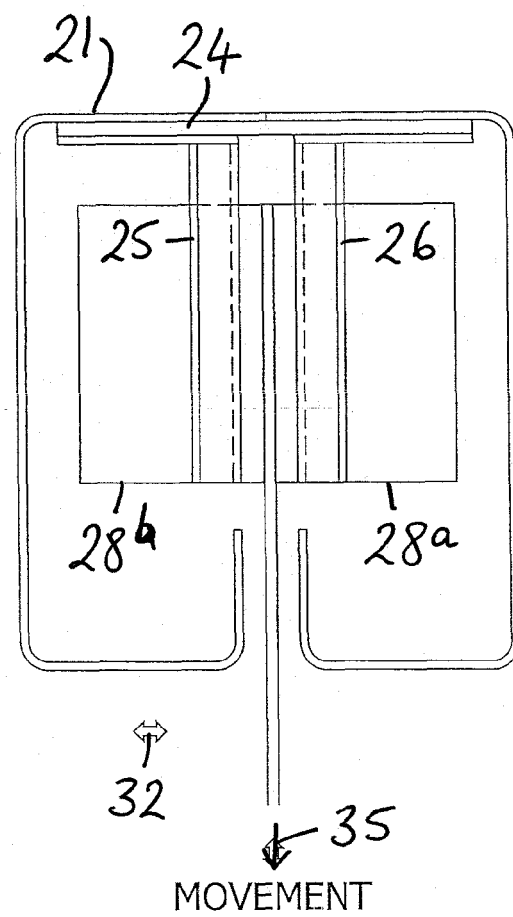


Figure 10



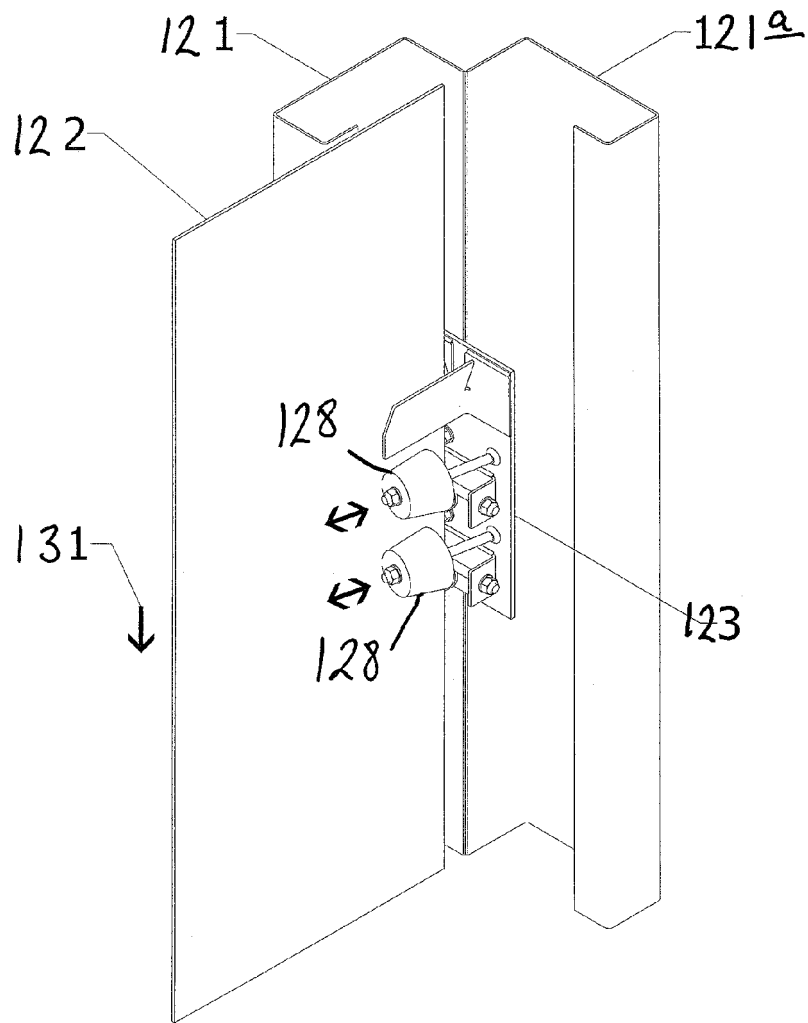


Figure 11

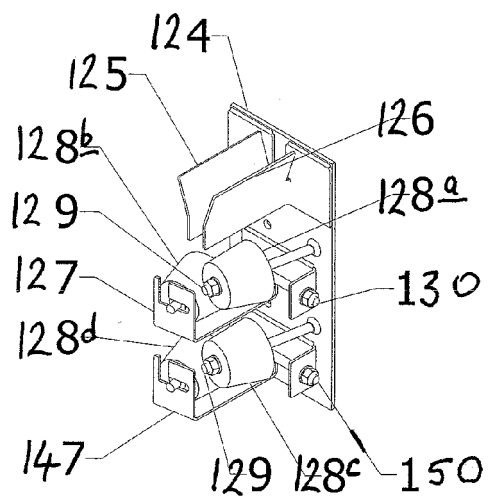


Figure 12

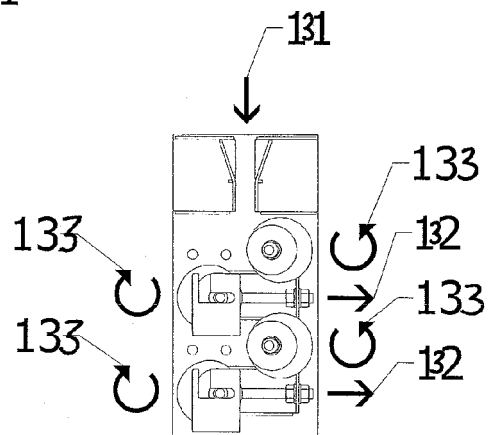


Figure 13

Figure 14

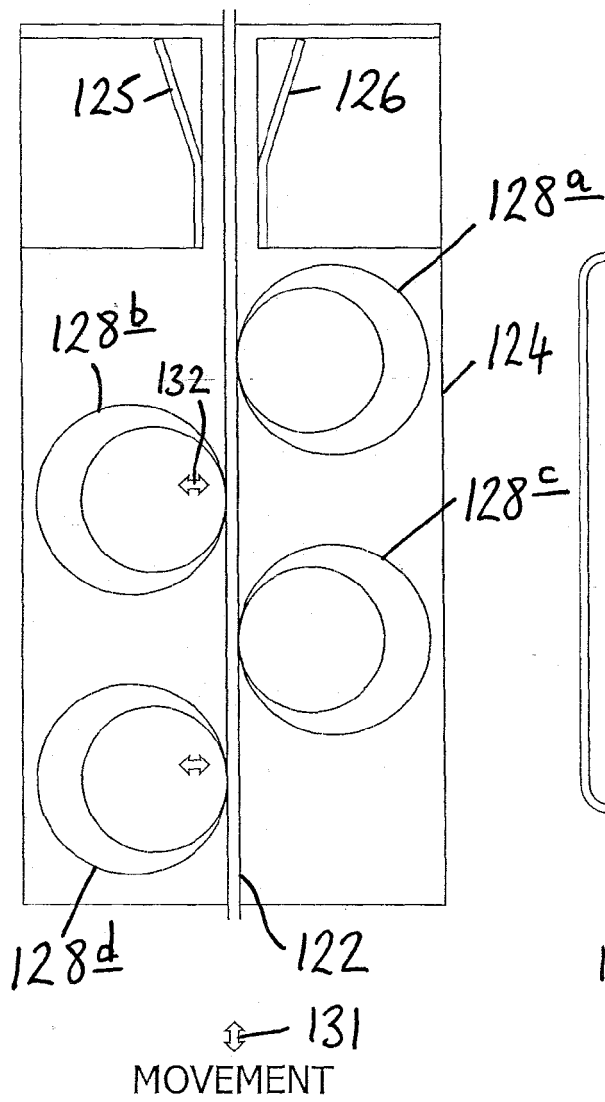


Figure 15

