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(54) **Unfolding mechanism and collapsible information carrier**

(57) The subject matter of this patent application is an unfolding mechanism (1) for collapsible information carriers (13) having side working elements, comprising fastening elements for joining the mechanism (1) with information carrier (13), engaging elements, wherein the engaging elements are joined with each other by means of at least one resilient element (8), characterised by that

the engaging elements are distant from fastening elements, wherein between the fastening elements and engaging elements there is an adjustment area of fixed length, while between the engaging elements there is an adjustment area (a) of variable length.

The subject matter of this patent application is also an information carrier (13) that uses such unfolding mechanism (1).

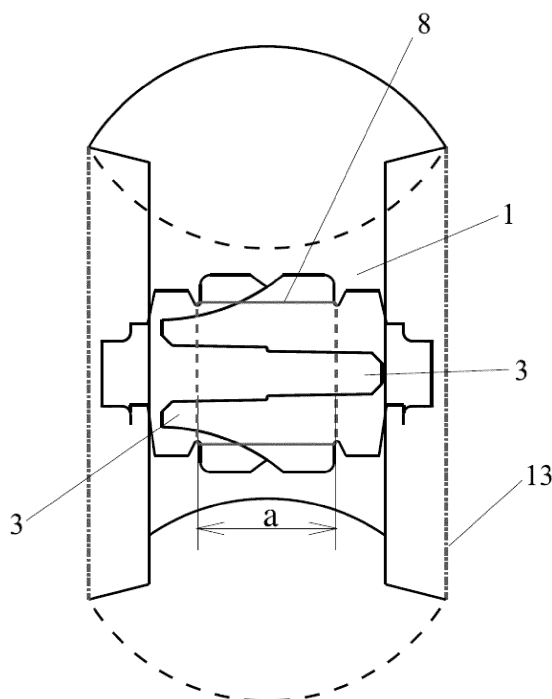


FIG. 5

Description

[0001] The subject of this invention is an unfolding mechanism and a collapsible information carrier.

[0002] The invention concerns an unfolding mechanism designed for use in collapsible information carriers. Information carriers are intended to provide an advertising or promotional information at points of sale, meeting halls and other public places where showing a suitable information to an audience is essential.

[0003] Standing information carriers having a bent exhibition surface are known from the prior art, whereas these information carriers after being transported to the exhibition place have to be unfolded by suitably trained personnel. Such standing information carrier is described in the U.S. patent no. 6,347,772. In this information carrier a single exhibition surface is curved due to effect of elasticity force of an elastic element mounted on the stand's rear panel. In this case the unfolding mechanism consists in using a rubber loop visible on the rear panel of the column during normal use of this carrier. To make a stand with two curved display surfaces, the double structure consisting of two single stands according to the U.S. patent no. 6,347,772 standing back to back must be used.

[0004] From the Polish patent no. PL 202 688 a standing information carrier is known that contains at least one sheet of rigid and bend material, resilient tapes for bending this sheet and elements for maintaining it in bent configuration that counteract the effect of resilient tapes. The elements counteracting the effect of resilient tapes are numerous separate belts spaced at some intervals along the display side, and preferably their length is smaller than the width of the display side. The mechanism described in the above cited document is relatively complicated for manufacturing and is difficult to use; moreover, in case of damage of the resilient tapes the stand folds itself and stops to fulfil its function.

[0005] The subject matter of the invention is the unfolding mechanism for collapsible information carriers, comprising the side working elements having fastening elements for connection of the mechanism with the information carrier, engaging elements where the engaging elements are connected together by means of at least one resilient element characterised by that the engaging elements are distant from the fastening elements. Between the fastening elements and the engaging elements there is an adjustment area of fixed length, while between the engaging elements there is a compensation area of variable length.

[0006] Preferably, the mechanism according to the invention is additionally characterised by the side working elements provided with the positioning means in the mechanism compensation area, which determine reciprocal position of cooperating with each other working elements.

[0007] Furthermore, the mechanism according to the invention is characterised by that it contains a central working element placed between the side working ele-

ments, and is equipped with the positioning means that cooperate with the positioning means of the side working elements.

[0008] Furthermore, the mechanism according to the invention is characterised by that the central working element further contains additional engaging elements, between which there is a central adjustment area of fixed length, and additionally the engaging elements of the side working elements are connected by means of at least one resilient element with additional engaging element of the central working element.

[0009] Furthermore, the mechanism according to the invention is characterised by that it contains many central working elements that cooperate with each other and with side working elements respectively.

[0010] Furthermore, the mechanism according to the invention is characterised by that the positioning elements have the shape of teeth cooperating with each other which are placed within the compensation area.

[0011] Furthermore, the mechanism according to the invention is characterised by that the working elements are made of materials of rigidity that enables reciprocal locking of positioning elements, in particular made of cardboard, corrugated board or solid board.

[0012] Furthermore, the mechanism according to the invention is characterised by that the length of the resilient element is such that the mechanism's length in expanded configuration corresponds to the information carrier's length in the contracted configuration, and mechanism's length in folded configuration is shorter than the information carrier's width in the folded configuration.

[0013] Furthermore, the mechanism according to this invention is characterised by that the resilient element is in a form of the elastic loop or set of elastic loops or elastic tapes.

[0014] Furthermore, the invention's subject matter is also the collapsible information carrier that contains the mechanism according to the invention.

[0015] Advantage of the mechanism according to the invention is its simple structure which facilitates considerably assembling of the collapsible information carrier at last stages of its manufacturing, what decreases considerably production costs of the mechanism compared with solutions known from the prior art.

[0016] Another advantage of the mechanism is its easy dismantling and lack of its negative impact on the environment. Only cardboard and elastic loops may be used for production of the mechanism, what makes the unfolding mechanism as well as the collapsible information carrier easy to recycle and not pollute the environment.

[0017] Another advantage of the mechanism in the preferable embodiment is its resistance to a breakage of the resilient element. Due to the use of positioning means, the collapsible information carrier keeps its unfolded shape even in case of a breakage of the resilient element.

[0018] The subject of this invention in preferable embodiments is shown in the drawing, wherein:

Fig. 1 shows the unfolding mechanism in first embodiment, in unfolded configuration;

Fig. 2 shows the unfolding mechanism in first embodiment, in folded configuration;

Fig. 3 shows the side working element of the unfolding mechanism;

Fig. 4 shows one surface of the collapsible information carrier with fastened unfolding mechanism in unfolded configuration;

Fig. 5 shows the unfolded information carrier with unfolding mechanism in folded configuration;

Fig. 6a shows the central working element of the unfolding mechanism in second embodiment;

Fig. 6b shows the unfolding mechanism in expanded configuration in second embodiment;

Fig. 6c shows the unfolding mechanism in contracted configuration;

Fig. 7a shows the folded collapsible information carrier;

Fig. 7b shows the partially unfolded collapsible information carrier;

Fig. 7c shows the unfolded collapsible information carrier;

Fig. 8a shows a partial section of the folded collapsible information carrier with the unfolding mechanism in expanded configuration;

Fig. 8b shows a partial section of the unfolded collapsible information carrier with the unfolding mechanism in contracted configuration;

Fig. 8c shows a section of the unfolded collapsible information carrier with two unfolding mechanisms in contracted configuration.

[0019] Figures 1 and 2 show the unfolding mechanism 1 for collapsible information carriers 13 that consists of generally two side working elements 2 made of cardboard, corrugated board or solid board and joined with each other by means of the resilient element 8. Each of side working elements 2 has positioning means 3 in a form of teeth 4 disposed within the compensation zone **a**. Furthermore, it is provided with two opposite engaging elements 5, the adjustment area 6 with determined length and the fastening element 7. The side working elements 2 are positioned relative to each other in such a manner that the teeth 4 are placed opposite each other and when the side working elements 2 are shifted towards centre of the compensation zone **a**, they overlap (their teeth interpenetrate), while the fastening elements 7 intended for joining the mechanism 1 with the collapsible information carrier 13 are on the opposite ends of the unfolding mechanism 1. Furthermore, on the engaging elements 5, having a form of triangular cut-out located between the positioning means 3 and the adjustment area 6, the resilient element 8 is disposed having a form of elastic loop of such a length, that length of the mechanism 1 in expanded configuration (Fig 1) corresponds to width of the collapsible information carrier 13 in folded configuration (Fig. 4), and length of the mechanism 1 in contracted

configuration (Fig 2) is shorter than width of the collapsible information carrier 13 in folded configuration (Fig. 4).

[0020] It should be noticed that the engaging elements 5 do not have to be in a form of symmetrically spaced triangular cut-outs, but may have, for example, form of a centrally placed cut-out, generally, the engaging elements 5 are intended for fastening the resilient element 8, and so their type will correspond with the type of resilient element 8 used.

[0021] Furthermore, it should be noticed that the fastening elements 7 may have a shape of tongues of a tongue- and- groove joint cooperating with cut- outs made in fastening areas of the collapsible information carrier 13, however, the fastening elements 7 may have other shape that enables to fasten the mechanism 1. For fastening the mechanism 1 a glued or welded joints can be used, as well as staples, etc.

[0022] The unfolding mechanism 1 generally is made of cardboard, corrugated board or solid board. The display surfaces 14 of the collapsible information carrier 13 must have some flexibility, while elements of the unfolding mechanism 1 should be rigid, for example they can be made of 1.5 mm to 4 mm thick cardboard with a basis weight from 300 g/m² to 550 g/m² or of cardboard with the basis weight from 350 g/m² to 600 g/m².

[0023] The mechanism 1 is in expanded configuration when the collapsible information carrier 13 is folded and leaves the last stage of production. Energy stored in tensioned resilient element 8 will be used for automatic unfolding of the collapsible information carrier 13 without the need to use additional tools at the exhibition place, and in a preferred embodiment, for locking the positioning means 3 that determine position of the mechanism 1 in contracted configuration, and thereby the collapsible information carrier 13 in unfolded configuration.

[0024] Fig. 3 shows the single side working element 2 of the unfolding mechanism 1 according to preferable embodiment. In Fig. 3 the fastening elements 7 and the engaging elements 5, the adjustment area 6 as well as positioning means 3 in the form of teeth 4 are visible. The positioning means 3 may have also other form, generally of any elements that wedge with each other, like a single cut-out, or a series of cut-outs, which will cooperate with analogous cut-outs on the second part of the unfolding mechanism, or have a form of a multi-finger teeth systems of various shapes.

[0025] Fig. 4 and 5 shows the single-segment information carrier 13 in folded configuration (transport) and in unfolded configuration (working) respectively. For better understanding of principle of operation of the unfolding mechanism 1 the walls of the information carrier 13 in fig. 4 and 5 are presented schematically, only by their outline, so that the unfolding mechanism 1 is visible. In normal operational conditions the unfolding mechanism 1 is not visible because walls of the information carrier 13 are not transparent; they are covered by displayed information.

[0026] Fig. 4 shows the information carrier 13 in folded

configuration (transport) equipped with the unfolding mechanism 1 according to the first embodiment of the invention. In this configuration the resilient element 8 is tautened and stores energy necessary for unfolding the information carrier. The length of the compensation area **a**, is maximal in this configuration, the tautness stress of the resilient element 8 is also maximal.

[0027] Fig. 5 shows the information carrier 13 from fig. 4 in unfolded configuration (working). Unfolding of the information carrier 13 consists in taking it out from a transportation packaging (not shown) and in case of single-segment information carrier, the information carrier 13 unfolds automatically, as energy stored in the resilient element 8 is released having no resistance from the packaging and the resilient element 8 shortens its length and shortens simultaneously length of the compensation area **a**. The release of energy makes that two display surfaces 14 bend outwards and the positioning means 3 of the working elements 2 of the unfolding mechanism 1 come into contact. At final stage of motion the positioning means 3 overlap and lock with each other and the mechanism 1 is determined in contracted configuration, thereby the unfolded configuration (working) of the information carrier 13 is fixed.

[0028] To enable using of the unfolding mechanism 1 in information carriers of different sizes the side, working element 2 according to the invention is equipped with the adjustment area 6, which length is selected depending on the information carrier's length. Such location of the adjustment area 6 enables to preserve standard size of the compensation area **a** and standard length of the resilient element 8 of the information carrier of a specific kind. Certainly, in case of considerable changes of width the standard length of the compensation area **a** may be insufficient to achieve suitable curve of the display surfaces and for this reason a series of sizes of unfolding mechanisms is planned which will be matched with sizes of the information carriers.

[0029] During the research work, it was unexpectedly noticed that locking of the positioning means 3 is so strong that even potentially possible damage of the resilient element 8 does not change the shape of the information carrier 13. Friction forces acting between the positioning means 3 are enough to overcome elasticity force of the display surfaces that tries to detach the locked teeth 4 of the positioning means 3, and due to this fact the information carrier 13 keeps its shape even in situation when the resilient element 8 is damaged.

[0030] Fig. 6b and Fig. 6c show second embodiment of the unfolding mechanism according to the invention. This embodiment differs from the first one in that additional central working element 9 is used, which structure is shown in Fig. 6a. The mechanism 12 in Fig. 6b is shown in expanded configuration, while Fig. 6c shows mechanism 12 in contracted configuration. Due to use of central working element 9, a double compensation area **a** is introduced, the length of which is increased compared with the first embodiment; moreover, additional central ad-

justment area 11 was obtained. The central working element 9 is disposed between the side working elements 2 and it is equipped with the positioning means 3a in a form of teeth 4a that cooperate with the positioning means 3 of the side working elements 2. The central working element 9 furthermore contains additional engaging elements 10 between which the central adjustment area 11 of fixed length is placed. This central adjustment area 11 increases considerably range of permissible lengths of the mechanism 12 without the need to use too long resilient elements 8. Moreover, the engaging elements 5 of each side working element 2 are joined by means of resilient element 8, with additional engaging elements 10 of the central working element 9.

[0031] Figs. 7a, 7b, 7c, 8a, 8b and 8c show application of a set of unfolding mechanisms in case of the multi-segment information carriers. The multi-segment information carriers enable to create an information carrier of needed height. Figures 7a, 7b, 7c, 8a, 8b and 8c show a three segment information carrier 13 that uses two unfolding mechanisms 1 according to the invention.

[0032] The multi-segment information carrier 13 is built from the segments 15 joined by common edge 16, and can be made from a single sheet of cardboard, which was suitably cut and treated with scoring (cardboard bending), what ensures its later folding in controlled manner along the bending lines.

[0033] Figures 7a, 7b, 7c show consecutive stages of unfolding process of the multi-segment information carrier 13, starting from the stage of initial unfolding shown in fig. 7a, where the whole information carrier 13 has folded shape slightly greater than single segment 15. Next in fig. 7b the stage of initial unfolding is shown when energy stored in resilient elements 8 starts bending the display surfaces 14 of the information carrier 13. At this stage an intervention of personnel is needed because the unfolding mechanism 1 shapes the display surfaces 14, while unfolding of next segments 15 is made manually. Figure 7c shows the information carrier 13 in unfolded configuration (working).

[0034] Figures 8a, 8b and 8c show the information carrier 13 with exposed unfolding mechanism 1, where individual figures show the unfolding mechanism 1 in consecutive configurations. Figure 8a shows the unfolding mechanism 1 in expanded configuration, while fig. 8b and 8c show the unfolding mechanism 1 in contracted configuration and fig. 8c shows a whole inside of the information carrier 13 according to this invention, showing location of the mechanisms 1 in the most upper and most lower segments 15. In other embodiments of the invention it is possible to use mechanisms 1 in each segment 15 as well as many mechanisms 1 in single segment 15, depending on needs and segment size.

[0035] Suitable selection of the compensation area **a** size and adjustment areas 6, 11 sizes and the length of the resilient element 8 enables to obtain the information carrier 13 of various shapes - from slightly convex, lens-like shape to information carrier with circular, semicircu-

lar, quarter circular, rectangular, square, triangular, trapezoidal and rhomboidal cross-section.

Claims

1. An unfolding mechanism for collapsible information carriers comprising side working elements (2) that contain:

fastening elements (7) for joining the mechanism (1) with the information carrier (13), engaging elements (5), wherein the engaging elements (5) are connected between them by means of at least one resilient element (8),

characterised by that

the engaging elements (5) are distant from the fastening elements (7), wherein between the fastening elements (7) and the engaging elements (5) is the adjustment area (6) of fixed length, while between the engaging elements (5) is the adjustment area (a) of a variable length.

2. The mechanism according to claim 1 **characterised by** that the side working elements (2) are equipped with the positioning means (3) within the compensation area (a) of the mechanism (1), which set the reciprocal position of cooperating with each other working elements (2).

3. The mechanism according to claim 1 or 2 **characterised by** that it contains the central working element (9) placed between the side working elements (2), equipped with the positioning means (3a) that cooperate with the positioning means (3) of the side working elements (2).

4. The mechanism according to claim 3 **characterised by** that the central working element (9) furthermore contains additional engaging elements (10) between which there is the adjustment area (11) of fixed length, and the engaging elements (5) of the side working elements (2) are joined by means of at least one resilient element (8) with additional engaging elements (10) of the central working element (9).

5. The mechanism according to claim 4 **characterised by** that it further contains many central working elements (9) that cooperate with each other and with side working elements (2) respectively.

6. The mechanism according to any of claims 2 or 5 **characterised by** that the positioning elements (3, 3a) have a shape of cooperating teeth (4, 4a) placed in the compensation area (a).

7. The mechanism according to any of claims from 1 to 6 **characterised by** that the working elements (2, 9) are made of materials of suitable rigidity that enables reciprocal locking of the positioning means (3, 3a), in particular made of cardboard, corrugated board or solid board.

8. The mechanism according to any of claims from 1 to 7 **characterised by** that the length of the resilient element (8) is such that the length of the mechanism (1) in expanded configuration corresponds to the width of the information carrier (13) in folded configuration, and the length of the mechanism (1) in contracted configuration is shorter than the width of the information carrier (13) in folded configuration.

9. The mechanism according to any of claims from 1 to 8 **characterised by** that the resilient element (8) is an elastic loop or set of elastic loops or elastic tapes.

10. The collapsible information carrier containing the mechanism (1, 12) according to any of claims from 1 to 9.

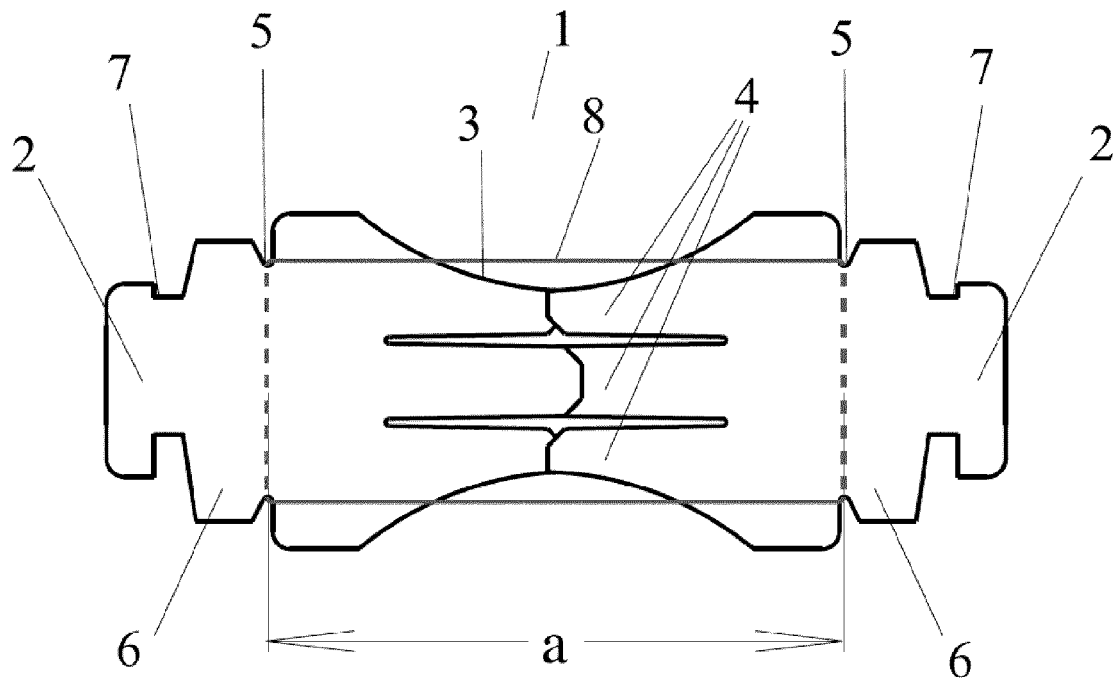


FIG. 1

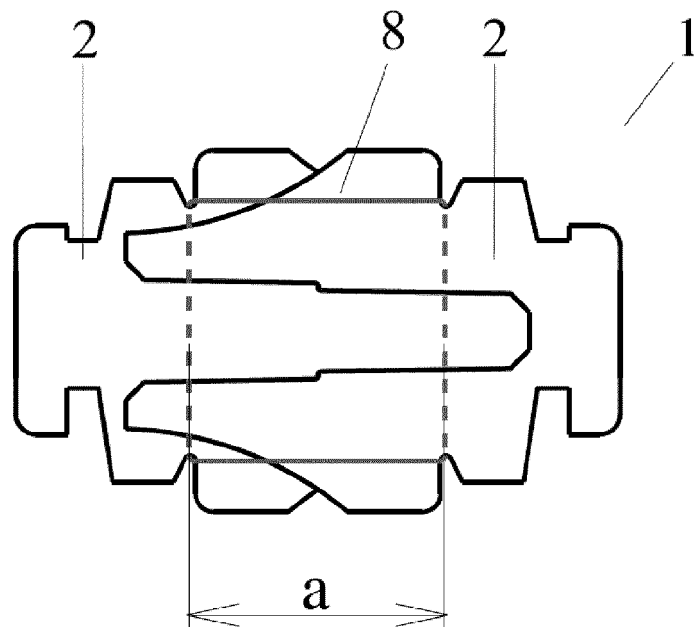


FIG. 2

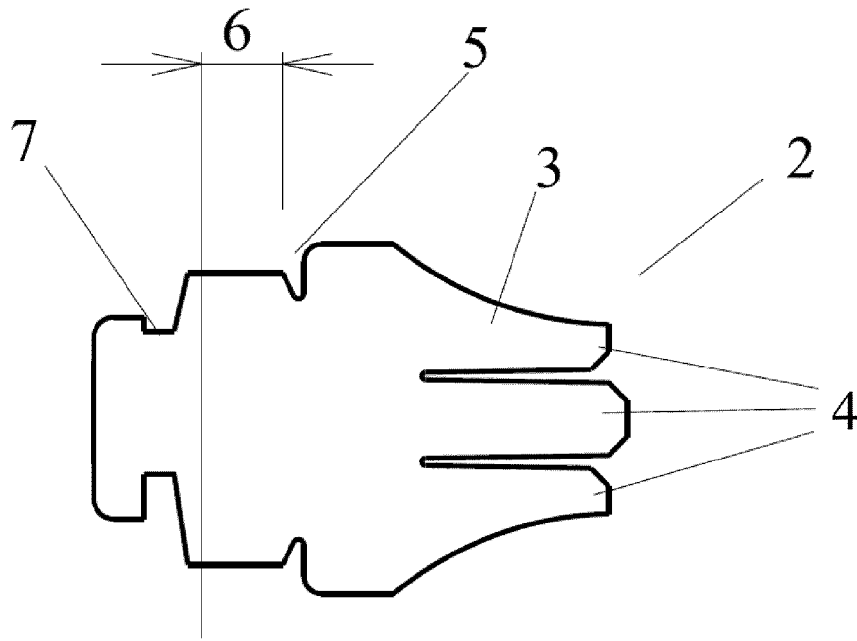


FIG. 3

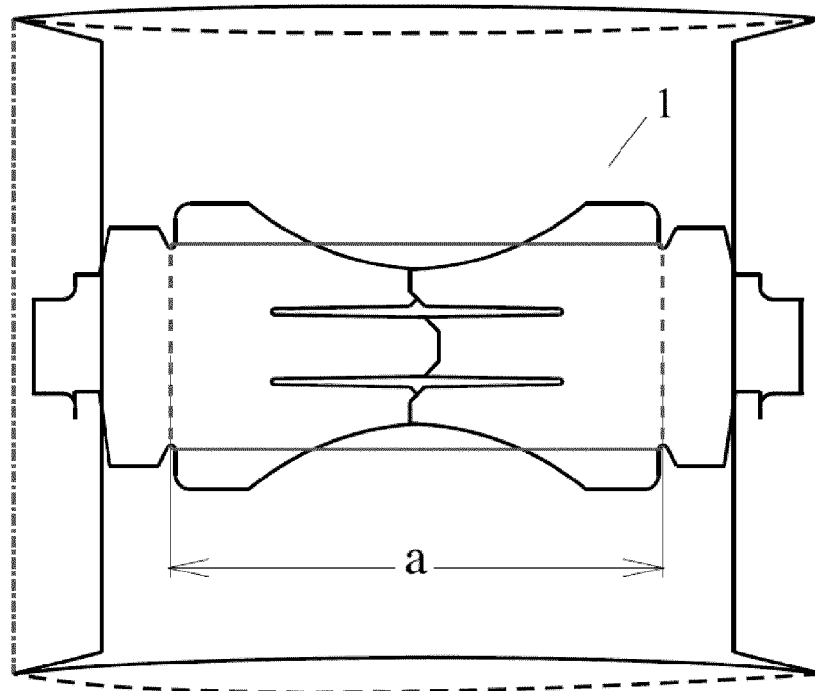


FIG. 4

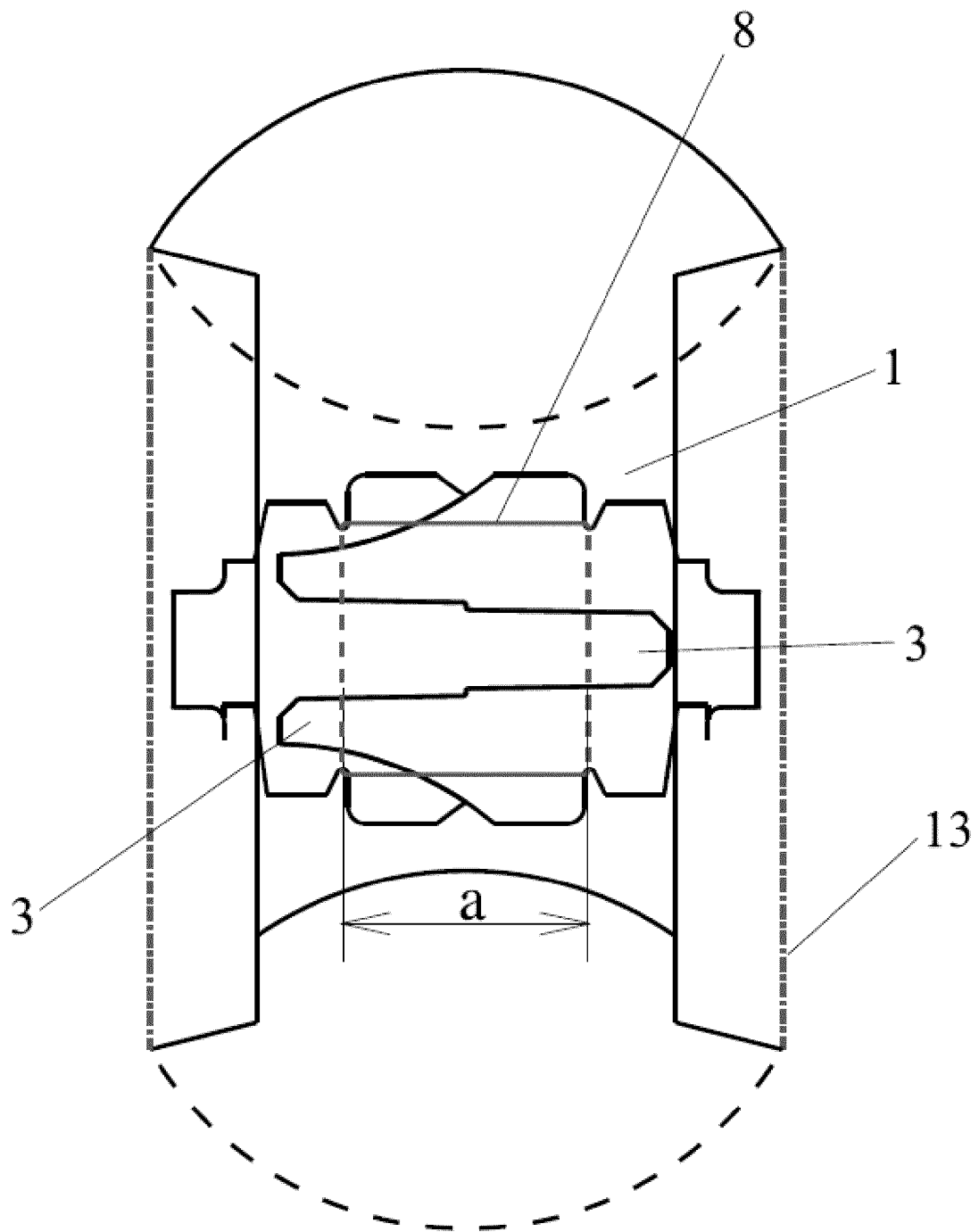


FIG. 5

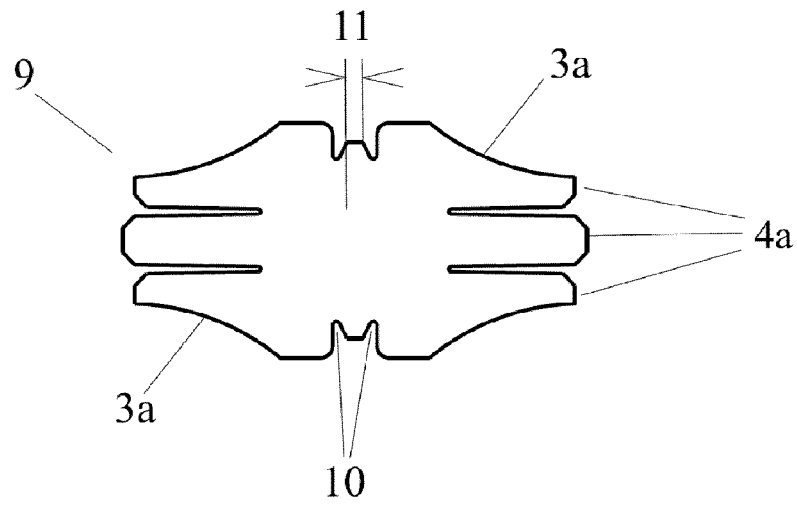


FIG. 6a

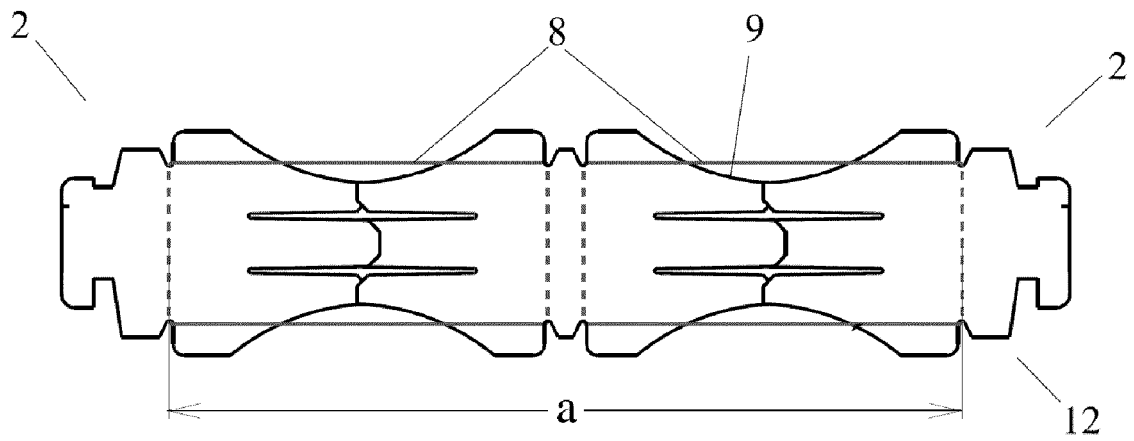


FIG. 6b

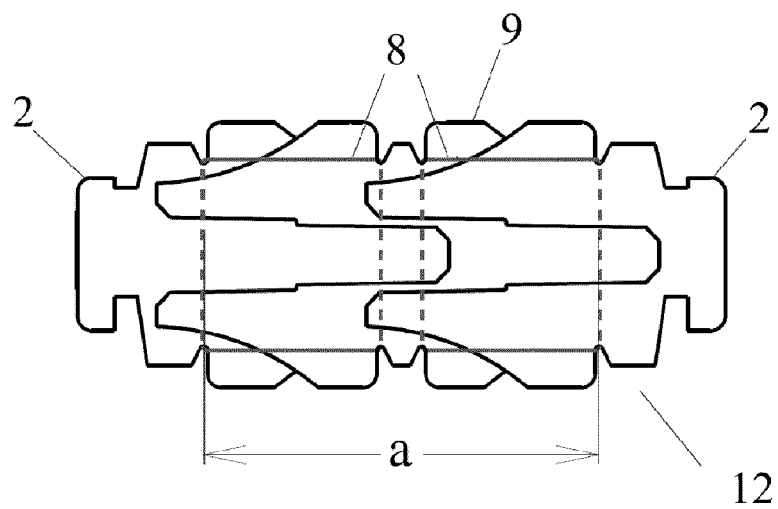


FIG. 6c

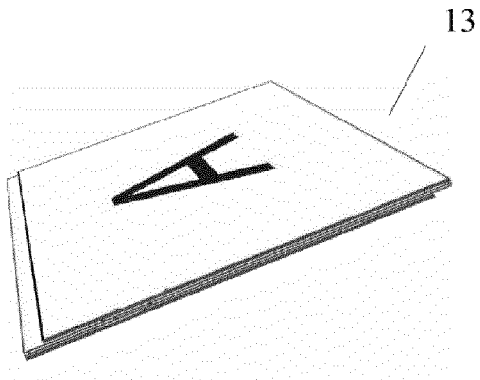


FIG. 7a

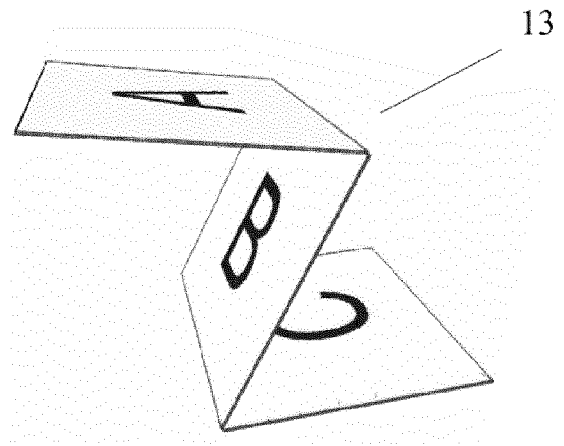


FIG. 7b

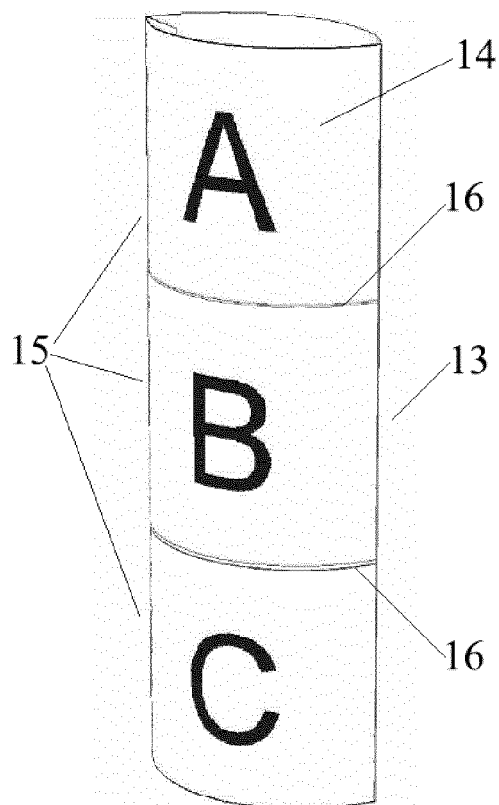


FIG. 7c

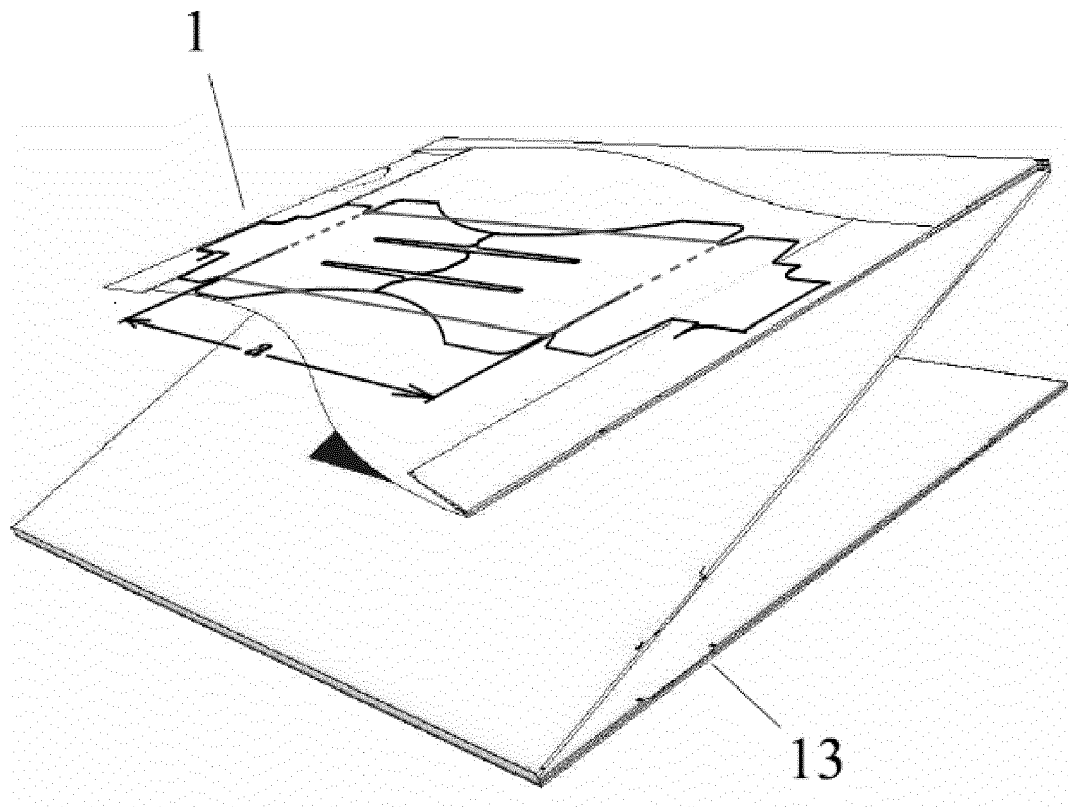


FIG. 8a

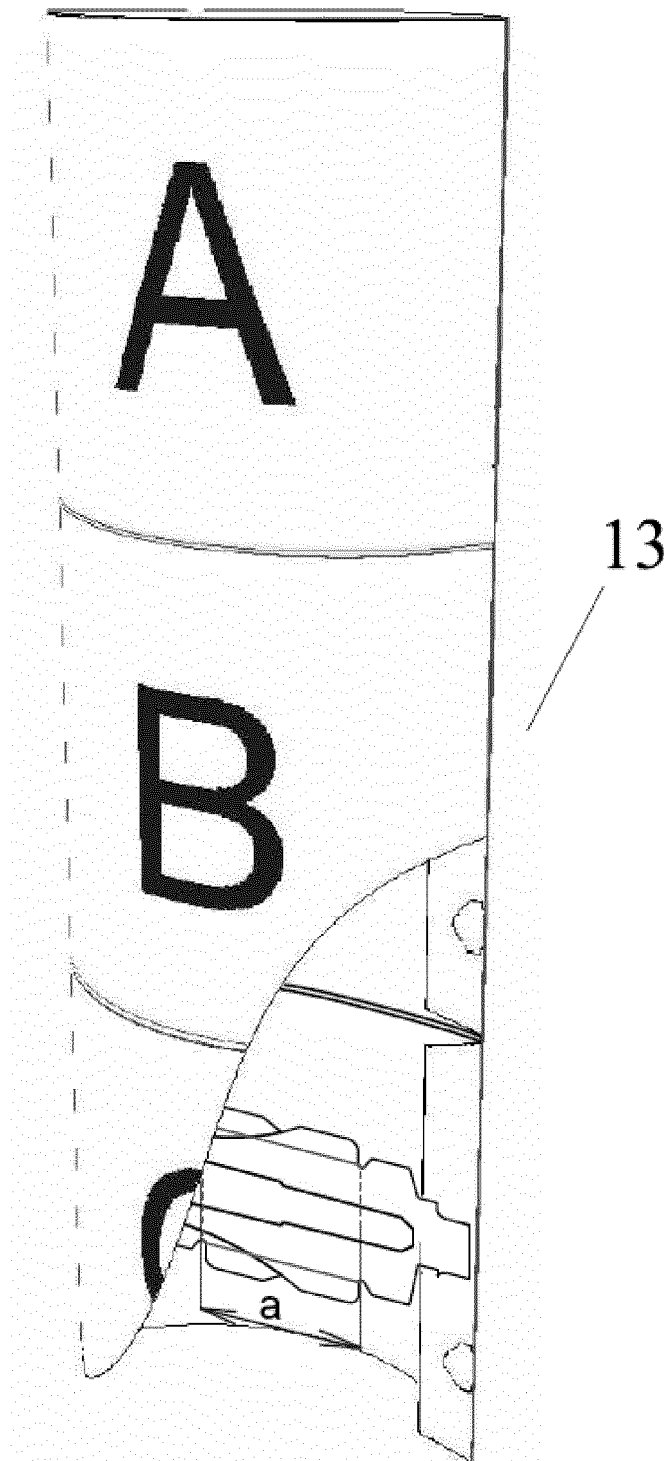


FIG. 8b

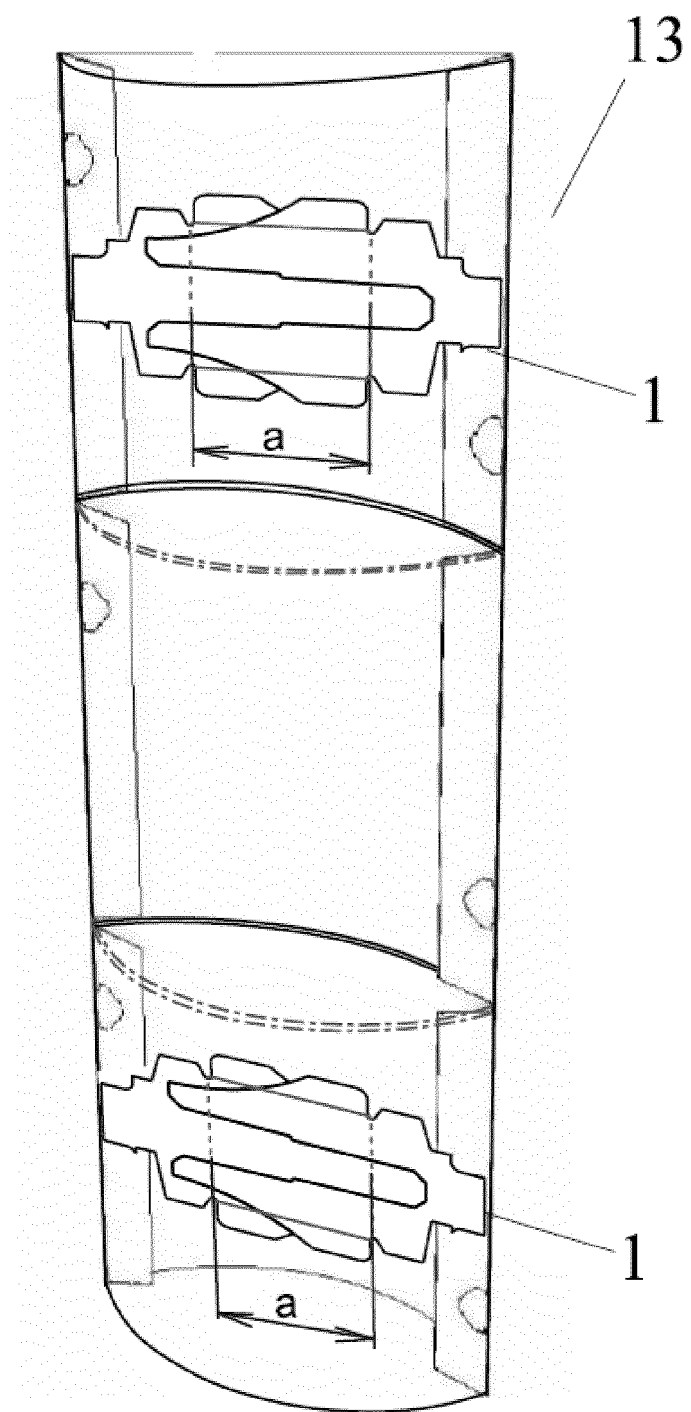


FIG. 8c

REFERENCES CITED IN THE DESCRIPTION

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