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(54) **A disc**

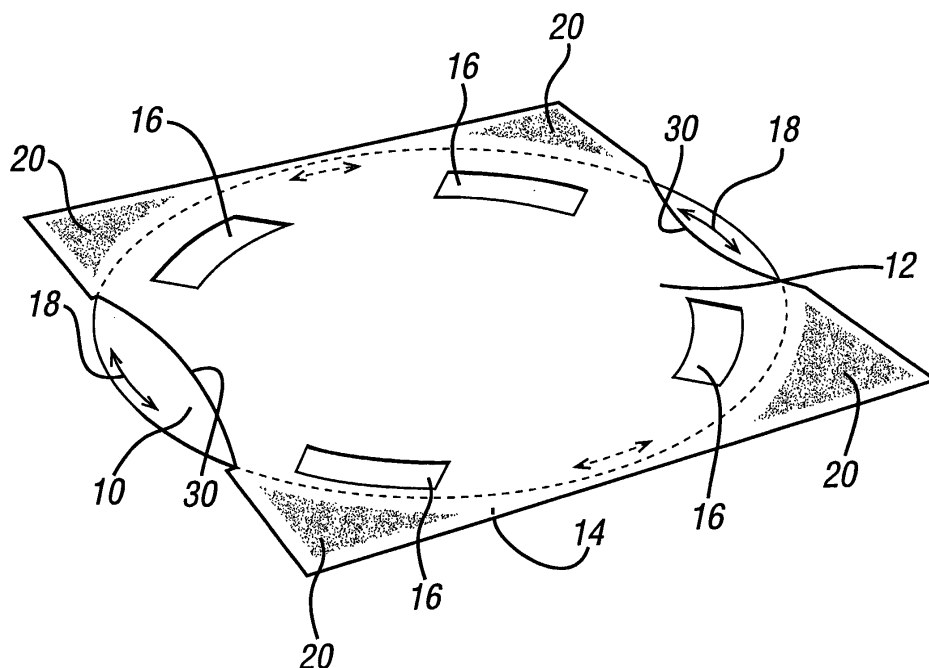
(57) A disc (10) captively mounted between two elements (12,14) for rotation therebetween and a blank (22) and method for manufacturing the same. The disc (10) is attached at a peripheral portion thereof to one of the elements (12,14) by a frangible connection, the breaking of which allows the disc to rotate.

The blank (22) is in the form of a single piece, three portion (40,42,44) foldable sheet. The first portion (40)

forms a front element (12), a second portion (42) forms a back element (14) and a third portion (44) comprises the disc (10) frangibly connected to two spacer portions (24).

The blank is folded so that the third portion (44) overlies the second portion (42) and again so that the first portion (40) overlies the third portion (44). The folded blank (22) is glued together at the spacer portions (24).

FIG. 1



## Description

**[0001]** The present invention relates to a disc captively mounted between two outer elements for rotation therebetween.

**[0002]** Discs mounted for rotation between two outer elements are well known. For example, one or more windows can be provided in at least one of the outer elements so that printed matter appropriately positioned on the disc can be selectively read. Rotation of the disc will then permit additional data to be read.

**[0003]** Typically, such discs are mounted by a metal rivet or spindle for rotation relative to the outer elements. However, recent developments have overcome the need for the rivet or spindle to be in the form of a metal piece.

**[0004]** In European Patent Application No. EP-A-0593820 one or both of the two outer elements are embossed so as to form a spindle about which a disc provided with a hole in the center thereof can rotate. The two elements are glued together at the embossment with the disc sandwiched between the two elements.

**[0005]** In PCT Patent Application No. WO 94/72270, there is disclosed a frangibly releasable circular cut-out spindle provided in the central area of a disc for rotation relative to the outer portion of the disc. This cut-out portion is glued to the outer elements.

**[0006]** In the above PCT Patent Application there is also disclosed in a second embodiment the formation of a rotatable disc from a single flat cardboard blank. The blank has three sections adapted for folding about two parallel fold lines. A first end section forms the disc section and has at its central portion a frangibly releasable circular portion for providing the spindle of the finished item. The remaining two sections form the outer elements and are folded about the disc section so as to sandwich the disc section therebetween. The three sections are glued together by the application of glue to one side of the blank at the middle of the two outer elements and in a ring on the middle section of the blank. Finally, in order for the item thus manufactured to function, the fold portions must be cut away from the folded item and a circular cut must be provided in the middle section, the cut being larger than and concentric with the cut-out spindle, and yet smaller than the ring of glue.

**[0007]** The main advantage of a rotatable disc being provided without a metal rivet is that such products can be used for mail marketing without the risk of, for example, the rivet catching on the edge of an envelope or fouling in a mail sorting machine. However, the disadvantage of these prior art solutions is that the disc must be held in its central portion by glue or the embossments. Therefore windows or apertures in the outer elements can only be positioned away from this central area.

**[0008]** Accordingly, it is an aim of the present invention to provide a disc rotatably mounted between two elements which requires no gluing, embossing, riveting

or the like at the central portion thereof thereby allowing unlimited use of the whole area of the disc for displaying information printed thereon.

**[0009]** A first aspect of the present invention is a disc captively mounted between two elements for rotation therebetween, wherein the disc is attached at a peripheral portion thereof to one of the elements by a frangible connection, the breaking of which allows the disc to rotate.

**[0010]** Preferably, the disc is fully circular so that the disc may be rotated through a full 360°C and the disc and two elements are formed from a single cardboard blank.

**[0011]** The two elements may be rectangular and linked together about the corners of the rectangles. One or both of the elements may form an outer surface of a larger item.

**[0012]** One or both of the two elements may be provided with windows for selectively reading information printed on the disc. The windows may be wholly or partially cut-out from the elements. Partially cut-out windows may be frangibly releasable and removed from the elements by the end user.

**[0013]** Part of the periphery of the disc may extend outwardly from the extremity of one or both of the elements, for example for allowing a user to grip the disc for rotation thereof.

**[0014]** Preferably the two elements form an envelope for the disc.

**[0015]** The two elements may be joined together by gluing, embossing, stapling, stamping or taping them together. In addition, the elements could be formed from a single folded sheet of cardboard or plastic. An intermediate spacing piece may be fitted between the two elements to facilitate smooth rotation of the disc between the elements.

**[0016]** Since there need not be a rivet or a spindle in the central or any other part of the disc, windows can be formed on any part of the outer elements, including over the central area of the disc. Therefore a window of any desired shape can be provided. The window can overlie the central portion of the disc. A plurality of second windows can also be provided. Such windows can be elliptical and can be a single elliptical window together with a plurality of additional windows arranged around the periphery of the disk, the elliptical window being suitable for illustrating accurately the stars in the sky at night, for example; The visible stars on a selected date and time can be depicted at the elliptical window by rotation of the disc relative to the outer elements, so as to select the correct date and time in the appropriate one of the plurality of second windows.

**[0017]** According to a second aspect of the present invention there is provided a method for the production of a disc in accordance with the first aspect of the present invention comprising providing a blank having first, second and third portions foldably connected together, the first and second portions forming outer walls

and the third portion forming a disc and a spacer portion frangibly connected to the disc, folding said third portion to overlie said second portion, folding said first portion to overlie said third portion, and attaching said first portion to said spacer portion.

**[0018]** According to a third aspect of the present invention there is provided a blank for manufacturing a disc in accordance with the first aspect of the present invention.

**[0019]** The present invention shall now be described by way of example with reference to the accompanying drawings in which:

Figure 1 shows a disc in accordance with the present invention; and

Figures 2 to 6 show, in perspective, a blank at various stages of a preferred method of manufacture for the disc.

**[0020]** Figure 1 shows a disc 10 captively held within an envelope formed from two outer elements 12, 14. A first element 12 has cut-out windows 16 provided therein. The disc 10 can be rotated in the direction shown by the arrows 18. Since the disc 10 is wholly circular, the disc 10 may rotate through a full 360° within the envelope.

**[0021]** A preferred method of manufacturing a device of the present invention, and in particular for commercial production of such discs, is to use a blank formed from a single sheet of card. Figures 2 to 6 illustrate such a blank and the various stages during the method of manufacture. The blank comprises a sheet having two fold lines 34, 36 provided thereon defining three portions 40, 42, 44. A first portion 40 defines a back element 14, a second portion 42 defines a front element 12 and a third portion 44 comprises the disc 10 and spacer portions 24. The third portion 44 is foldably connected to the second portion 42 along fold line 34 and the second portion 42 is foldably connected to the first portion 40 along fold line 36. The third portion 44 comprises two spacing portions 24, the disc 10 being frangibly connected to the spacing portions 24 and the spacing portions 24 being foldably connected by fold line 34 to the second portion 42.

**[0022]** The front element 12, formed from second portion 42, has various cut-outs provided therein. There are three forms of cut-outs in this second portion 42. The first type of cut-out is an array of windows 16. The second type of cut-out is an oval shaped window 26 and is particularly suitable for a rotating disc for displaying, for example, the sky at night. The cut-outs may be die-cut from the blank before assembly of the disc, as has been done with the array of windows 16. However the windows may be merely partially cut out for frangible release by the end user, such as has been done with the oval shaped window 26. In order to facilitate the removal of the oval shaped window 26, a finger hole 38 is pro-

vided. This can be pressed from the blank prior to assembly.

**[0023]** The third type of cut-out is a pair of ports 28 through which the rim of the disc 10 extends in the assembled product. With reference to Figure 1, the two ports 28 form arcuate cut outs 30 such as those provided at the edge of the envelope for facilitating gripping of the rotating disc 10 for rotation thereof within the envelope. The ports 28 are optional since in alternative embodiments the rim of the disc 10 may extend beyond at least one edge of the outer elements.

**[0024]** The ports 28 are positioned centrally across the fold lines 34, 36.

**[0025]** As shown in Figure 4, upon folding the third portion 44 over the second portion 42, the disc 10 overlaps the ports 28.

**[0026]** In this preferred embodiment, the first portion 40 of the blank 22 has a similar size and shape to the second portion 42, both being substantially square and the fold lines 34, 36 are arranged parallel to one another. Windows may be provided for viewing data printed on the reverse side of the disc 10.

**[0027]** The steps required to manufacture a disc using the blank 22 involve folding the third portion 44 up and over the second portion 42 so as to overlie the second portion 42 and then folding the first portion 40 up and over the combined second and third portions 42 so as to overlie the third portion 44 thereby captivating the rotating disc 12 between the second portion 42 and the first portion 40.

**[0028]** Two connecting points 32 identified on the first portion 40 are arranged to meet the spacing portions 24 upon folding the first portion 40 over the second and third portions 42, 44. The surfaces of either or both of the connecting points 32 and the spacing portions 24 are provided with an adhesive so that the spacing portions 24 and the connecting points 32 can be pressed together to link them and the elements together to form a first two of four connections between the elements. The hinges formed by the fold line 36 between the first and second portions 40, 42 provide third and fourth connections between the two elements 12, 14, separated by the port 28 positioned across the fold line 36. A minimum of three connections between the two elements 12, 14 could be provided, dependent upon their relative positions around the disc 10.

**[0029]** In order to enable the disc to rotate within the envelope thus formed, it is necessary to fracture the frangible connection between the spacing portions 24 and the rotating disc 10, which should be a simple matter of applying a rotation force to the portions of the rims of the disc 10 which extend through the ports 28. However, during the folding and gluing steps, the frangible connection could be broken by the folding machine. The frangible connection may be in the form of nicks which may be released to some extent during these folding and gluing steps.

**[0030]** Although the blank 22 can be formed and fold-

ed one at a time for producing a low volume of rotating discs, it should be appreciated that in an automated process producing large volumes of these discs, a die cutting machine may operate to process, one after another, entire print sheets, so as to generate arrays of blanks simultaneously. These arrays of blanks may then be fed in continuous manner as a stream of individual blanks to a folding and gluing machine.

**[0031]** Further, the outer elements need not be square, or even rectangular. For example, one or both could be triangular with up to three portions of the rim of the rotatable disc extending beyond the extremities of the triangular outer element.

**[0032]** The present invention has been described above purely by way of example. It should be noted that modifications of detail can be made within the scope of the invention as defined in the claims appended hereto.

## Claims

1. A disc captively mounted between two elements for rotation therebetween, wherein the disc is attached at a peripheral portion thereof to one of the elements by a frangible connection, the breaking of which allows the disc to rotate. 25
2. A disc according to claim 1, wherein the disc is circular. 30
3. A disc according to claim 1 or 2, wherein the disc and two elements are formed from a single cardboard, plastic or paper blank. 35
4. A disc according to claim 1, 2 or 3, wherein the two elements are rectangular and linked together about the corners of the rectangles. 40
5. A disc according to any preceding claim, wherein one or both of the elements form an outer surface of a larger item. 45
6. A disc according to any preceding claim, wherein one or both of the two elements are provided with at least one window. 50
7. A disc according to any preceding claim, wherein part of the periphery of the disc extends outwardly from the extremity of one or both of the elements. 55
8. A disc according to any preceding claim, wherein the two elements form an envelope for the disc.
9. A disc according to any preceding claim, wherein the two elements are jointed together by gluing, embossing, stapling, stamping or taping them together.
10. A disc according to any preceding claim, wherein

an intermediate spacing piece is fitted between the two elements.

11. A disc according to any preceding claim, wherein an elliptical window is provided in an element overlying the central portion of the disc.
12. A disc according to any preceding claim, wherein a plurality of windows are provided in either element.
13. A method for the production of a disc as claimed in claim 3 comprising providing a blank having first, second and third portions foldably connected together, the first and second portions forming outer walls and the third portion forming a disc and a spacer portion frangibly connected to the disc, folding said third portion to overlie said second portion, folding said first portion to overlie said third portion, and attaching said first portion to said spacer portion.
14. A blank for manufacturing a disc according to any one of claims 1 to 12.

FIG. 1

