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(54) Capping and de-capping of plastic bottles.

(57) A plastic bottle (10) has a flange (15) on its neck. A pair of recesses (18) is formed in the flange. Each recess being shaped to be engageable with a stop member (7) on a star wheel (4) when the bottle passes through a capping or de-capping station, to prevent rotation of the bottle and to permit it to be capped or de-capped.

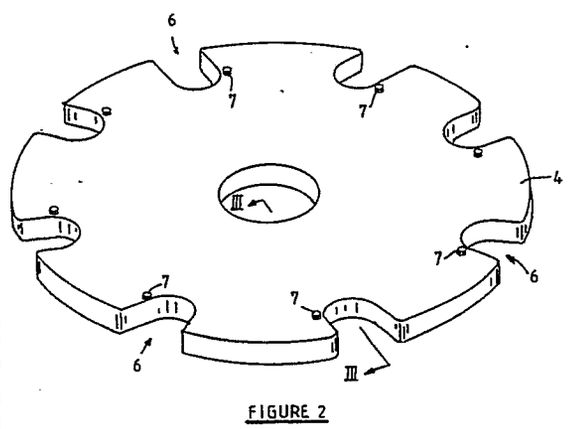

FIGURE 2

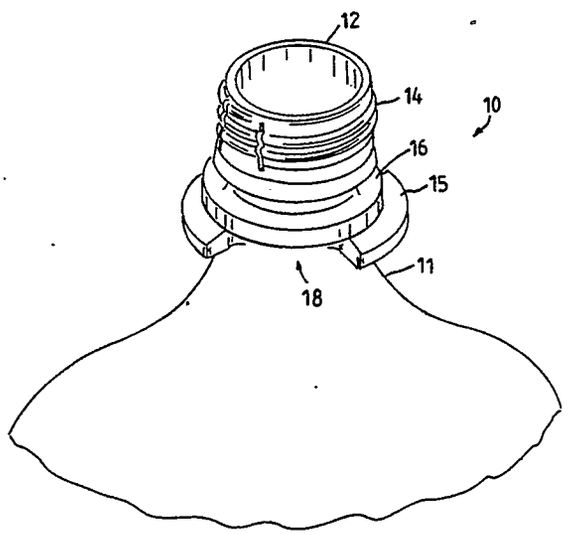

FIGURE 4

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CAPPING AND DECAPPING OF BOTTLES

This invention relates to the capping and de-capping of bottles, more particularly plastic bottles.

Blow moulded or blow formed plastic bottles with volumes of 1,5 or 2 litres have traditionally been used for carbonated beverages as disposable bottles. However, they are today being used as returnable bottles, for economic reasons. Because of their size, bottles of this kind usually have a flange on their necks to facilitate handling of the bottles. These bottles are relatively thin walled and when they are not under pressure they are flexible to lateral forces. This presents a problem in the case of automatic de-capping of the bottles in a de-capping apparatus since the bottles cannot effectively be gripped by strapping in the de-capping apparatus as in the case of glass bottles. Because of the flexibility of plastic bottles to lateral pressure, problems can even be experienced in the capping of such bottles.

It is accordingly an object of the invention to overcome this problem.

A plastic bottle according to the invention which has a flange on its neck is characterized in that a recess is formed in the flange, the recess being shaped to engage a stop member on a star wheel when the bottle passes through a capping or de-capping station to prevent rotation of the bottle and to permit it to be capped or de-capped.

The recess is preferably in the form of a cut-out in the flange extending to the neck of the bottle in a radial direction and extending approximately one quarter of the circumferential length of the flange. The cut-out preferably has radiused ends adapted to trap against the stop member on the star wheel. The recess is preferably one of a pair of diametrically opposed recesses formed in the flange.

The recess may be formed underneath an annular shoulder located on the upper side of the flange.

The invention also concerns capping or de-capping apparatus having a star wheel with a plurality of bottle neck receiving notches provided along its periphery, characterized in that a stop member is provided adjacent each notch which co-operates with a recess in a flange of a plastic bottle as defined above to prevent rotation of the bottle and to permit the bottle to be capped or de-capped.

Each stop member is preferably located to one side of each notch in the star wheel.

Each stop member preferably projects above the upper surface of the star wheel and is spring loaded to enable it to be depressed. Each stop member may be spring loaded by means of a leaf spring mounted on the underside of the star wheel.

The invention further concerns a method of capping or de-capping bottles as defined above comprising the steps of providing a capping or de-capping apparatus as defined above, feeding the bottles into the apparatus so that consecutive bottles engage consecutive notches in the star wheel of the capping or de-capping apparatus, causing consecutive capping or de-capping heads to descend on to the bottles whereby they are rotated until the recess in the flange of each bottle engages the stop member adjacent the notch on the star wheel to trap the bottle against rotation, and completing the capping or de-capping operation.

A preferred embodiment of the invention will now be described by way of example with reference to the accompanying drawings in which :-

Figure 1 is a perspective view broadly illustrating a de-capping apparatus used in de-capping of beverage bottles;

Figure 2 is a perspective view of a star wheel of the apparatus of Figure 1 incorporating a modification in accordance with the invention;

Figure 3 is a section taken on line III-III in Figure 2;

Figures 4 & 5 are a perspective view and elevation respectively of the upper end of a plastic bottle made in accordance with the invention; and

Figures 6 & 7 illustrate the de-capping of a bottle in accordance with the invention.

In Figure 1 there is shown a de-capping apparatus 1 of conventional construction having a bottle receiving star wheel 2 for receiving plastic bottles. From the star wheel 2 the bottles are transferred to a bottle neck receiving star wheel 4. Above the star wheel 4 is a rotating unit carrying de-capping heads 5 which descend sequentially to de-cap the bottles whilst they are engaged with the star wheel 4. This kind of apparatus is well-known and widely used and needs no further elaboration.

Figures 2 and 3 illustrate the star wheel 4 of the apparatus in greater detail and in a form modified in accordance with the invention. The star wheel 4 is in the form of a circular metal disk with a plurality of bottle neck receiving notches 6 along its periphery. On the left hand side of each notch 6 a stop member 7 is provided which projects above the upper surface of the star wheel. Each stop member 7 is in the form of a pin passing through the star wheel and is spring loaded by means of a leaf spring 8 on the underside of the star wheel, permitting the pin to be depressed. Any other form of spring loading may of course be used.

In figures 4 and 5 a bottle 10 is shown which is made in accordance with the invention, for use with

the de-capping apparatus 1. The bottle 10 has a neck 11 terminating in a mouth 12. A threaded finish 14 surrounds the mouth 12. Below the finish 14 a flange 15 is provided on the bottle to facilitate handling thereof. In this embodiment of the invention the flange 15 has an integral shoulder 16 on its upper side which serves the purposes set forth in our South African patent 87/4560. The bottle 10 normally carries a plastic cap 17 (Figure 5).

On the flange 15 two diametrically opposed recesses 18 are formed. Each recess 18 is in the form of a cut-out extending to the neck of the bottle 10 in a radial direction and extending approximately one quarter of the circumferential length of the flange 15.

In use, empty bottles 10 with caps 17 thereon are advanced into the de-capping apparatus 1 along the path indicated by arrow 20 (Figure 1). As a bottle 10 is received by the neck receiving star wheel 4 the flange 15 of the bottle comes to rest on the upper surface of the star wheel 4. It may for example come to rest with the flange 15 positioned as shown in Figure 6. In this position the flange 16 will depress the stop member 7. A de-capping head 5 next descends on to the cap 17 on the bottle, grips it and rotates in an anti-clockwise direction. If the cap is applied to the bottle with sufficient torque the bottle will rotate with the cap. As a result, the flange 15 will clear the stop member 7 which will spring up under the action of the leaf spring 8 and the bottle will continue to rotate until a trailing end 18a of one of the recesses 18 is trapped by the stop member 7 as shown in Figure 7. This will bring the bottle to a halt and the de-capping head will remove the cap 17 from the bottle which will proceed on its way through the de-capping apparatus.

In order to enhance the trapping action against the stop member 7, the ends of the recess 18 are radiused as shown in Figures 6 and 7.

Whilst the invention has been described with reference to a de-capping apparatus 1, it is equally applicable to capping apparatus. However, in the case of capping apparatus, as opposed to de-capping apparatus, the stop members 7 will be provided on the right-hand side of the notches 6 in the bottle neck receiving star wheel 4.

Thus the invention provides a useful means of overcoming exisitng problems with the capping or de-capping of plastic bottles.

Many other embodiments of the invention may be made without departing from the scope of the invention as defined in the appended claims.

Claims

1. A plastic bottle (10) having a flange (15) on its neck (11), characterized in that a recess (18) is formed in the flange, the recess being shaped to engage a stop member (7) on a star wheel (4) when the bottle passes through a capping or de-capping station to prevent rotation of the bottle and to permit it to be capped or de-capped.

2. A bottle as claimed in claim 1 in which the recess (18) is in the form of a cut-out in the flange (15) extending to the neck (11) of the bottle in a radial direction and extending approximately one quarter of the circumferential length of the flange.

3. A bottle as claimed in claim 2 in which the cut-out has radiused ends (18a) adapted to trap against the stop member (7) on the star wheel (4).

4. A bottle as claimed in any one of the preceding claims in which the recess is one of a pair of diametrically opposed recesses formed in the flange.

5. A bottle as claimed in any one of the preceding claims in which the recess (18) is formed underneath an annular shoulder (16) located on the upper side of the flange (15).

6. Capping or de-capping apparatus having a star wheel (4) with a plurality of bottle neck receiving notches (6) provided along its periphery, characterized in that a stop member (7) is provided adjacent each notch (6) which co-operates with a recess (18) in a flange (15) of a plastic bottle (10) as defined in any one of the preceding claims to prevent rotation of the bottle and to permit the bottle to be capped or de-capped.

7. Apparatus as claimed in claim 6 in which each stop member (7) is located to one side of each notch (6) in the star wheel.

8. Apparatus as claimed in claim 6 or claim 7 in which each stop member (7), projects above the upper surface of the star wheel and is spring loaded to enable it to be depressed.

9. Apparatus as claimed in claim 8 in which each stop member (7) is spring loaded by means of a leaf spring (8) mounted on the underside of the star wheel (4).

10. A method of capping or de-capping a bottle (10) as claimed in any one of claims 1 to 5 comprising the steps of providing capping or de-capping apparatus as claimed in any one of claims 6 to 9, feeding a plurality of such bottles into the apparatus so that consecutive bottles engage consecutive notches (6) in the star wheel (4) of the capping or de-capping apparatus, causing consecutive capping or de-capping heads (5) to descend on to the bottles whereby they are rotated until the recess (18) in the flange (15) of each bottle engages the stop member (7) adjacent the notch (6) on the star wheel (4) to trap the bottle against rotation, and completing the capping or de-capping operation.

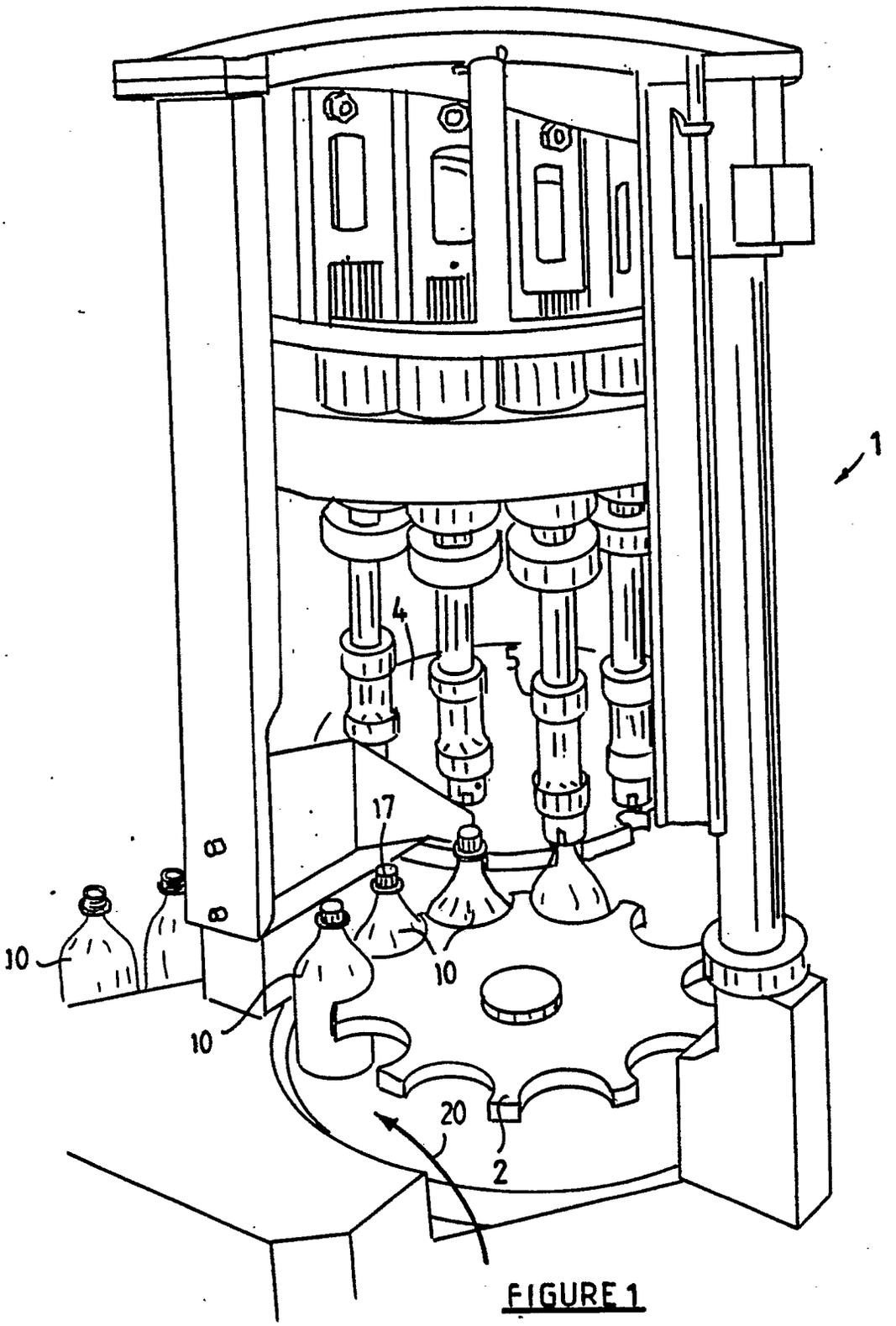

FIGURE 1
(PRIOR ART)

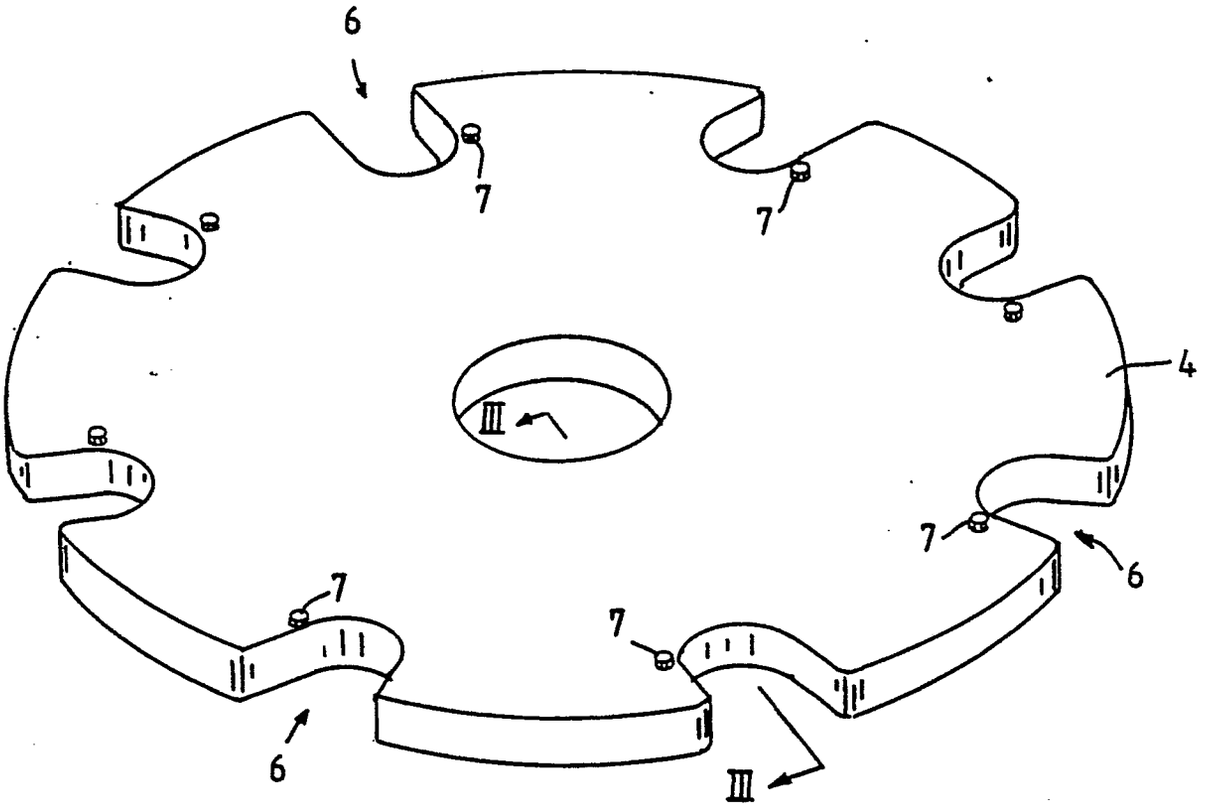

FIGURE 2

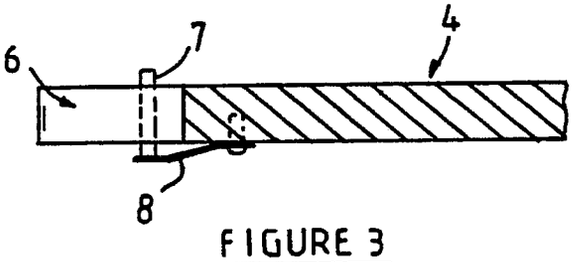

FIGURE 3

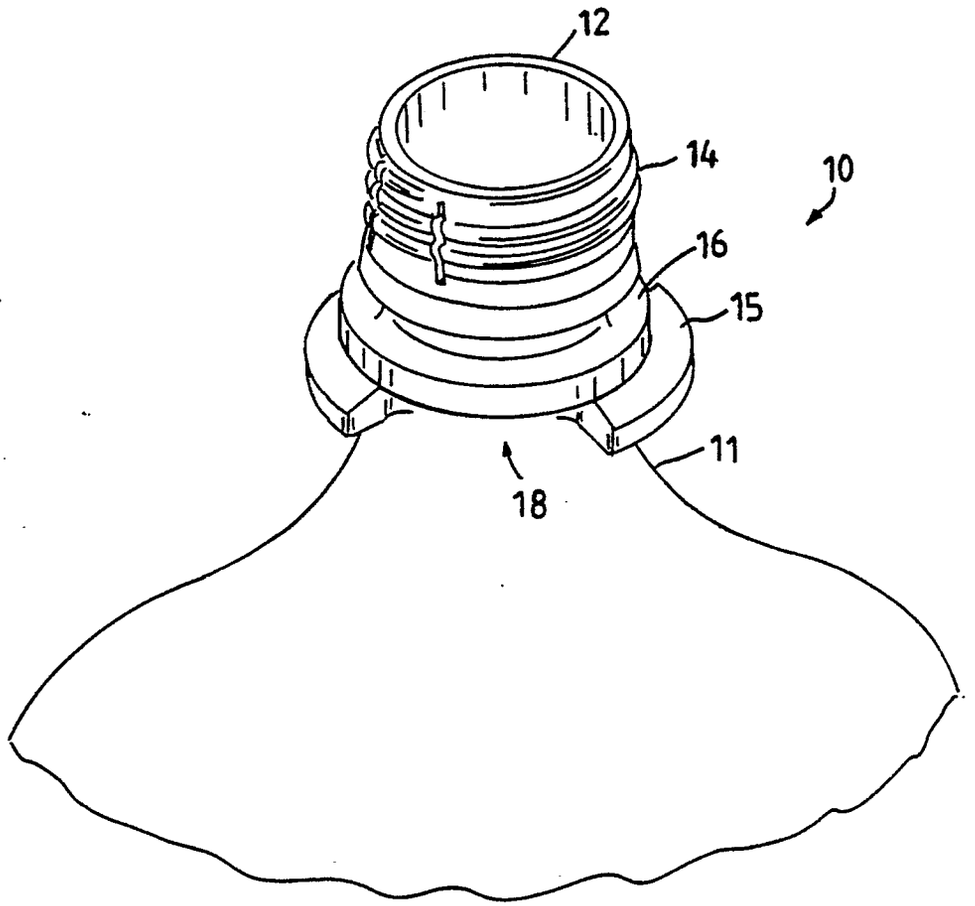

FIGURE 4

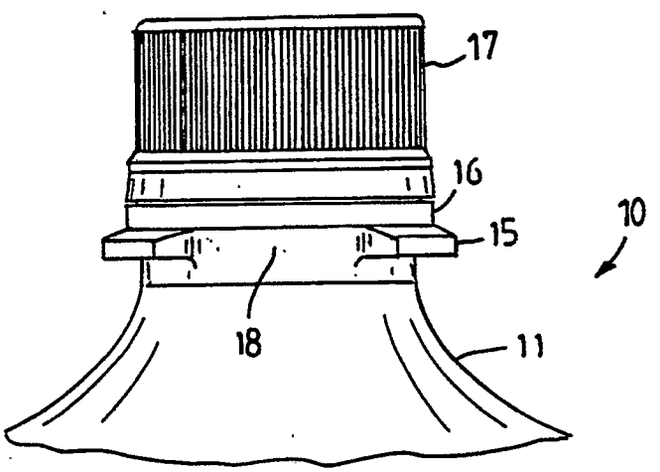

FIGURE 5

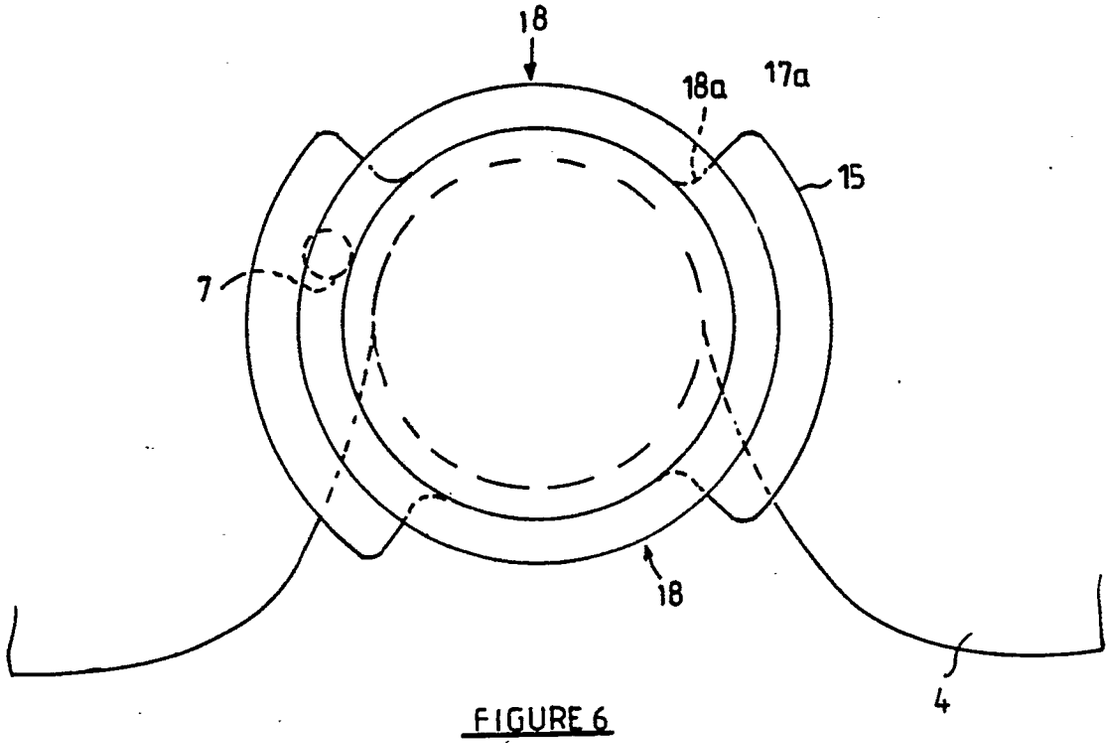

FIGURE 6

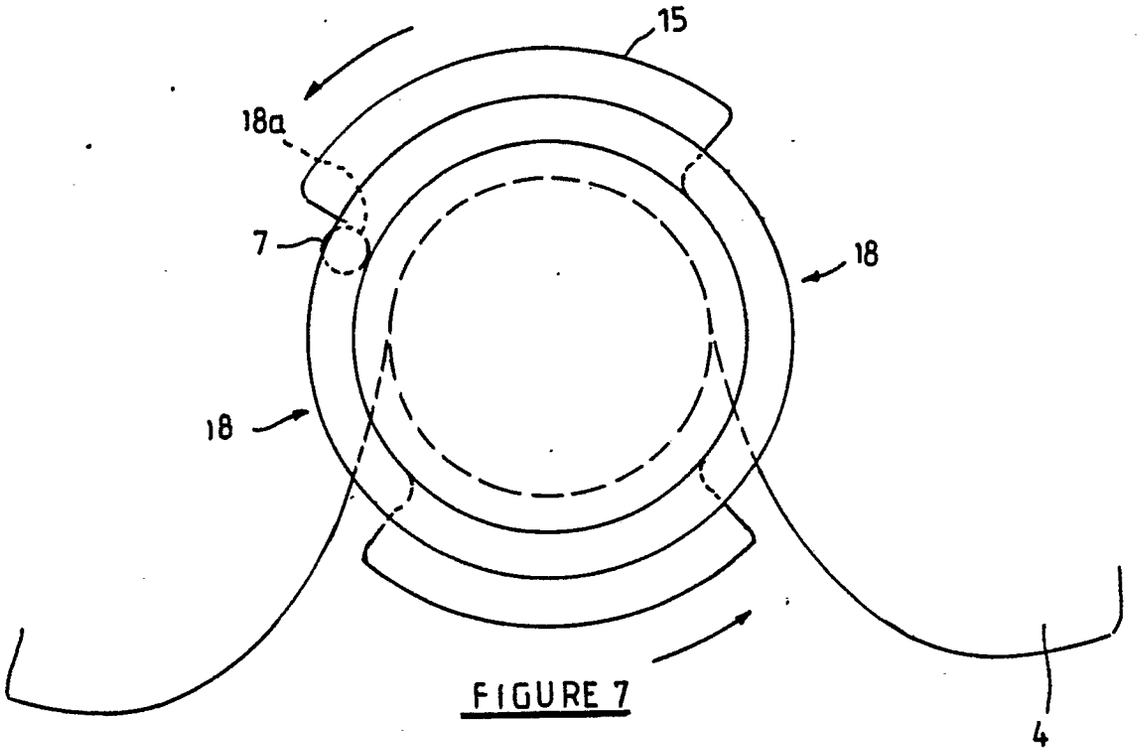

FIGURE 7

European Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 90 30 6450

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
A	US-A-3 784 040 (DOUGLAS) * Column 2, lines 18-50; figures * ---	1	B 65 D 1/02 B 67 B 3/20 B 67 B 7/18 B 65 C 9/06
A	US-A-3 499 567 (SPOTTS) * Abstract; figures 1,2 * ---	1	
A	GB-A- 954 054 (DENNISON MANUFACTURING) * Page 3, lines 17-25; figures 3,4,8-10 * -----	6,10	

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

B 65 C
B 65 D
B 67 B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	13-09-1990	MARTINEZ NAVARRO A.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
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E : earlier patent document, but published on, or after the filing date
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