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(71) Applicant: **BOWTHORPE PLC**
Crawley, West Sussex RH10 2RZ (GB)

(72) Inventor: **Blanks, Steven John**
Winsford, Cheshire, CW7 2TU (GB)

(74) Representative: **Evans, Huw David Duncan**
Urquhart-Dykes & Lord,
Three Trinity Court,
21-27 Newport Road
Cardiff CF2 1AA (GB)

(54) Tie

(57) A one-piece plastics tie for tying about the neck of a bag comprises an elongate strap 10 provided with a series of serrations 11 on one side thereof and with an apertured head 12 at one end thereof, and a pawl 14 disposed in the head aperture 13 for engaging the strap serrations 11 when the strap 10 is passed through the head aperture, the strap 10 being provided with a series of teeth 20 on one side thereof for gripping the neck of the bag about which the tie is to be applied, each tooth 20 having surfaces 21 which are alternately inclined across the width of the strap. The neck of the bag is pinched into the channels between adjacent teeth 20 and thus it is difficult to slide the tie axially of the neck, since the surfaces of the teeth 20 lie at an opposed angle to the direction of movement.

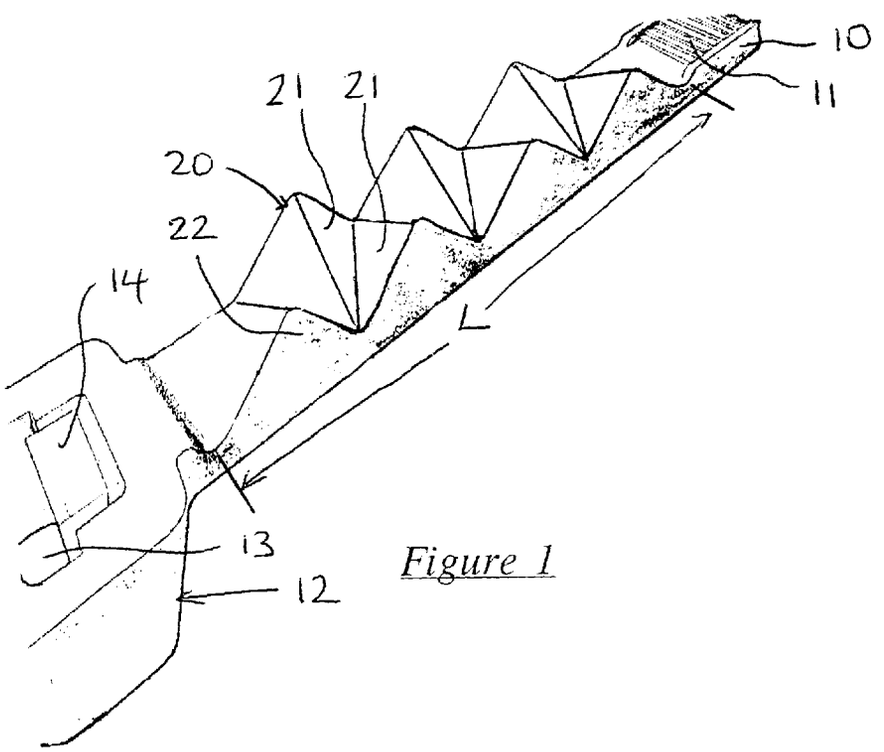

Figure 1

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Description

This invention relates to a tie, and more particularly but not solely to a tie for tying the neck of a bag or other packaging article.

It is well known to tie the neck of a bag by applying a plastics tie. One such tie comprises an elongated serrated strap having an apertured head at one end: in use, the strap is looped around the neck of the bag, inserted through the head aperture and pulled tight. The serrations on the strap interlock with a pawl in the head aperture to prevent loosening.

A disadvantage of such ties is that they have a tendency to slide off the neck of the bag if the contents of the bag move against the neck. One industry where this problem is encountered is the carpet industry. Typically, a bag is formed around a roll of carpet by applying a flexible plastics sleeve over the roll of carpet and subsequently forming chokes at opposite ends of the sleeve, using the above-mentioned ties. During transit, the rolls of carpet have a tendency to move axially inside the sleeve against the tie at one end thereof: this has the effect of sliding the tie along the sleeve until it becomes detached.

British patent No. 2 212 764 discloses a security tie having spikes which penetrate the neck of a cash or mail bag to which it is applied, in order to prevent loosening. However, such ties are unsuitable for applying to plastics bags and other packaging articles of flexible plastics material, since the spikes tear rather than grip the plastics material.

We have now devised a tie which alleviates the above-mentioned problems.

In accordance with this invention, there is provided a tie comprising an elongate strap provided with a series of serrations on one side thereof and with an apertured head at one end thereof, and means disposed in the head aperture for engaging the strap serrations when the strap is passed through the head aperture, the strap being provided with a series of transverse formations on one side thereof for engaging the article around which the tie is to be applied, the formations providing surfaces which are alternately inclined across the width of the strap.

In use, when the tie is formed into a loop and tightened around the neck of a bag or other article, the shape of the neck is deformed into a shape which substantially corresponds with the internal surface of the loop. Any attempts to slide the tie axially of the neck will be resisted, since the formations include surfaces which are inclined with respect to the direction of movement. Furthermore under load, compressive and tensile forces are respectively applied to the bag by the converging and diverging surfaces, and these forces oppose each other to make it even more difficult to slide the tie axially of the neck of the bag.

The tie thereby grip the neck of the bag or other article without actually penetrating the material thereof. Ties in accordance with this invention can also be used as security ties, since they are equally as difficult to remove as conventional security ties.

The formations may comprise projections or ridges which project outwardly from the strap.

Preferably the formations comprise a series of teeth which project outwardly from the plane of the strap, each adjacent pair of teeth defining a channel directed across the width of the strap.

Preferably each tooth comprises opposite side walls, which generally face in opposite directions longitudinally of the strap, the side walls of each tooth defining said alternately inclined surfaces.

Preferably the side walls of each channel lie in respective planes which respectively intersect the strap along the same or parallel lines, such that the cross-sectional profile of each channel is uniform along its length.

Preferably the teeth comprise tips, the tips of alternate teeth of the series being disposed on alternate sides of a line which extends axially of the strap.

Preferably the side walls of each tooth converge towards its tip.

Preferably the angle A at which the walls converge is substantially equal to 2 x 360/n, where n is the total number of teeth.

Preferably the height of the teeth of substantially equal to, or less than $L/2\pi$, where L is length of the strap covered by the projections.

Preferably each channel comprises a flat base, about which the strap bends when formed into a loop.

Embodiments of this invention will now be described by way of examples only, and with reference to the accompanying drawings, in which:

FIGURE 1 is a perspective view of a portion of an embodiment of tie in accordance with this invention, showing details of the head and teeth thereof;
FIGURE 2 is a plan view of the tie of Figure 1;
FIGURE 3 is a side view of the tie of Figure 1;
FIGURE 4 is a sectional view along the line IV-IV of Figure 2;
FIGURE 5 is a side view of the tie of Figure 1, when formed into a loop; and
FIGURE 6 is a perspective view of an alternative embodiment of tie, when tied about the neck of a bag.

Referring to Figures 1 to 4 of the drawings, there is shown a one-piece tie of plastics material. The tie comprises a flat elongate strap 10 provided with a series of transverse ratchet serrations 11 on one side thereof and with a head 12 projecting from the opposite side of the strap 10.

The head 12 comprises an aperture 13, which extends perpendicular to the strap 10, and which is arranged to receive the free end of the strap 10. A pawl 14 is disposed in the head aperture 13 for engaging the

strap serrations when the strap 10 is formed into a loop and inserted into the head aperture 13. The pawl 14 prevents the strap from being moved in the withdrawal direction.

The series of strap serrations 11 terminates some distance from the head 12, and a series of teeth 20 are formed on the strap 10 between the strap serrations 11 and the head. The teeth 20 are disposed on the same side of the strap 10 as the serrations 11.

Each tooth 20 comprises a flat front wall 22, the front wall of successive teeth being co-planar with alternate side edges of the strap 10. The front wall 22 of each tooth 20 is triangular in shape, and extends outwardly to a tip.

Each tooth 20 further comprises a pair of inclined sidewalls 21, which are triangular in shape, and which generally face in opposite directions axially of the strap. The inclined side walls 21 of each tooth converge away from the strap 10 and meet along a line, which extends from the tip of the tooth transverse the strap, the line being inclined downwardly from the tip to a point which is level with the surface of the strap. The side walls 21 of each tooth converge at angle A, which is substantially equal to 2 x 360°/n, where n is the number of teeth 20 in the series.

It will be appreciated that the tips of successive teeth 20 alternately lie on opposite sides of a line which extends axially of the strap 10. Each tooth 20 is triangular in plan, as well as being triangular when viewed from either end of the strap 10.

Each adjacent pair of teeth 20 overlap across the width of the strap 10 and along the length of the strap 10. The opposed side walls 21 of adjacent pairs of teeth define a v-shaped channel 25, as shown in Figure 4. The v-shaped channels 25 defined by successive pairs of teeth 20 alternately converge and diverge at angle B across the width of the strap 10, wherein angle B is preferably 90° or thereabouts.

Referring to Figure 5 of the drawings, in use the strap 10 is inserted into the head aperture 13 and pulled tight until the first tooth 20 abuts the underside side of the head 12. In this position the strap 10 forms a loop, and the teeth 20 interengage, such that the v-shaped channels 25 become more confined ann substantially parallel-sided. The loop is almost fully closed by the interengaging teeth 20, which respectively define segments of the closed loop, owing to the aforementioned relationship between the angle A and the number of teeth 20.

Preferably the tips of the teeth 20 almost meet at the centre of the loop, and thus the height of each tooth is preferably substantially equal to $L/2\pi$, where L is the length of the strap 10 covered by the teeth 20.

Referring to Figure 6 of the drawings, there is shown a similar tie 30 having more teeth than the embodiment of Figure 1. In use, the tie 30 is formed into a loop around the neck of a bag 31. The teeth 20 close up to form restricted channels 25 therebetween, which alternately converge and diverge at angle B in a direction which extends axially of the neck of the bag 31. The neck of the bag 31 is pinched into the channels 25, and thus it is difficult to slide the tie axially of the neck, since the channels do not extend in the direction of movement. Furthermore under load, compressive and tensile forces are applied to the bag by the converging and diverging walls of the channels 25 , and these forces oppose each other to make it even more difficult to slide the tie axially of the neck of the bag.

Claims

1. A tie comprising an elongate strap provided with a series of serrations on one side thereof and with an apertured head at one end thereof, and means disposed in the head aperture for engaging the strap serrations when the strap is passed through the head aperture, the strap being provided with a series of transverse formations on one side thereof for engaging the article around which the tie is to be applied, the formations providing surfaces which are alternately inclined across the width of the strap.

2. A tie as claimed in claim 1, in which the formations comprise projections which project outwardly from the strap.

3. A tie as claimed in claim 1, in which the formations comprise ridges which project outwardly from the strap.

4. A tie as claimed in claim 1, in which the formations comprise a series of teeth which project outwardly from the plane of the strap, each adjacent pair of teeth defining a channel directed across the width of the strap.

5. A tie as claimed in claim 4, in which each tooth comprises opposite side walls, which generally face in opposite directions longitudinally of the strap, the side walls of each tooth defining said alternately inclined surfaces.

6. A tie as claimed in claims 4 or 5, in which the side walls of each channel lie in respective planes which respectively intersect the strap along the same or parallel lines, such that the cross-sectional profile of each channel is uniform along its length.

7. A tie as claimed in any of claims 4 to 6, in which the teeth comprise tips, the tips of alternate teeth of the series being disposed on alternate sides of a line which extends axially of the strap.

8. A tie as claimed in any of claims 4 to 7, in which the side walls of each tooth converge towards its tip.

9. A tie as claimed in claim 8, in which the angle at which the walls converge is substantially equal to 2 x 360/n, where n is the total number of teeth.

10. A tie as claimed in claims 8 or 9, in which the height of the teeth is substantially equal to, or less than L/ 2π, where L is length of the strap covered by the projections.

11. A tie as claimed in any of claims 4 to 10, in which each channel comprises a flat base, about which the strap bends when formed into a loop.

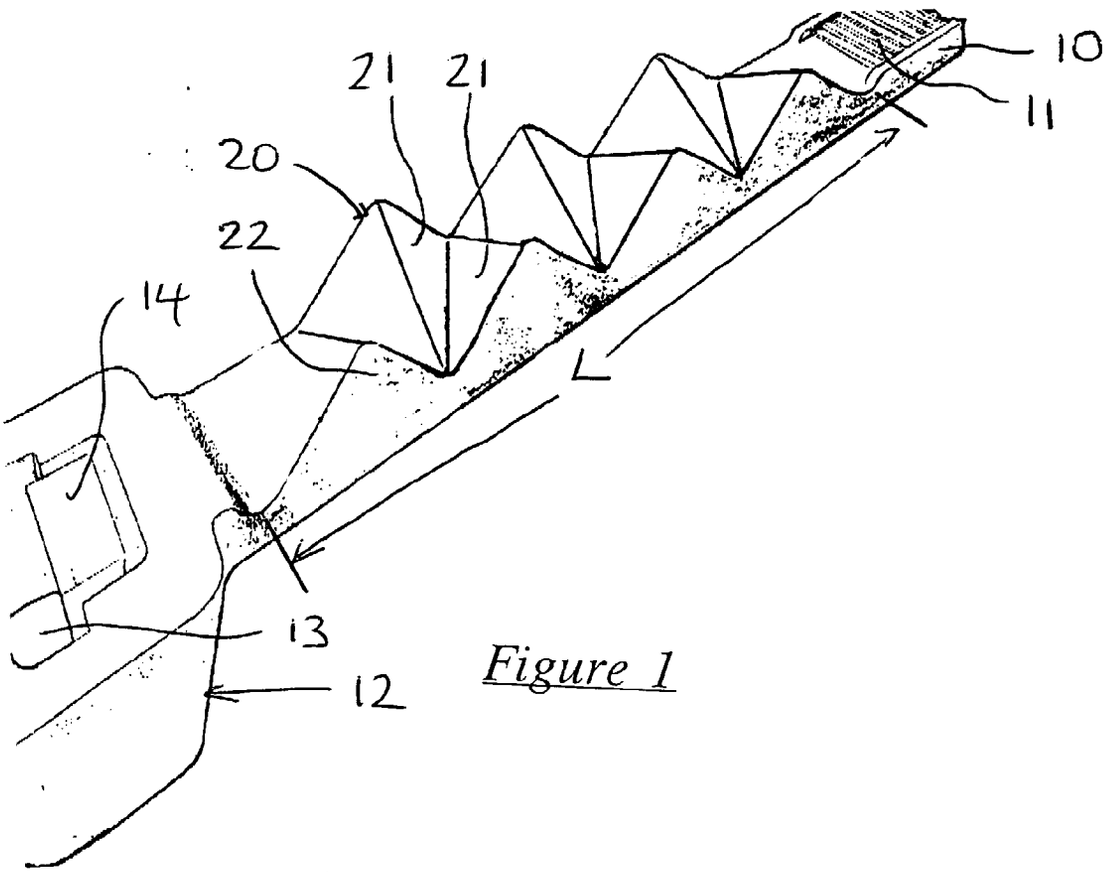

Figure 1

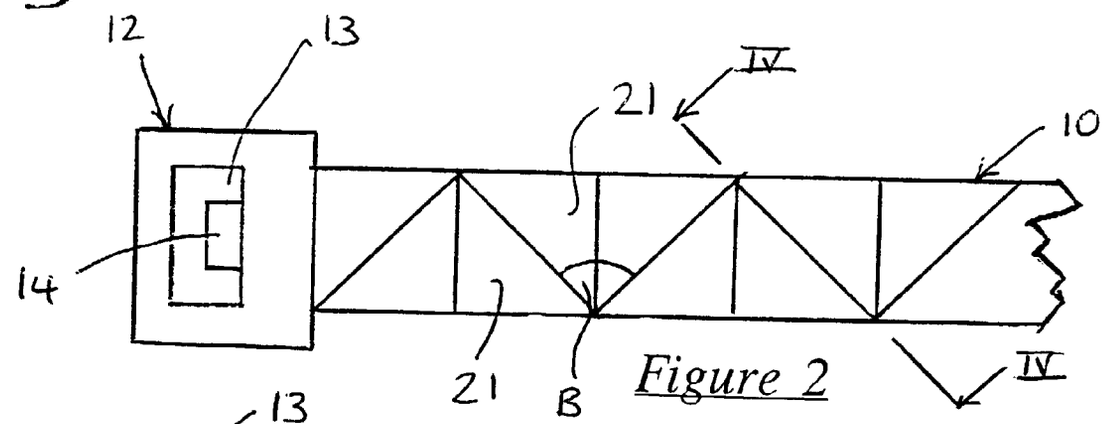

Figure 2

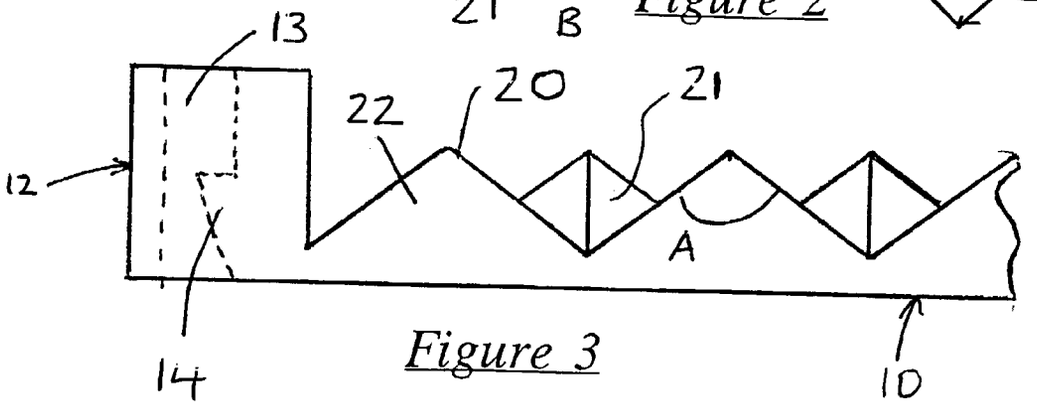

Figure 3

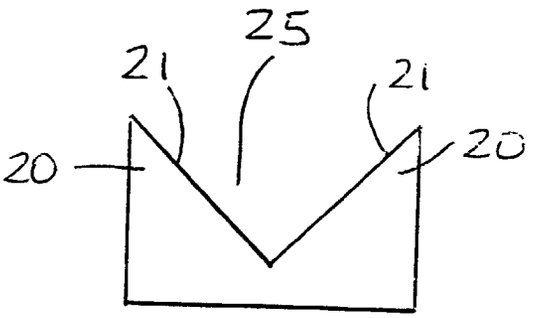

Figure 4

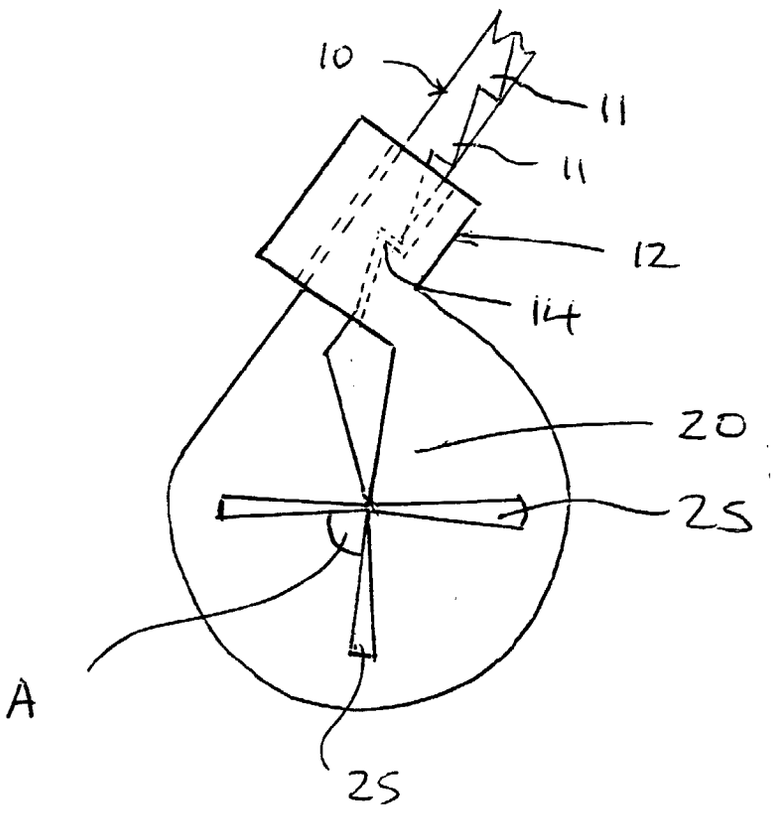

Figure 5

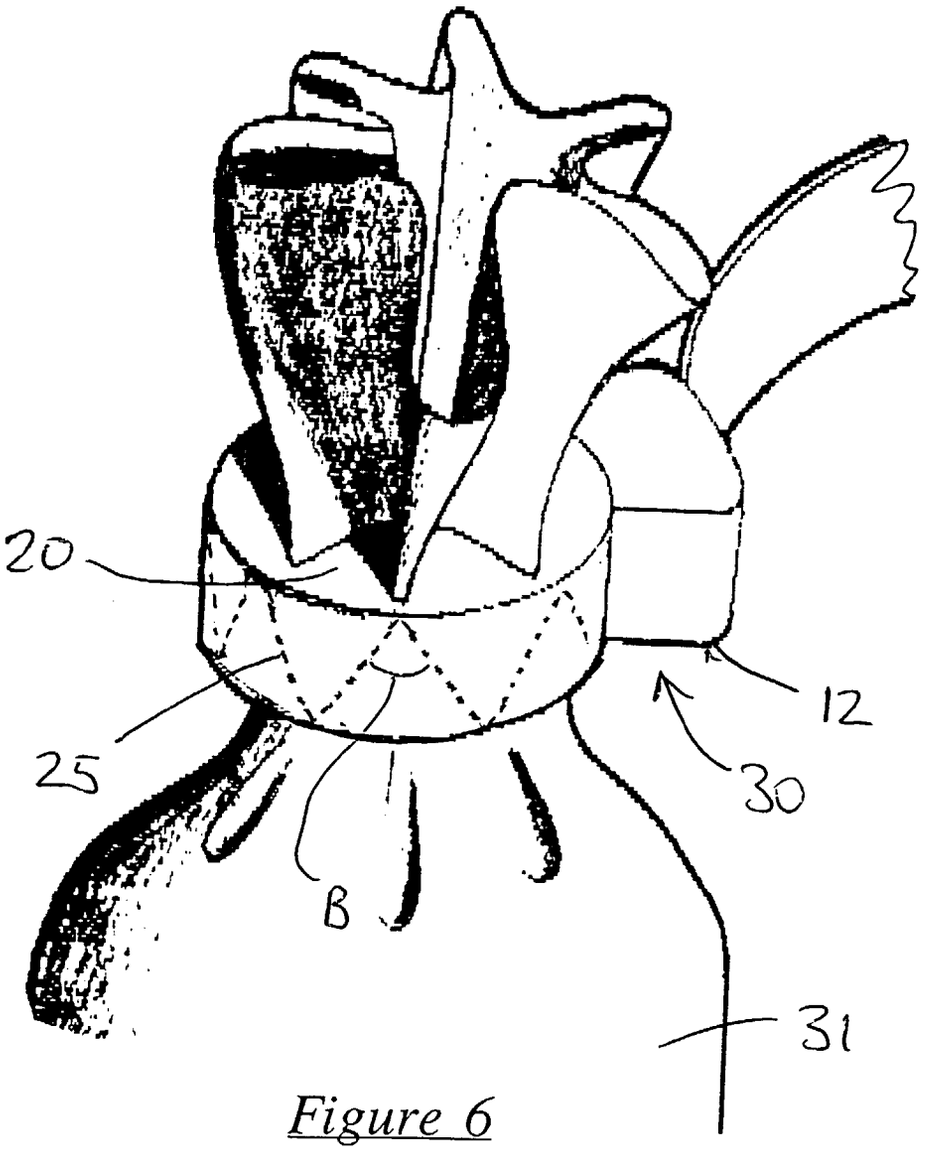

Figure 6

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 98 30 2619

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.6)
X	US 5 123 686 A (WENK) 23 June 1992 * column 3, line 57 - column 6, line 18; figures *	1-5	B65D63/10
A	US 3 735 449 A (ROSALES L) 29 May 1973 * the whole document *	1	
A,D	GB 2 212 764 A (BOWTHORPE HELLERMANN LTD) 2 August 1989 * page 3, line 1 - page 4, line 17; figures *	1	
A	US 3 747 164 A (FORTSCH W) 24 July 1973 * column 1, line 48 - column 3, line 30; figures *	1	
A	US 4 235 280 A (HELMS JIMMY L ET AL) 25 November 1980 * column 2, line 32 - line 51; figures *	1	
			TECHNICAL FIELDS SEARCHED (Int.Cl.6) B65D G09F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
BERLIN	13 July 1998	Olsson, B

CATEGORY OF CITED DOCUMENTS

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