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(12) # EUROPEAN PATENT APPLICATION

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(54) **Separating device for sideways removing a publication from the lower side of a pile of publications.**

(57) The invention relates to a separating device for sideways removing a publication (6) from the lower side of a pile (2) of publications such as magazines, papers and the like, comprising a periodically activated suction table (3) moving to and for below said pile that can grip the frontal portion of the lowest publication as seen in the direction of removal. This separating device comprises a second suction table (4) that as seen in the direction of removal is positioned behind said first suction table, said two suction tables being controlled in such a way that the publication to be removed at first will be moved in the direction opposite to the direction of removal prior to its motion in the direction of removal. Due to this it is possible to remove publications with their open sides ahead without any restrictions.

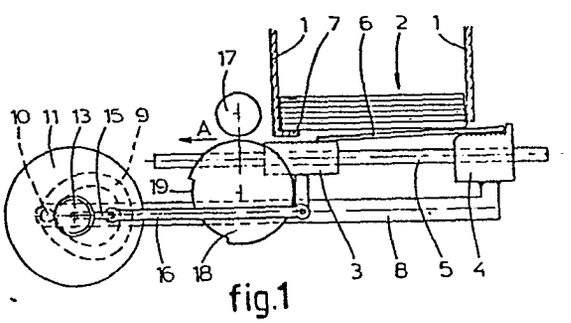

fig.1

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Separating device for sideways removing a publication from the lower side of a pile of publications

The invention relates to a separating device for sideways removing a publication from the lower side of a pile of publications such as magazines, papers and the like, comprising a periodically activated suction table moving to and fro below said pile that can grip the frontal portion of the lowest publication as seen in the direction of removal.

A known separating device of this type comprises a suction table that during removal of a publication loosens the frontal edge thereof from the pile and transfers the publication in the direction of removal. After being removed from said pile the publication can be supplied to a device for carrying out a further operation.

As with this known device a publication has to be removed with its back ahead there generally are no problems. But often, for example if the publication has to be supplied to certain folding or banding machines, it is necessary to remove the publications with their open sides ahead. However, especially if handling thin publications, the known separating device then has the disadvantage that it is nearly impossible to guarantee that always only one publication will be removed. Moreover, the publications often will be damaged or crumpled up during the removal.

It is an object of the present intention to provide a separating device of the type mentioned before wherein said disadvantages are solved in an easy but nevertheless effective way.

Therefore, the separating device according to the invention is characterized in that it comprises a second suction table that as seen in the direction of removal is positioned behind said first suction table, said two suction tables being controlled in such a way that the publication to be removed at first will be moved in the direction opposite to the direction of removal prior to its motion in the direction of removal.

The second suction table that, as seen in the direc-

tion of removal, is positioned behind the first suction table can grip the rear portion of the publication as seen in the direction of removal. In case the publication has to be removed with its open side ahead the back of the publication is positioned in said rear portion. As a result this rear portion of the publication that is gripped by the second suction table has such a rigidity that the publication can be moved without any restriction over some distance in the direction opposite to the direction of removal, whereafter it will be possible to remove the publication in the direction of removal without damaging or crumpling up this publication.

In an advantageous embodiment of the separating device according to the invention it comprises a stationary support surface being constructed in such a way that the publication to be removed can move under said support surface while the frontal portion of the publication thereabove as seen in the direction of removal will be supported by this support surface.

Because the support surface supports the frontal portion of the publication lying above the publication to be removed this portion does not rest on said publication to be removed so that the friction between these two publications obstructing the removal of said lowest publication will be diminished.

Hereafter, the invention will be further explained with reference to the drawing in which is shown an embodiment of the separating device according to the invention.

Fig. 1 shows schematically a side-elevational view of an embodiment of the separating device according to the invention;

Fig. 2 shows a plan view of the separating device of Fig. 1; and

Fig. 3 illustrates schematically the method of operation of a separating device according to the invention.

The separating device schematically shown in Fig. 1 comprises a holder 1 for a pile of publications 2, a first suction table 3 and a second suction table 4. The holder 1 can be filled from its top with publications, such as magazines,

papers or the like forming a pile 2.

Movably to and fro below the pile 2 the two suction tables 3, 4 both are supported by a guidance 5; therefore, the suction tables 3, 4 are provided with a recess receiving said guidance 5. The first suction table 3 can grip the frontal portion of the publication to be removed as seen in the direction of removal (indicated by arrow A), while the second suction table 4, as seen in the direction of removal, is positioned behind the first suction table 3 and can grip the rear portion of said publication 6. The pile of publications 2 is placed in the holder 1 in such a way that the backside of each publication 6 is positioned above the second suction table 4.

The holder 1 is provided with a stationary support surface 7 for supporting the frontal portion of the publication lying thereabove during removing the lowest publication 6 under this support surface 7. As will be further explained later on, the second suction table 4 is provided with a drive for moving the publication 6 in the direction opposite to the direction of motion prior to the motion in the direction of removal. The distance over which the second suction table 4 first moves the publication 6 in this direction at least is that large that the frontal portion of this publication 6 disengages said support surface 7.

In the position of the separating device shown in Fig. 1 the frontal edge of the lowest publication 6, where the open side of this publication 6 is positioned, has disengaged the support surface 7 and under influence of the gravity force as well as the forces exercised on the central portion of the publication 6 by the weight of the pile 2, has reached the first suction table 3. After said publication 6 in this way at its open side being loosened from the pile 2 the first suction table 3 can remove it under the support surface in the direction of removal. The gap between the lower side of the support surface 7 and the upper side of the first suction table 3 is big enough to ensure an unrestricted passage of this publication 6.

The drive of the second suction table 4 exists of an operator rod 8 being connected to said second suction table 4

and further comprising a follower member 10 cooperating with a curved track 9. In the represented embodiment of the separating device the following member 10 exists of a follower roll, but other follower members can also be applied.

The operator rod 8 only can make a to and fro motion that is parallel to the guidance 5 and that is caused by the shape of the curved track 9. The curved track 9 is provided on a disk 11 that, as appears clearly from Fig. 2, is mounted on a drive shaft 12 of the first suction table 3. This drive shaft 12 is driven by a motor 13 that is connected with the drive shaft 12 through a coupling 14. The rotation of the drive shaft 12 causes a rotation of the disk 11 so that the intersection between operator rod 8 and curved track 9, at which intersection the follower roll 10 is positioned, moves to and fro. Forced by the follower roll 10 the operator rod 8 and therefore also the second suction table 4 will move to and fro wherein the second suction table 4 will always assume the same position after each complete revolution of the disk 11.

Moreover, the drive shaft 12 comprises a crank shaft 15 driving a drive rod 16 that is connected to the first suction table 3. Because the crank shaft 15 is part of the drive shaft 12 carrying the disk 11 with the curved track 9 the motions of the first suction table 3 and the second suction table 4 are mutually coupled, however it not being necessary that the relative distance between both suction tables is constant. In the represented embodiment of the separating device it indeed is not.

Finally two pairs of cooperating transfer means are positioned next to the first suction table 3 for transferring the publication 6. These transfer means comprise an upper pair of pressure rolls 17 and a lower pair of transport disks 18. Each transport disk 18 comprises a recess 19 extending over 90° of its circumference. The publication 6 is inserted into this recess 19 and then is transferred by the remaining section of the circumference of the transport disks 18. Instead of the represented arrangement in which said transfer means 17, 18 are positioned between the holder 1 and the drive shaft 12 it is possible that the transport disks 18 also are mounted on

the drive shaft 12. The advantage of this is that in this way a correct synchronisation is achieved between the disk 11 and the crank shaft 15 on the one side and the transport disks 18 on the other.

The operation of the separating device according to the invention will be elucidated referring to Fig. 3. For the sake of clarity in Fig. 3 the disk 11 and the crank shaft 15 respectively, are illustrated at both sides of the suction tables; the coupling between the disk 11 and the crank shaft 15 as described above, however, remains unchanged.

The angle references of the disk 11 containing the curved track 9 as illustrated in Fig. 3 represent the angular displacement of the disk 11 relative to a chosen starting position that is represented by 0°. This starting position is represented in Fig. 3e and will be further explained hereafter. The curved track 9 is shaped in such a way that the second suction table 4 stands still for a short while in its two extreme positions. Therefore, the two acute-angled circle segments that are enclosed by two dotted lines limit curved track sections with a constant distance towards the centre of the disk. As a result the second suction table 4 will stand still when the follower roll 10 is in one of these two curved track sections.

In the position shown in Fig. 3a a recently separated publication 6' has just reached the transfer means 17, 18. At this instant the first suction table 3 is deactivated and starts loosing its suction capacity. For, the reduction of the suction capacity takes some time so that the deactivation has to start before the first suction table 3 reaches its extreme left position as represented in Fig. 3b. After the first suction table 3 has disengaged the publication 6' said publication 6' is removed by the transfer means 17, 18 and, if necessary, is supplied to a next operation step.

The publication 6 being lowest now and in the file 2 being stacked above the publication 6' has engaged the second suction table 4 with its rear side where the back of the publication 6 is positioned, said second suction table 4 standing still in its extreme left position. In the time period

that preceeds the beginning of a right-handed motion of the second suction table 4, the second suction table 4 is activated and its suction capacity is increased. Therefore, the publication 6 will be sucked firmly to the second suction table 4 so that this can move the publication 6 at first in the direction opposite to the direction of removal.

Fig. 3 shows the moment on which the first suction table 3 starts to move to the right and where the transfer means 17, 18 remove the publication 6' to the left. The second suction table 4 is still in its extreme left position.

When the disk 11 has reached the position shown in Fig. 3c, the first suction table 3 that is deactivated moves to the right. The second suction table is just before moving to the right for moving the publication to the right that at this instant is firmly sucked to the suction table. Forced by the curved track 9 the second suction table 4 moves towards its extreme right position as shown in Fig. 3d. After reaching this position the second suction table 4 will stand still for a while during which stand-still the suction capacity of the second suction table 4 will be reduced. During the motion of the second suction table 4 from the position according to Fig. 3c towards the position according to Fig. 3d the frontal side of the publication 6, corresponding with the open side of the publication 6, will disengage the support surface 7 so that this frontal side falls upon the first suction table 3. As a result the frontal side of the publication 6 is effectively separated from the frontal side of the next publication in the pile 2 lying thereabove.

In Fig. 3e the first suction table 3 has reached its extreme right position and will be activated. The moment of activation can, if necessary, be a short while before the moment of reaching the represented position.

Finally Fig. 3f represents the situation in which the first suction table 3 has sucked the publication 6 and is removing it under the support surface 7 to the left. The second suction table 4 is deactivated and is just before moving to the left. After a short while the two suction tables 3, 4 again will reach the positions shown in Fig. 3a, wherein the

publication 6 engages the transfer means 17, 18 and wherein a next publication rests with its rear side on the second suction table 4.

The invention is not limited to the embodiment described above, but can be varied widely within the scope of the invention.

CLAIMS

1. Separating device for sideways removing a publication from the lower side of a pile of publications such as magazines, papers and the like, comprising a periodically activated suction table moving to and fro below said pile that can grip the frontal portion of the lowest publication as seen in the direction of removal, characterized in that it comprises a second suction table that as seen in the direction of removal is positioned behind said first suction table, said two suction tables being controlled in such a way that the publication to be removed at first will be moved in the direction opposite to the direction of removal prior to its motion in the direction of removal.

2. Separating device according to claim 1, characterized in that moving the publication at first in the direction opposite to the direction of removal occurs under influence of the second suction table.

3. Separating device according to claim 1 or 2, characterized in that it comprises a stationary support surface being constructed in such a way that the publication to be removed can move under said support survace while the frontal portion of the publication thereabove as seen in the direction of removal will be supported by this support surface.

4. Separating device according to claim 3, characterized in that the distance over which the second suction table at first moves the lowest publication in the direction opposite to the direction of removal being at least that large that the frontal portion of this publication as seen in the direction of removal disengages said support surface.

5. Separating device according to one of the preceding claims, characterized in that the second suction table is drivable by an operator rod being connected to said second suction table and further comprising a follower member such as a follower roll cooperating with a

curved track.

6. Separating device according to claim 5, c h a r a c t e r i z e d i n t h a t the curved track is provided on a disk that is mounted on a drive shaft taking care of the to and fro motion of the first suction table.

7. Separating device according to claim 6, c h a r a c t e r i z e d i n t h a t the drive shaft of the first suction table comprising a crank shaft driving a drive rod that is connected to the first suction table.

8. Separating device according to one of the claims 5-7, c h a r a c t e r i z e d i n t h a t the curved track for the second suction table is shaped in such a way that the second suction table stands still for a short while in its two extreme positions.

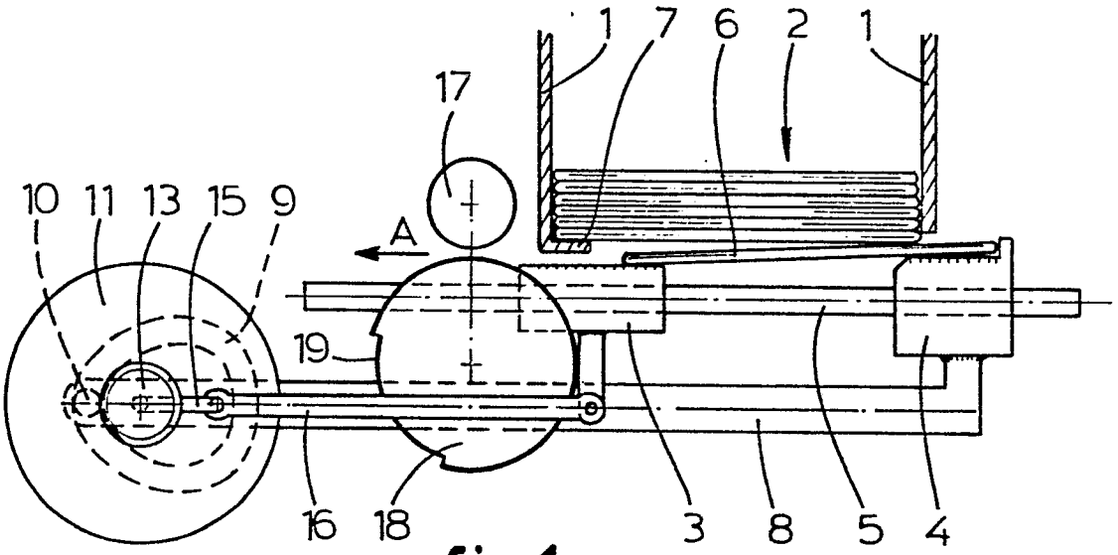
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fig.1

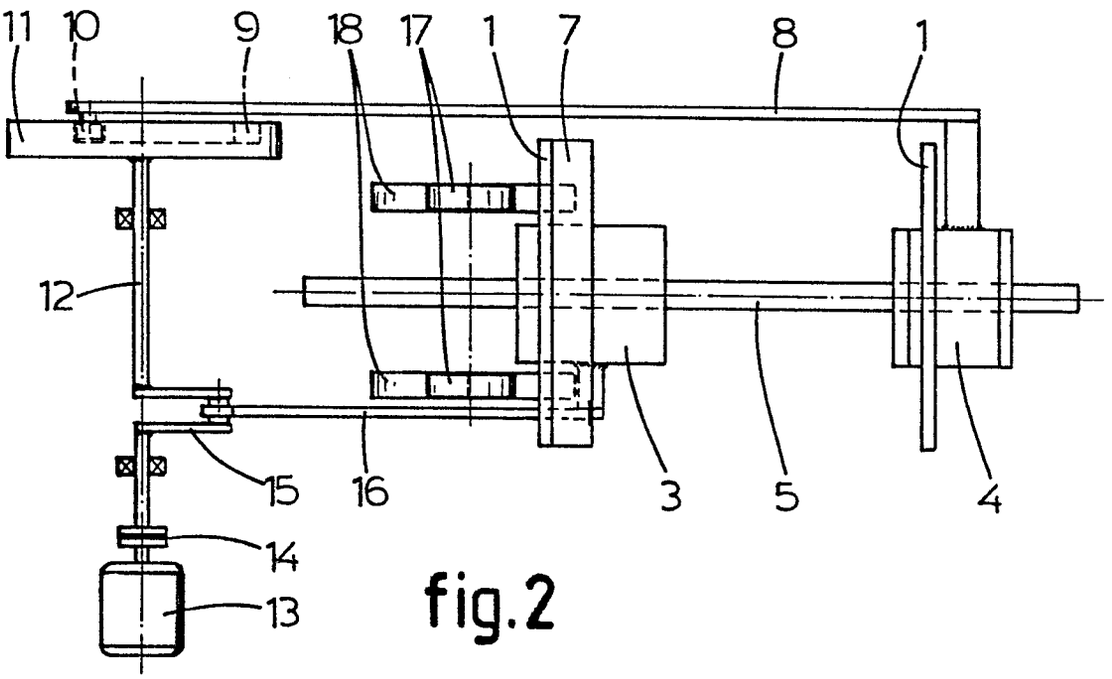
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fig.2

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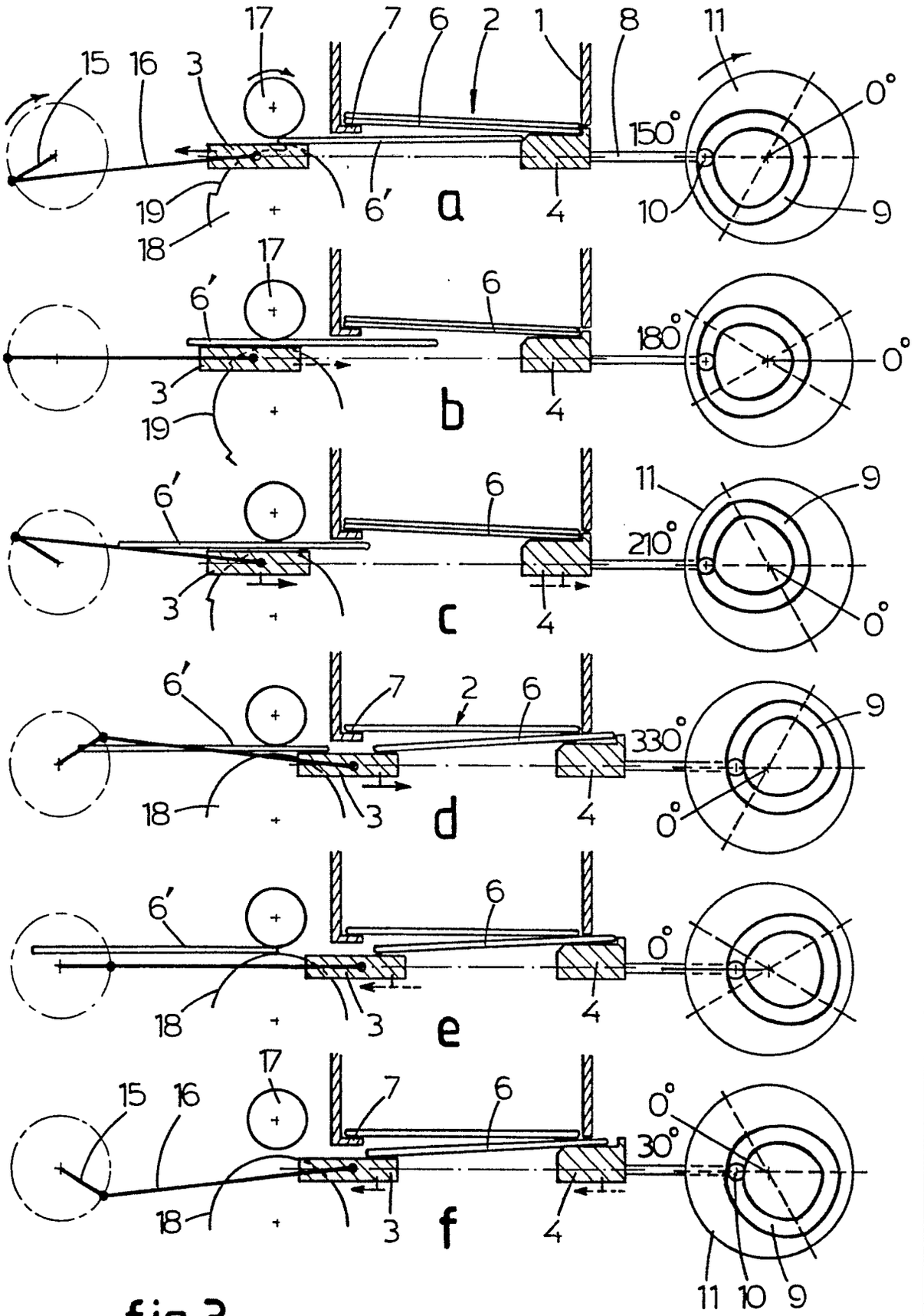

fig.3

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EUROPEAN SEARCH REPORT

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Application number

EP 85201568.4

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.4)
Y	US - A - 3 917 259 (G. SALVADE) * Fig. 1; specification column 2, lines 44-58 *	1-4	B 65 H 3/12 B 65 H 1/06
Y	US - A - 2 570 842 (L. BONNARD) * Fig. 1-7; specification column 3, line 70 - column 5, line 7 *	1-4	
A	US - A - 3 835 582 (P. ASPINWALL) * Fig. 1-3; specification column 2, lines 5-27 *	5-8	

TECHNICAL FIELDS SEARCHED (Int. Cl.4)

B 65 G
B 65 H

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
VIENNA	09-12-1985	SÜNDERMANN

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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