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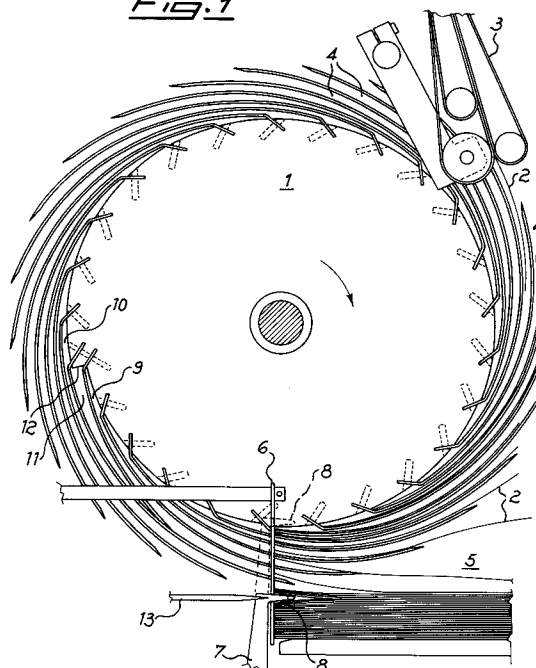
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DE ES FR GB IT(71) Applicant: **FIN-OMET S.r.l.**
Via Caduti Lecchesi a Fossoli, 22
I-22053 Lecco (CO)(IT)(72) Inventor: **Bartesaghi, Angelo**
Via Roccolo 6
I-22053 Lecco (CO)(IT)(74) Representative: **Marietti, Giuseppe**
STUDIO ASSOCIATO MARIETTI & PIPPARELLI
Viale Caldara 38
I-20122 Milano (IT)(54) **Device for storing sheets in piles having a preset number of elements.**

(57) A device for storing sheets in piles BY rotary machines comprises at least a conveyor belt (3) at the outlet of which a plurality of disks (1), coaxially and axially spaced between each other receive in appropriate seats, called "pockets" (4), volutedly arranged towards the outside, the sheets (2) to be deposited in a discharging area (5). Each pile in formation is properly separated from the underlying one by envisaging at least an offsetting (12) between the bottoms of two subsequent pockets (9,10) in the disks, as well as suitable means of separation (7,13) that operate in correspondence with said offsetting. The separating means, movable and synchronized with the disks, interpose themselves between the last sheet of one pile and the first sheet of the subsequent pile, subsequently following the movement of the sheets deposited coming out of the pockets. Means to remove the completed piles from the discharging area are advantageously associated with the separation means.

Fig. 1**EP 0 561 100 A1**

The present invention concerns a device for storing sheets in piles rotary machines, generally coupled with the outlet of a system of conveyor belts.

In the known machines, sheets, generally coming from a cutter, are carried, by means of cooperating conveyor belts, to a group of coaxial rotary disks, parallel and axially spaced. The disks are provided with appropriate seats, hereinafter defined as "pockets", uniformly distributed and volutely bent towards the inside. The word "pocket" defines the space resulting between two adjacent fins appertaining to a series of curved fins arranged on the external surface of each disk and axially aligned with corresponding fins on the other disks.

The disks and the system of conveyor belts operate at properly synchronized speeds to allow a single sheet to be stored in each pocket of the disks.

Sheets are thus transferred to a discharging area, generally placed below the group of disks, where sheets find one or more projecting elements arranged between the disks. The sheet stop with respect to the rotation of the disks allows the sheet to be removed from the pocket and to be positioned, by fall down, on top of the pile that is going to be formed. Each complete pile is then removed from the discharging area by known means.

In most applications of the known devices there is the need to form piles constituted by a well determined number of sheets, said number being possibly even lower than the number of sheets discharged in a single cycle of rotation of the disks. For this reason systems to count the sheets are envisaged that however often prove to be imprecise and inefficient.

In fact, in the devices of the prior art, the high speed at which sheets are discharged from the disks jeopardizes the counting precision, mainly when piles consisting of few sheets have to be formed.

Furthermore, the precision and good operation of said devices also depend on the characteristics of the material of the sheets, in particular on the weight of each sheet, on its thickness and rigidity.

An object of the present invention is to provide a device which allows the formation of piles each consisting of a well defined number of sheets, independently from the materials from which sheets are obtained and from the speed at which sheets are removed from the disks pockets, namely capable of operating in a reliable way at high speeds, with similarly high productivity.

This object is achieved by the present invention that concerns a device for storing up sheets in piles in rotary machines, comprising at least a conveyor belt at the outlet of which a plurality of equal disks, coaxially and axially spaced from each

other is provided, each disk carrying receiving pockets volutely arranged towards the outside; and one or more fixed retaining elements, projecting between said disks in correspondence with a discharging station of said sheets, characterized in that the bottom of at least one of the pockets in each of said disks is offset in a radial direction, towards the disk center, with respect to the bottom of the adjacent preceding pocket, in the direction of rotation of the disks themselves; and in that at least a separating means for sheet piles sheets is able to be inserted, in correspondence with said retaining elements, in the space between said offset pocket bottoms, said separating means following subsequently the sheets further deposited out of the pockets.

The presence of said offsetting between the bottoms of two pockets allows in fact to separate with an extreme precision the consecutive piles, interposing one or more separating means at the level of the offsetting, the separating means moreover favouring the removal of the completed piles. In particular the sheet removed from the pocket immediately preceding the offsetting corresponds to the last sheet on top of a completed pile, while the sheet removed from the pocket having its bottom radially offset towards the center corresponds to the first sheet on the bottom of the subsequent pile.

According to an advantageous feature of the invention, the number of pockets comprised between two subsequent offsettings is equal to the number of sheets in each pile, or is a submultiple of said number of sheets, thus allowing the formation of one or more piles consisting of a well determined number of sheets for each rotation cycle of the disks.

According to a further advantageous feature of the present invention, the separating means are movable between the disks, synchronized therewith, according to a prefixed cyclic run from an upper position in correspondence with said offsetting(s) to a lower position below said pockets. Said separating means advantageously comprise one or more fingers insertable between subsequent piles of sheets.

These and other advantages will result clearer from the following description, given illustrative and not limiting purposes, with reference to the accompanying drawings, wherein:

- figure 1 is a longitudinal sectional view of the device according to a preferred embodiment of the invention;
- figure 2 is a magnified view of a detail of the device according to the invention; and
- figure 3 is a cross sectional view of an embodiment of the device according to the invention.

Figure 1 shows one of the disks 1 receiving the sheets 2 from a group of cooperating conveyor belts 3, said sheets being introduced into the pockets 4. The disk 1, rotating clockwise with the other disks in figure 1, carries the sheets 2 in correspondence with a discharging station 5.

In correspondence to the latter there are provided fixed projecting elements 6, inserted between the disks, that stop the sheets 2 causing their removal from the pockets 4 and their subsequent deposition in the discharging area 5.

In the vicinity of the projecting elements 6, separating means 7 act between the disks, said means comprising at least one finger 8 and moving with cyclic movements synchronized with the disks.

According to an advantageous feature of the invention at least one pocket 9 is provided, whose bottom is offset in a radial direction, towards the disks centre, with respect to the bottom of the adjacent pocket 10 preceding the pocket 9 in the direction of rotation of the disks themselves.

In a preferred embodiment the pockets 9 and 10 define in the disks a space 11, not opened for being occupied by any sheet, that includes the connecting surface 12, for instance a step, between the bottom surfaces of the pockets 9 and 10.

According to a further preferential feature the bottoms of the pockets immediately subsequent to one of said offsettings, before the following offsetting in the direction of rotation of the disks, consist of curved surfaces with a radius of increasing size.

Figure 2 is a magnified view of a detail of the device that clearly shows the separating means 7 in the position in which the relevant fingers 8 intercept the space 11, the fingers 8 being at the height of the connecting surface 12 of the offsetting between the bottom of the pockets 9 and 10. The sheet in the pocket 10, stopping against the projecting elements 6, lies below the fingers 8, while the sheet in the pocket 9, lies above the fingers 8 and is then separated from the previous one.

Figure 3 represents a cross sectional view of a preferential embodiment of the device comprising the disks 1 and the separating means 7, the latter ones being in the position where the fingers 8 find themselves below the pockets 4.

According to an advantageous feature of the invention, the separating means 7 are associated with means for the removal of piles. The latter comprise pivots 13 that are preferably positioned between each pair of means 7 for the separation of piles, but with possibility of reciprocal sliding between pivots 13 and means 7.

The separation between the sheets in the pockets 9 and 10 takes place at the moment in which the offsetting passes in correspondence to the fingers 8 in the position in which they appear in figure 1 as indicated by a dashed line. In this position the

sheet contained in the pocket 10 is extracted from said pocket below the fingers 8, while the sheet contained in the pocket 9, whose bottom is radially offset towards the disk centre, is extracted above the fingers 8. Figure 2 shows more in detail the respective position of fingers 8 and sheets in pockets 9 and 10 just when separation occurs.

In the moment immediately following the sheets separation of the means 7 are lowered and, consequently, the fingers 8 accompany the lower sheet as far as the top of the underlying pile and support the upper sheet during deposition. The movement carries the fingers 8 below the pockets 4 up to a position of temporary stop wherein, one or more pivots 13 are inserted between the already partially separated piles to allow the removal of the underlying pile.

The offsettings between the bottoms of the pockets on the disks, together with said means to separate the piles of sheets, provide the device with a great precision in all applications, independently from the operation speed of the device and from the materials constituting the sheets.

Claims

1. A device for storing sheets in piles by rotary machines, comprising: at least a conveyor belt at the outlet of which a plurality of equal disks, coaxially and axially spaced from each other is provided, each disk carrying receiving pockets volutedly arranged towards the outside; and one or more fixed retaining elements projecting between said disks in correspondence to a discharging station of said sheets, characterized in that the bottom of at least one pocket in each of said disks is offset in a radial direction, towards the disk center, with respect to the bottom of the adjacent preceding pocket, in the direction of rotation of the disks themselves; and in that at least a separating means for sheet piles sheets is able to be inserted in correspondence with said retaining elements, in the space between said offset pocket bottoms, said separating means following subsequently the sheets further deposited out of the pockets.
2. A device according to claim 1, characterized in that the number of pockets comprised between two of said subsequent offsettings is equal to the number of sheets in each pile, or is a submultiple of said number of sheets.
3. A device according to claim 1 or 2, characterized in that the bottoms of the pockets comprised between two of said subsequent offsets, in the direction of rotation of the disks, are

constituted by curved surfaces with a radius of increasing size.

4. A device according to one of the preceding claims, characterized in that said pockets having bottoms respectively offset define in each of said disks a closed space, not to be occupied by any sheet, comprising said offsetting. 5
- 10
5. A device according to one of the preceding claims, characterized in that said separating means are movable between said disks and synchronized therewith, according to a prefixed cyclic run from an upper position in correspondence to said offsetting to a lower position below said pockets. 15
6. A device according to one of the preceding claims, characterized in that said separating means comprise one or more fingers that can be inserted between the piles of sheets. 20
7. A device according to any of the preceding claims, characterized in that said separating means are associated with means to remove the piles. 25
8. A device according to claims 6 and 7, characterized in that said means to remove the piles comprise one or more pivots insertable between the piles in correspondence with said one or more fingers. 30

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Fig. 1

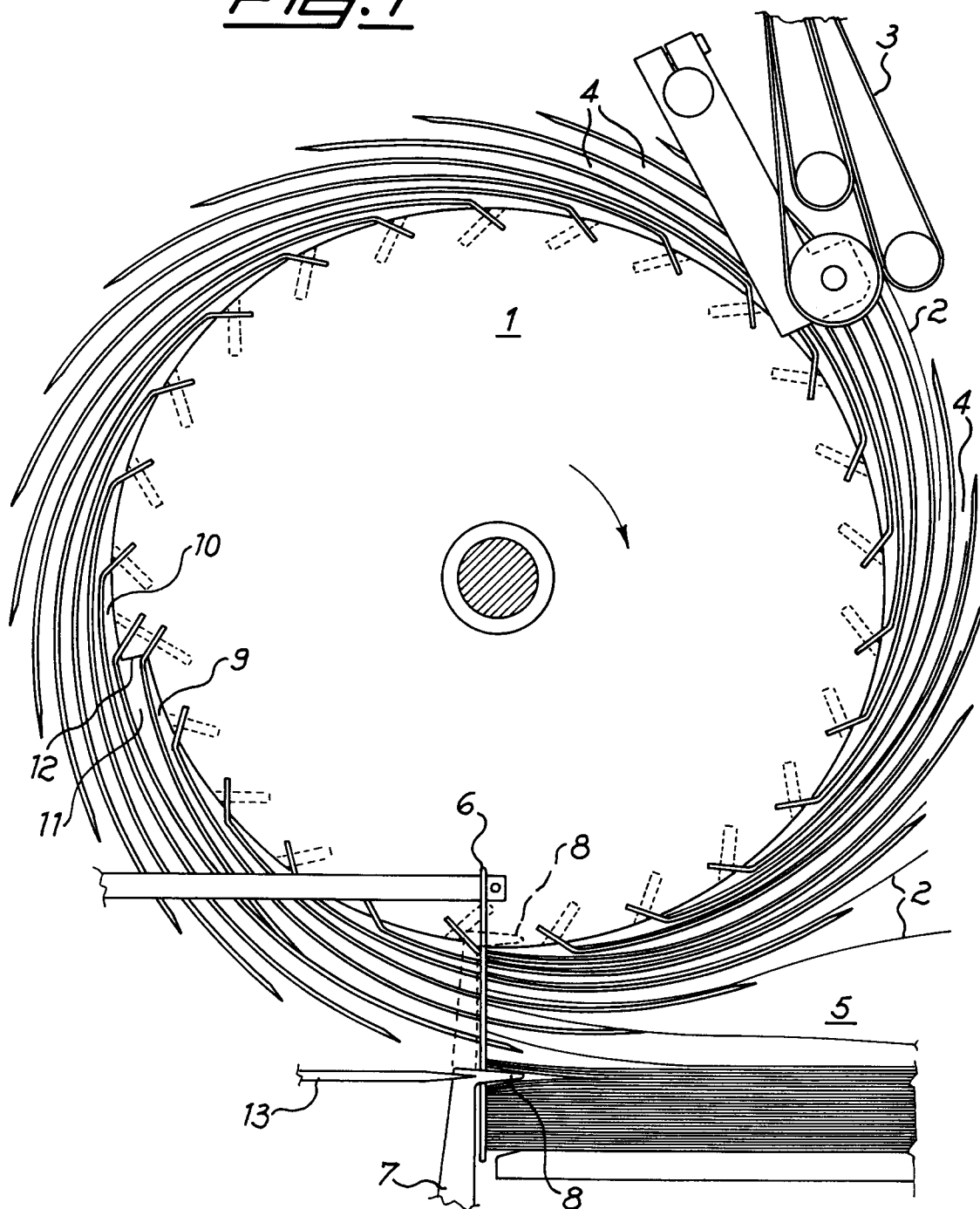


Fig. 2

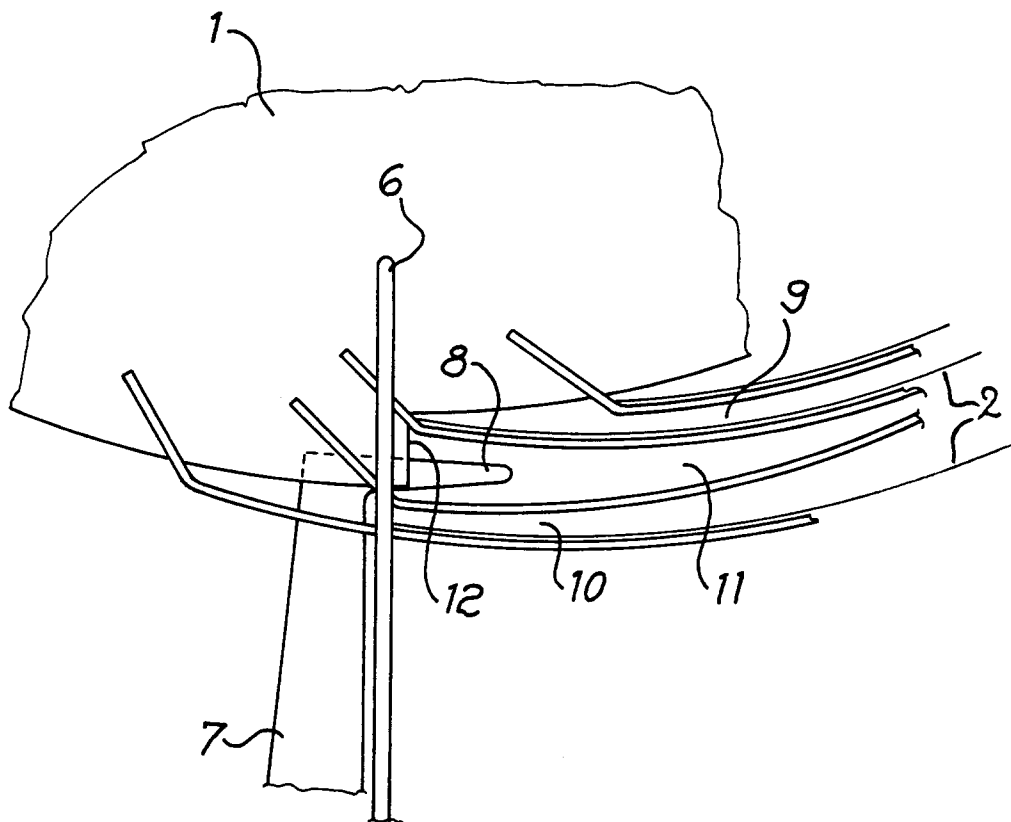
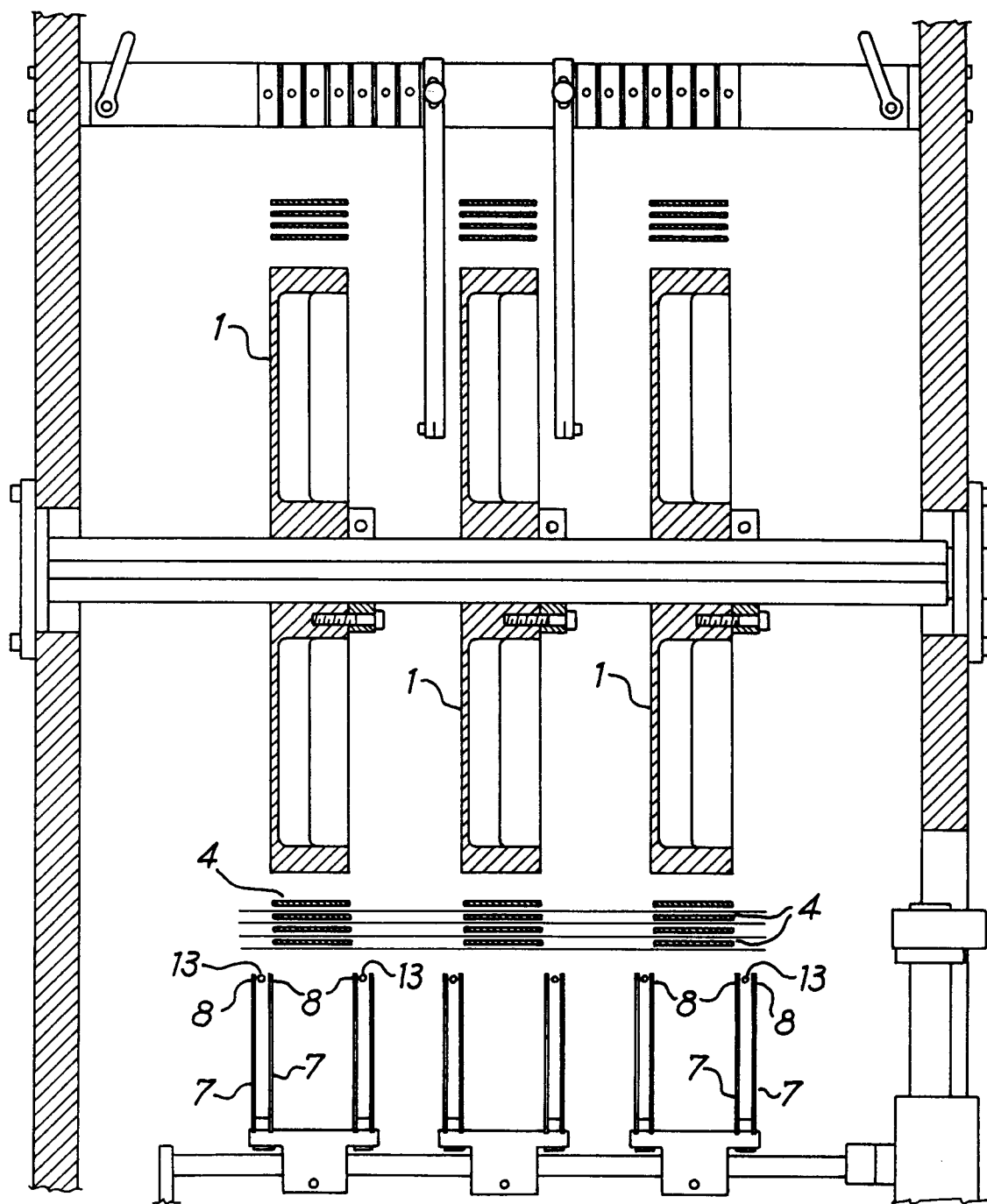


Fig. 3





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EUROPEAN SEARCH REPORT

Application Number

EP 92 83 0142

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)
X	WO-A-9 204 265 (PROCTER & GAMBLE)	1-3	B65H29/40
Y	* abstract; figures 1,5 *	5-8	B65H31/32

A	EP-A-0 102 814 (KABUSHIKI KAISHA TOSHIBA)	1	
Y	* abstract; figures 1,7,8 *	5-7	

Y	EP-A-0 392 139 (JAGENBERG)	8	
	* abstract; figures 6-11 *		

			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			B65H B41F
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 18 DECEMBER 1992	Examiner HAGBERG A.M.E.
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	