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(54) **Unit, such as a facsimile unit, with a thermal printing device**

(57) Unit, for example facsimile unit, having a thermal printing device (6) comprising a strip-shaped thermal printing head (7) which is pressed against printer roller (9) in a sprung fashion, a collection region (28) for printed sheets (31) of paper which is arranged adjacent to the printer roller (9) and in which the conveying path (24) of the sheets of paper is deflected by a preferably acute angle (α), and a thermal transfer film (14) which is wound onto a first, rotatably mounted roll (12) and is guided through between the printer roller (9) and thermal printing head (7) to a second, rotatably mounted roll (15), the thermal transfer film (14) being guided via a

deflection strip (27) which is arranged between the printer roller (9) and second roll (15) and this deflection strip (27) being arranged in such a way that the thermal transfer film (14) extends in the direction of the collection region (28) in the section between the printer roller (9) and the deflection strip (27), and in the direction away from the collection region (28) in the section between the deflection strip (27) and the second roll (15), the collection region (28) being kept free of devices for conveying printed sheets (31) of paper onwards, and at least one securing means being arranged in the collection region (28).

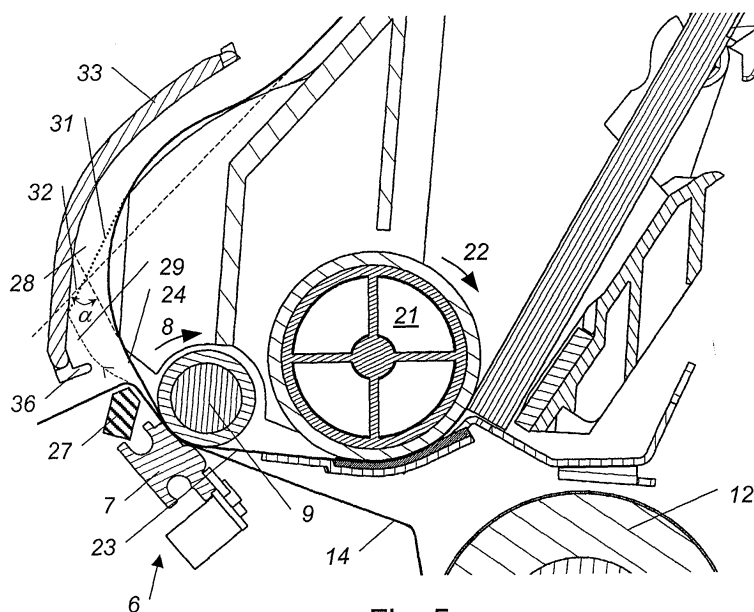


Fig. 5

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Description

[0001] The invention relates to a unit, for example facsimile unit, having a thermal printing device comprising a strip-shaped thermal printing head which is pressed against printer roller in a sprung fashion, a collection region for printed sheets of paper which is arranged adjacent to the printer roller and in which the conveying path of the sheets of paper is deflected by a preferably acute angle, and a thermal transfer film which is wound onto a first, rotatably mounted roll and is guided through between the printer roller and thermal printing head to a second, rotatably mounted roll, the thermal transfer film being guided via a deflection strip which is arranged between the printer roller and second roll and this deflection strip being arranged in such a way that the thermal transfer film extends in the direction of the collection region in the section between the printer roller and the deflection strip, and in the direction away from the collection region in the section between the deflection strip and the second roll.

[0002] According to the previously known prior art, devices for conveying the printed sheets of paper onwards are provided in the collection region for printed sheets of paper. Said devices have the purpose of moving a printed sheet of paper onwards as soon as it has disengaged from the printer roller. Conveying the sheets of paper onwards in this way ensures that the rear edge of the printed sheet of paper is largely lifted off from the thermal transfer film and as a result cannot be soiled by it, and that subsequent printed sheets can be stored in an ordered fashion and printed and moved onwards from the printer roller without the risk of paper jams forming.

[0003] Such conveying devices require a considerable degree of expenditure on components, which on the one hand increases the manufacturing costs of the unit and on the other hand constitutes an additional source of faults.

[0004] The object of the present invention is to disclose a unit of the type specified at the beginning whose collection region for printed sheets of paper has a particularly simple configuration. However, the invention is nevertheless to ensure that completely printed sheets of paper are lifted off from the thermal transfer film and kept out of the movement path of subsequent printed sheets of paper.

[0005] This is achieved according to the invention in that the collection region is kept free of devices for conveying printed sheets of paper onwards, and in that at least one securing means is arranged in the collection region.

[0006] By completely dispensing with driven conveying devices in the collection region it is possible to reduce the expenditure on components which is associated with the manufacture of the unit, as a result of which the functional reliability and service life of the unit will also improve.

[0007] In one development of the invention it is possible to provide for the securing means to comprise a supporting face, permitting undesired contact between the rear edge of the sheets of paper and the thermal transfer film to be easily avoided.

[0008] According to another refinement of the invention it is possible to provide for the securing means to comprise a supporting projection. The supporting projections are components which can be manufactured very easily and at very low cost. As - in contrast to known conveying devices - they are not driven components but rather fixed stationary ones, they have a high level of functional reliability and a long service life.

[0009] According to one particularly preferred refinement of the invention it is possible to provide for the supporting projection and/or the supporting face to be secured on the housing-intermediate wall which bounds the collection region. It is therefore not necessary to provide any specific devices for securing the supporting projections and/or supporting faces but rather housing parts which are present in any case are used for this, which also entails a reduction in the expenditure associated with the implementation of the invention.

[0010] In a further refinement of the invention it is possible to provide for the securing means to comprise at least one roller with a return motion blocking element or the like. This enables the sheets of paper to be reliably prevented from slipping back.

[0011] According to yet another embodiment of the invention it is possible to provide for the securing means to comprise a labyrinth paper guide, which also enables the sheets of paper to be easily prevented from slipping back.

[0012] The invention is explained in more detail below with reference to the appended drawings in which a particularly preferred exemplary embodiment is described. In said drawings:

Fig. 1 shows a cross section through a first embodiment of a unit according to the invention with a supporting projection;

Fig. 2 shows a cross section through a second embodiment of a unit according to the invention with a roller with a return motion blocking element;

Fig. 3 shows a cross section through a third embodiment of a unit according to the invention with a labyrinth paper guide;

Fig. 4 shows a cross section through a fourth embodiment of a unit according to the invention with a supporting face; and

Fig. 5 shows an enlarged view of the region about the printer roller, thermal printing device and collection region of the unit according to Fig. 1.

[0013] Figs. 1 to 5 are schematic illustrations of embodiments of a unit 1 which can be used in particular as a facsimile unit. The unit 1 contains a thermal printing device 6 which is provided with a thermal printing head

7. This thermal printing head 7 has an essentially strip-shaped design and can be used to print using dots. This printing is carried out on a blank sheet which can be driven incrementally using a printer roller 9 which can be driven in the direction of the arrow 8, that is to say in the clockwise direction. The printer roller 9 interacts with the thermal printing head 7. The printing device 6 is held against the printer roller 9 using spring means so that the thermal printing head 7 is pressed in a sprung fashion against the printer roller 9.

[0014] In the thermal transfer printing method which can be carried out using the thermal printing head 7, a thermal transfer film 14 is heated at certain points using the thermal printing head 7, resulting in a wax-like ink which is connected to the thermal transfer film 14 being transferred to the blank sheet to be printed. The aforesaid thermal transfer film 14 is wound onto a first roll 12, the first roll with the supply of thermal transfer film 14 being supported by an unwinding mandrel 13. This unwinding mandrel 13 is rotatably mounted with the result that the roll 12 is also rotatably mounted. From the first roll 12, the thermal transfer film 14 is guided through between the printer roller 9 and thermal printing head 7 to a second roll 15 which is supported by a winding mandrel 16 which is also rotatably mounted. The winding mandrel 16 can be driven from the printer roller 9 in the direction of an arrow 18 by means of a gearwheel mechanism.

[0015] A deflection strip 27, by means of which the thermal transfer film 14 is guided, is arranged between the printer roller 9 and the second roll 15. This deflection strip 27 is arranged in such a way that the thermal transfer film 14, in the section between the printer roller 9 and the deflection strip 27, extends in the direction of a collection region 28 for printed sheets of paper which is arranged adjacent to the printer roller 9, and extends away from this collection region 28 in the section between the deflection strip 27 and the second roll 15.

[0016] In order to print a blank sheet, such a blank sheet must be removed from a blank-sheet receptacle 19 which contains a stack 20 of such blank sheets, that is to say a blank sheet must be separated. For this reason, the unit has a blank-sheet-separating roller 21 which can be driven in rotation in the direction of an arrow 22, that is to say also in the clockwise direction. Using the blank-sheet-separating roller 21, the respective uppermost blank sheet of the stack 20 of blank sheets can be removed from the blank-sheet receptacle 19 and conveyed into the region between the printing head 7 and printer roller 9 (= blank-sheet infeed). As soon as a blank sheet has reached the printer roller 9, the blank sheet to be printed on is driven onwards using the printer roller 9, the blank-sheet-separating roller 21 then being deactivated in terms of drive, as is already known per se of such devices. A blank sheet is moved onwards along the conveying path 23 between the blank-sheet receptacle 19 and the printer roller 9. After the blank sheet has been printed on, the printed sheet of paper is

moved onwards along the conveying path 24. This conveying path 24 extends through the collection region 28 and is deflected by an angle α within this collection region 28. More details will be given below on the size of this deflection angle α .

[0017] The present invention relates to the handling of a printed sheet 31 of paper - indicated by dotted lines in Fig. 5 - as soon as the said sheet 31 of paper has left the printer roller 9 and thermal printing head 7.

[0018] According to the previously known prior art, devices for conveying printed sheets 31 of paper onwards were provided in the collection region 28. Said devices were generally two or more rollers which bore against one another, clamped in the printed sheets 31 of paper between them and conveyed said sheets 31 of paper onwards as they were driven in rotation. The invention provides that such devices for conveying printed sheets 31 of paper onwards will not be provided, that is to say that the collection region 28 will be kept free of such conveying devices.

[0019] A printed sheet 31 of paper is in any case conveyed onwards by the printer roller 9 as long as it is engaged with it, and said sheet 31 of paper is thus pushed into the collection region 28. The deflection of its conveying path 24 which takes place there arches and prestresses the printed sheet 31 of paper as it inherently has the tendency to align itself again. When the lower edge 32 of the sheet 31 of paper has left the printer roller 9 or the region in which the printer roller 9 bears against the thermal printing head 7, it bears against the thermal transfer film 14 and can firstly be conveyed onwards from it as far as the deflection strip 27. When the lower edge 32 of the sheet 31 of paper reaches the deflection strip 27, the sheet 31 of paper can relax, as a result of which its lower edge 32 is swivelled in the direction of the arrow 29, causing the sheet 31 of paper to slide off the deflection strip 27 (cf. dotted representation of the sheet 31 of paper in Fig. 5).

[0020] In order to prevent the rear edge 32 of the sheet 31 of paper being able to slip back as far as the thermal transfer film 14 and being blackened by it, at least one securing means is arranged in the collection region 28.

[0021] In the embodiment of the unit according to the invention which is illustrated in Fig. 4, the securing means comprises a supporting face 35 against which the rear edge 32 can support itself. The reliability of the securing means can be improved if the rear edge 32 of the sheet 31 of paper comes to rest on a supporting projection 36 which is arranged adjacent to and at a relatively small distance from the deflection strip 27.

[0022] The supporting face 35 and/or the supporting projection 36 could be designed so as to extend over the entire width of the thermal transfer film 14, however, in order to perform the function just presented, it is sufficient to provide two relatively small securing means, in particular supporting faces 35 and/or supporting projections 36 which are arranged at the level of the two edge

regions. As the housing-intermediate wall 33 which bounds the collection region 28 is made to extend relatively close to the deflection strip 27 in the exemplary embodiment in the enclosed drawings, the supporting face 35 and/or the supporting projection 36 can be secured to it. However, this is not a compulsory embodiment, and the supporting face 35 and/or the supporting projection 36 could also be secured to carriers especially provided for them or to the external wall of the housing.

[0023] The size of the angle α by which the conveying path 24 is deflected within the collection region 28 can be derived from what has been explained above: this deflection must be of such a degree that printed sheets 31 of paper are prestressed to such an extent that when they reach the deflection strip 27 they swivel their lower edge 32 over the supporting face 35 and/or the supporting projection 36. In the exemplary embodiment in Fig. 5, the angle α is an acute angle.

[0024] Furthermore, the position and size of the supporting face 35 and/or of the supporting projection 36 must be selected so as to correspond to the aforementioned function, which is however within the scope of the expertise of a person skilled in the art and can very easily be found out through appropriate sequences of trials. The supporting face 35 and/or the supporting projection 36 are also dimensioned in such a way that a plurality of sheets 31 of paper can be stored simultaneously on them. It is thus also possible to carry out relatively large printing jobs without each printed sheet 31 which is produced in the process having to be removed by hand immediately after its completion, the printed sheets being stored in the correct sequence, in contrast with the prior art.

[0025] In the embodiment of the unit 1 shown in Fig. 2, the securing means comprises two rollers with a return motion blocking element 37. When the sheet 31 of paper is conveyed from the printer roller 9 and the thermal transfer film 14 into the collection region 28, the rollers 37 are moved by the sheet 31 of paper. After the rear edge 32 has reached the deflection strip 27, the rollers 37 prevent the sheet 31 of paper from slipping back. Instead of two rollers 37, it is also possible to provide just one roller 37 or a plurality of rollers 37.

[0026] The slipping back of the sheet 31 of paper can also be prevented by a labyrinth paper guide 38, as is illustrated schematically in Fig. 3. The sheet 31 of paper is held in the labyrinth here.

[0027] In other embodiments, the collection face 35, the supporting projection 36, the roller with return motion blocking element 37 or the like and the labyrinth paper guide 38 can be combined, it being possible to provide two or more of the holding means.

[0028] The invention which constitutes the subject matter is not restricted to the application in facsimile units illustrated in the appended drawings. It can instead also be used in any desired unit with a thermal printing device, for example in a computer printer constructed

according to this principle.

Claims

1. Unit, for example facsimile unit, having a thermal printing device (6) comprising a strip-shaped thermal printing head (7) which is pressed against printer roller (9) in a sprung fashion, a collection region (28) for printed sheets (31) of paper which is arranged adjacent to the printer roller (9) and in which the conveying path (24) of the sheets of paper is deflected by a preferably acute angle (α), and a thermal transfer film (14) which is wound onto a first, rotatably mounted roll (12) and is guided through between the printer roller (9) and thermal printing head (7) to a second, rotatably mounted roll (15), the thermal transfer film (14) being guided via a deflection strip (27) which is arranged between the printer roller (9) and second roll (15) and this deflection strip (27) being arranged in such a way that the thermal transfer film (14) extends in the direction of the collection region (28) in the section between the printer roller (9) and the deflection strip (27), and in the direction away from the collection region (28) in the section between the deflection strip (27) and the second roll (15), **characterized in that** the collection region (28) is kept free of devices for conveying printed sheets (31) of paper onwards, and **in that** at least one securing means is arranged in the collection region (28).
2. Unit (1) according to Claim 1, **characterized in that** the securing means comprises a supporting face (35).
3. Unit (1) according to Claim 1 or 2, **characterized in that** the securing means comprises a supporting projection (36).
4. Unit (1) according to Claim 3, **characterized in that** the supporting projection (36) and/or the supporting face (35) (is) are secured on the housing-intermediate wall which bounds the collection region (28).
5. Unit (1) according to one of Claims 1 to 4, **characterized in that** the securing means comprises at least one roller with a reverse motion blocking element (37) or the like.
6. Unit (1) according to one of Claims 1 to 5, **characterized in that** the securing means comprises a labyrinth paper guide (38).

Fig. 1

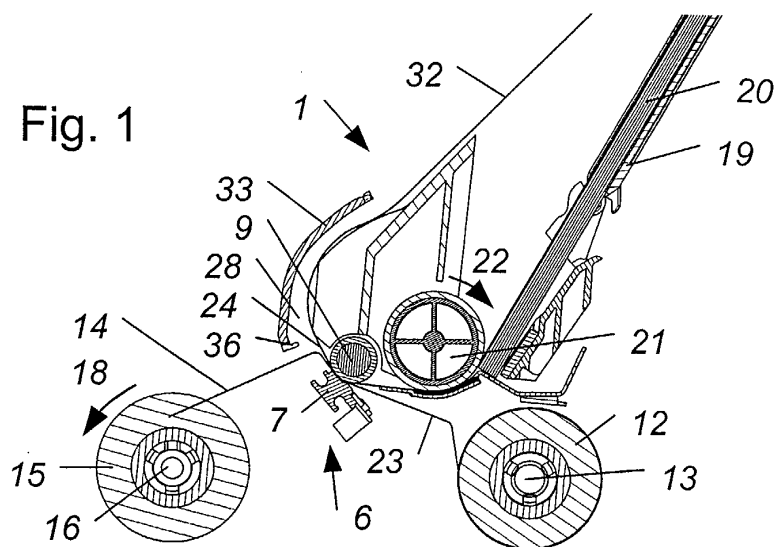


Fig. 2

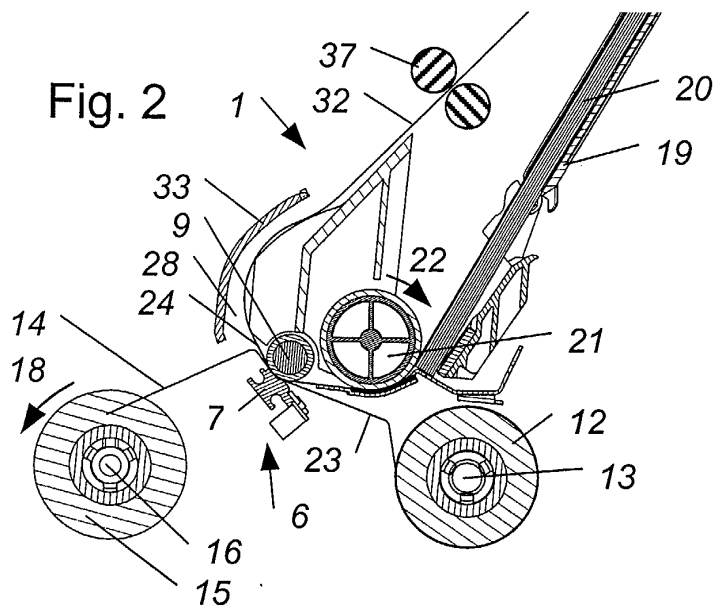
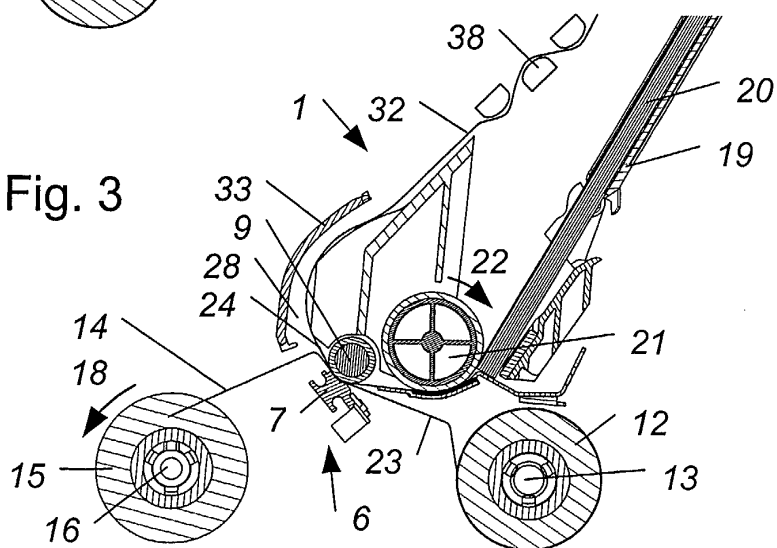


Fig. 3



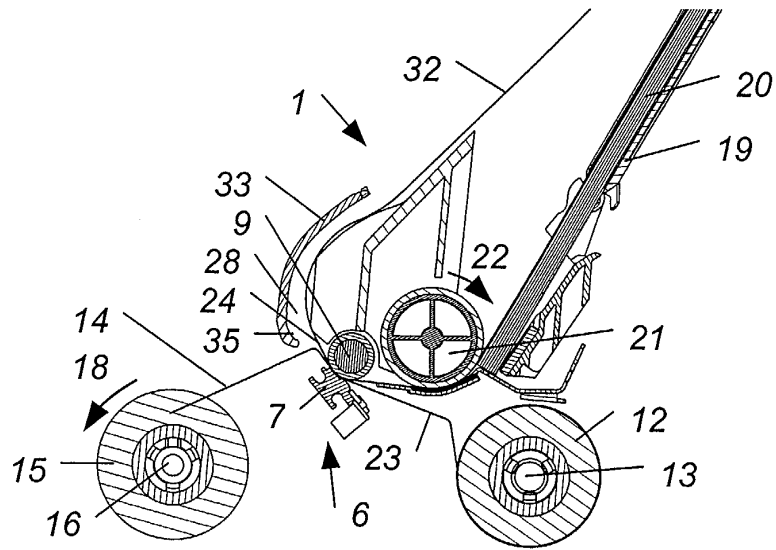


Fig. 4

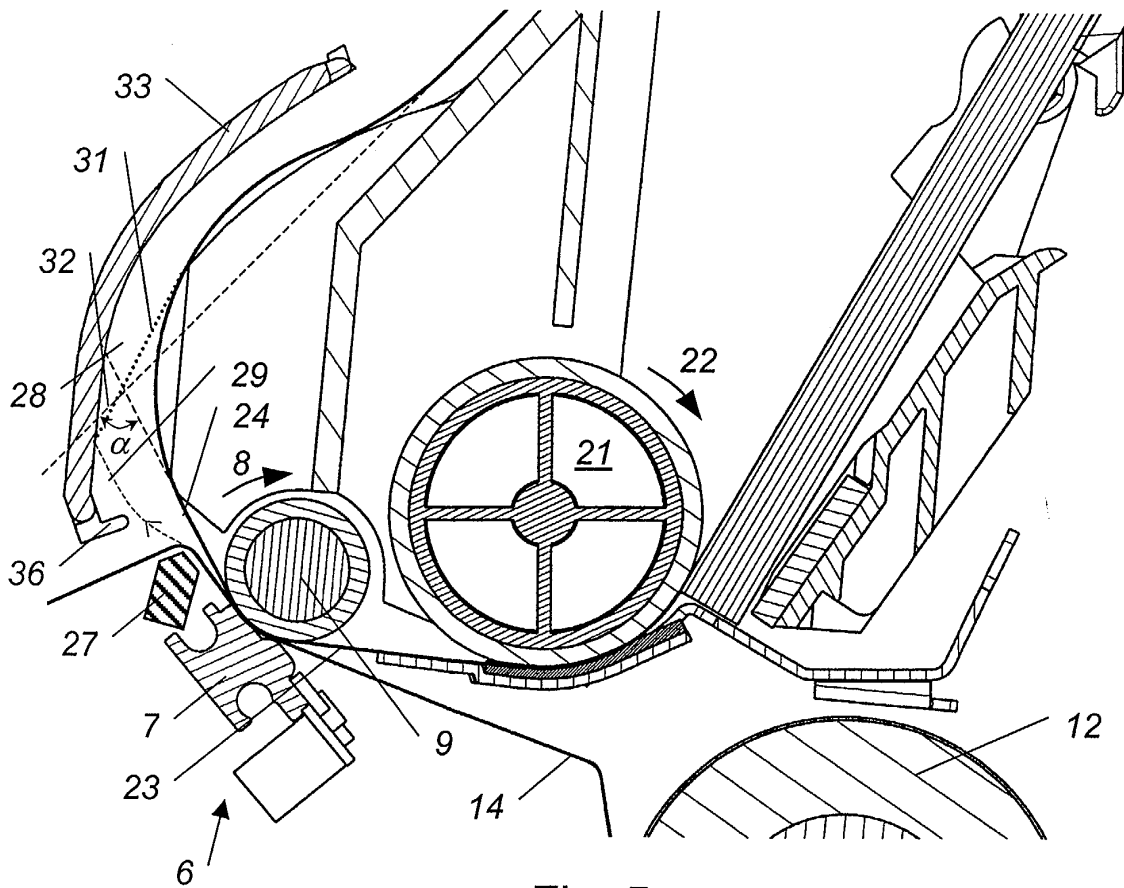


Fig. 5



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EUROPEAN SEARCH REPORT

Application Number
EP 03 29 0574

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.7)
X	US 5 959 652 A (PRIVIN DAVID) 28 September 1999 (1999-09-28) * column 7, paragraph 2 - paragraph 4; figures 2,3 *	1-4	B41J13/10 B41J17/28
X	US 5 667 321 A (SAGO AKIRA) 16 September 1997 (1997-09-16) * column 3, paragraph 2 - column 4, paragraph 1; figure 2 *	1-4	
			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
			B41J
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 31 July 2003	Examiner Wehr, W
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EP 03 29 0574

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31-07-2003

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US 5959652	A	28-09-1999	NONE	
US 5667321	A	16-09-1997	JP 8301497 A	19-11-1996

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