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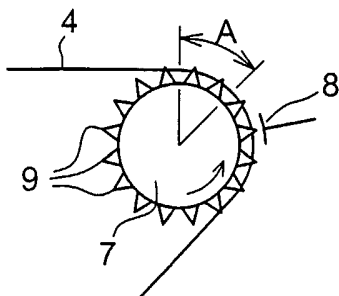
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(54) Title: METHOD AND DEVICE FOR CONVEYING A STRIP OF CARDS IN A CARD-STICKING MACHINE



(57) Abstract: In a method and device for conveying a strip (4) of cards in a card-sticking machine (1), there is a driven register drum (7) with pins (9) projecting radially with respect to its surface. The strip of cards is guided over the surface of the register drum (7), the pins (9) being adapted to interact with register holes, which are present in the strip of cards. The pins (9) make the register holes in the strip of cards. For this purpose, the pins are pointed, toothed or in blade form. There is no frictional coupling between the strip of cards and the register drum.



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Method and device for conveying a strip of cards in a card-sticking machine

5

The present invention relates to a development in the field of card-sticking machines, and relates in particular to a method and device for automatically applying cards, preferably made from flexible, sheet-like material, for example from paper or
10 thin cardboard, with the aid of a card-sticking machine, to a web of paper which is moving through a (rotary) printing installation and from which an end product, for example a printed, published or information product is produced.

15 Card-sticking machines of this type are known, for example, from US-A 4,351,517 ("Neal"), US-A 5,968,307 ("Siler"), EP-A 0 949 178 ("Siler") and GB-B 990 140 ("BARR"). For this purpose, a strip comprising a large number of cards which are located one behind the other in the longitudinal direction is
20 fed to a card-sticking machine of this type, and in the card-sticking machine the cards are successively separated one by one from the strip before each being secured to a subsequent repeating web length, which forms a page and is advanced through the (rotary) printing installation or the like (for example
25 intaglio printing, offset, heat-offset or cold-offset), of the web of material. Partly as a result of the particularly high operating speed (90 000 cards per hour or more), the cards in the strip of cards are attached to one another by means of a tearable perforation or other weakened line running in the
30 transverse direction of the strip of cards, so that the cards can easily, quickly and reliably be separated from one another in the card-sticking machine by being torn off one another.

The card is applied to the web of material using the card-sticking machine after the web of material has passed through
35 one or more printing units in the printing installation, in which an image, text or the like is applied, for example using printing ink, and before said web of material is divided into the individual pages/sheets for the end product.

Identical information, images and the like can be applied to the repeating web length, but this is not a requirement. In the above text, the term repeating web length is to be understood as
5 meaning that the web of material is intended subsequently to be divided into separate leaves/sheets/pages.

A characteristic feature is that in general the cards are only fixed to the repeating web length over a small part of their
10 surface area, generally less than 50%, or even less than 25% or indeed less than approximately 10% of their surface area. A hotmelt adhesive, which is applied to the cards in the card-sticking machine using a metering nozzle mounted therein, generally before the cards are detached from one another, is
15 generally used to secure the cards to the web. In general, the cards are secured using a strip of adhesive which runs in the longitudinal direction, so that they can easily be removed from the end product at a later time. However, it is also possible for the card to be secured to the web of material at various
20 positions in a longitudinal or transverse direction, so that the card remains reliably flat on the web of material.

The cards are generally rectangular, elongate and smaller than A4 or A5 format (for example approximately 14 cm long). The
25 quality is generally between 80 and 500 g/m². The quality of the web of paper to which the card is secured is generally below 150 g/m².

As is known, the card-sticking machine includes, on its feed
30 side, what is known as a register drum, over which the strip of cards is guided (preferably substantially without any slipping) in order for the strip of cards to be conveyed. The rotational speed of the register drum is controlled by a control device of the card-sticking machine in order to enable the advancing
35 movement of the cards through the card-sticking machine to be synchronized with the advancement speed of the repeating web length as it passes through, so that each card is applied to substantially the same location on the repeating web length. It should be clear that the control unit of the card-sticking

machine generally sets the circumferential velocity of this register drum and therefore the speed at which the strip of cards is supplied to the card-sticking machine to be considerably lower than the advancement velocity of the repeating web length passing through, since the card length generally is considerably shorter than the repeating web length. Further details on this synchronization and/or the maintenance of a phase relationship between the strip of cards and the repeating web length can be found in EP-A 0 949 178 (in particular Figs. 7 and 8, and the associated description) or in the manual dated 4 May 1992 for the Electrocard card-sticking machine, model 763, marketed by Hurletron, Inc. of Danville, Illinois, United States of America.

According to US-A 4,351,517 ("Neal") or GB-B 990 140 ("BARR"), for example, the register drum may be designed with blunt pins which project radially from its surface and are adapted to interact with register holes which have previously been formed in the strip of cards. These register holes are round with a diameter of 3.2 mm (1/8 inch) and a pitch of 12.7 mm (1/2 inch), corresponding to the world standard for "tractorfeed". According to US-A 5,968,307 ("Siler"), for example, the register drum may be designed without register pins, so that there is no need for register holes to previously have been formed in the strip of cards.

It is an object of the invention to provide an alternative way of conveying the strip of cards in a card-sticking machine using a driven register drum with pins which project radially from its surface.

According to the invention, this object is achieved by designing, for example shaping, the pins in such a manner that they are suitable for making register holes in the strip of cards, preferably of a considerably smaller dimension than the register holes of world standard format which have been used hitherto, preferably narrower or shorter by a factor of 10. In a variant, these pins may be adapted for interacting with register holes in the strip of cards which are considerably smaller than

- the register holes of world standard format which have been used hitherto, preferably narrower or shorter by a factor of 10. In a further development, these register pins may be suitable for making register holes in the strip of cards or processing
- 5 register holes which are present in the strip of cards in such a manner that a tearable perforation or other weakened line is formed in the strip of cards, preferably extending in the longitudinal direction of the strip of cards.
- 10 Register holes which are considerably smaller than those of world standard format which have been used hitherto are to be understood as meaning, inter alia, a shape comparable to that of a tearable perforation in, for example, toilet paper or 80-grams
- 15 3.0 mm), in order to have the appearance of a tearable perforation. It will be clear that with register holes with a format corresponding to a tearable perforation, the width of the register holes (i.e. the dimension in the plane of the material perpendicular to the direction of advance of the card through
- 20 the card-sticking machine) is smaller by a factor of more than 10 than the width of register holes of world standard format (approximately 0.1 mm compared to 3.2 mm).

The register holes are in the form, for example, of small slots

25 or incisions, i.e. with a width which is considerably narrower than their length, for example a width which is less than 10%, preferably less than 5%, of their length. In an expedient embodiment, the length of the holes is less than approximately 2 mm, preferably less than approximately 1 mm, and the width of

30 the holes is less than approximately 0.5 mm, preferably less than approximately 0.2 mm. The slots, incisions or the like do not necessarily extend through the entire thickness of the card.

Therefore, the invention achieves, inter alia, one or more of

35 the following objectives: a more attractive appearance of the cards secured in the printed product; simpler production of the strip of cards, since there is no need for register holes to be formed in them in advance; easier removal of the cards from the

printed product; more reliable operation of the card-sticking machine.

The register pins preferably have the ability to cut, perforate
5 or puncture the material of the strip of cards. For this purpose, they may be pointed, toothed or in blade form, for example may be elongate when seen from above and/or triangular when seen from the side. They may have one or more cutting edges. In a preferred embodiment, the register pins are formed
10 by a wheel which is coaxial with the register drum and has cutting teeth on its radial circumference, for example as is currently used to make a tearable perforation in a web of material. This wheel may be integrated with the register drum. Given this information, the person skilled in the art will be
15 readily able to develop the desired register pins, and consequently there is no need to provide any further details in this respect.

Surprisingly, it has been found that with register pins of this
20 type moving synchronously with the register drum, a strip of cards can be reliably advanced through the card-sticking machine in the desired way, then separated and applied to the desired location on the end product. It has also been found that register pins of this type alone are sufficient to transmit the
25 required driving power to the strip of cards, and consequently there is no need for frictional coupling between the strip of cards and register drum, as stipulated by US-A 5,968,307.

It is preferable for a pressure-exerting means to be located
30 opposite the register drum, so that the strip of cards moves into the gap between the two components, the said pressure-exerting means being adapted to keep the strip of cards pressed onto the register pins. The pressure-exerting means preferably acts over a relatively small section of the width of the strip
35 of cards, for example less than 25% or less than 15% of said width. It is preferable for the said pressure-exerting means to be formed by a stationary pressure-exerting surface, such as a pressure-exerting shoe, along which the strip of cards slides, and if appropriate with a low-friction sliding surface, for

example comprising Teflon®. It is preferable for the sliding surface to be of elastically yielding design, for example to be covered with a material which can easily be compressed elastically. In a preferred embodiment, therefore, the pressure-exerting surface is brush-like or loop-like. The pressure-exerting means also functions as a tearing initiator and to prevent imbalance during tearing. Without the pressure-exerting means, a considerably higher tensile force is required in the strip of cards to separate the cards along the tearable perforation. The pressure-exerting means preferably acts in the region of the register pins.

The invention is explained in more detail below on the basis of a currently advantageous exemplary embodiment which is shown in the drawing and which, it should be clear, is not intended to restrict the scope of the invention. In the drawing:

Fig. 1 shows a diagrammatic side view of the most important components of a card-sticking machine;

Fig. 2 shows a section of a strip of cards in plan view; and

Fig. 3 shows a detail from Fig. 1.

In the drawing, the arrows drawn indicate the usual direction of movement.

25

As illustrated by Figs. 1, 2 and 3, a card-sticking machine 1 is incorporated in a rotary printing press (not shown; for example for intaglio printing, offset or cold-set) for printing newspapers, magazines or the like, at a position which is such that the web of paper 2 which has been unwound from a stock reel and printed by printing units (for example provided with printing rollers) passes through the machine 1 in the direction indicated by the dashed line and by the arrow, on its way to the downstream cutting, binding and finishing stations and the like. On arrival at the machine 1, the web 2 is printed with a predetermined pattern (the imprint) in each case at a predetermined repeat length, which repeat length corresponds to a page or an integer multiple thereof in the end product. Pre-printed cards 3 are also supplied to the card-sticking

machine 1 in the form of a single row of cards 3 which has been formed into a continuous strip 4 (cf. in particular Fig. 2), which advances in the direction indicated by the arrow. Within this strip 4, the cards 3 are attached to one another by a transversely running tearable perforation 10. In the machine 1, the leading card 3 in the strip 4 is in each case pulled off along the tearable perforation 10 after adhesive has been applied to this card 3, and the said card 3 is then stuck onto the web 2. This sticking is carried out in such a manner that a card 3 is always stuck to each repeat length of the web 2 at least at substantially the same position (cf. for example Fig. 2 of EP-A 0 949 178).

The strip 4, which is supplied from a stock (not shown) and is not provided with register holes, passes over freely rotating guide rolls 5, 6 and then moves into the nip between a rotationally driven drive or register drum 7 and a stationary sliding shoe 8. The register drum 7 includes register pins 9 which are aligned in the radial circumferential direction, project radially from its surface and maintain a space between them (cf. in particular Fig. 3), and these pins, as the drum 7 rotates, successively penetrate through the strip 4 so as to form register holes, so that the strip 4 is pulled out of the stock by the pins 9 while the sliding shoe 8 holds the strip 4 pressed onto the pins 9. The register pins 9 are located on the circumference of a flat circle or wheel which is integrated with the drum 7. A metering nozzle 11 then applies adhesive to the strip 4 carried along with the drive drum 7. An optionally interrupted strip of adhesive 13 is applied using the metering nozzle 11 in the region between longitudinal edge 21 and the tear line 20 which has been made in the strip 4 by the register pins 9, parallel to and at a short distance from the longitudinal edge 21.

The sliding shoe 8 interacts with the strip of cards 4 at a location at an angular distance (denoted by A in Fig. 3) of approximately 80° with respect to the point where the strip 4 leaves the drum 7, as seen in the upstream direction of the strip 4. This angle A may also be larger or smaller, and is

preferably at least 20° or 40°. However, the shoe 8 may also cover the strip of cards 4 over substantially the entire distance over which the strip 4 is in contact with the drum 7 and/or register pins 9.

5

The triangular toothed shape of the pins 9, the flanks of which are formed by cutting edges, can be seen from Fig. 3. Fig. 3 shows the strip of cards 4 at a distance from the register drum 7. In reality, the strip of cards 4 is in contact with the circumferential surface of the drum 7 at least in a partial region of the circle-arc part A.

The strip 4 then moves through the gap between guide plates 14, 15 located above one another, and then passes into the nip between a rotationally driven setting drum 16 and a conveyor belt 22 which moves with it and presses the leading card 3 in the strip 4 onto the drum 16 over a radial circumferential part thereof (for example at least 10°), so that the strip 4 is frictionally locked to the discharge drum 16. The velocity of the circumferential surface of the discharge drum 16 is in this case set to be higher than that of the circumferential surface of the drive drum 7, while it is ensured that there is no or virtually no slipping between strip 4 and drive drum 7 or setting drum 16 (maximum slip 0.1 mm, preferably at most 0.02 mm, most preferably at most 0.01 mm for one or both drums 7, 16), so that a strong pulling action is exerted on the strip in the section between the drums 7, 16, so that the strip gives way at a tearable perforation, with the result that the leading card 3 in the strip 4 is separated off in the region between the drums 7, 16. In this context, it must be clear that the free length of the strip 4 between the drums 7, 16 is at most double the card length.

The sliding shoe 8 also serves for the controlled tearing of the tearable perforation 10 in the region between the drums 7 and 16. On account of the pressure exerted on the strip of cards 4 by the sliding shoe 8, the tearable perforation will start to tear at one location at a relatively low tensile force in the strip 4. Fig. 2 indicates the position in the width direction of

the sliding shoe 8 with respect to the strip 4, from which it is clear that the shoe 8 is located directly above the register pins 9.

- 5 The circumferential surface of the drum 7 is smooth and hard and does not make any contribution to the driving of the strip 4.

To synchronize the advancing movement of the card 3 and the web 2, so that the card 3 is always secured to a repeating web
10 length at the correct position, the machine 1 includes, between the drums 7, 16, a detector 17 which comprises a light sensor 17a and a light beam generator 17b, with the light beam from generator 17b being interrupted by a card 3 moving past, which is recorded by the sensor 17a. It is in this way possible to
15 reliably determine, inter alia, the position between the drums 7, 16 of the leading edge of the first card 3 of the strip 4. The detector 17 also counts the number of cards 3 and controls the metering from the nozzle 11.

- 20 While the separated card 3 is being advanced on the outer circumference of the drum 16 by the latter, the side of the card 3 to which adhesive has been applied comes into contact with the web 2 which is advancing through the nip between the drum 16 and a freely rotating pressure-exerting roll 24, so that it is stuck
25 securely to it and leaves the machine 1 together with the repeating web part.

The machine 1 is controlled in such a manner that the circumferential surface of the drum 16 moves at the same speed
30 as the web 2. For this purpose, the control unit receives information concerning the velocity of the web 2 from the printing press and matches the velocity of the drum 16 to it. The velocity of the circumferential surface of the drum 7 is controlled by the control unit as a function of the position of
35 the card 3 detected by the detector 17, in order to ensure that the card 3 arrives on the web 2 at the correct location. It will be clear that the variation in velocity of the drum 7 for this synchronization is relatively minor compared to the mean

velocity of this drum 7, amounting, for example, to at most 20% thereof.

In a variant which is not shown in the drawing, the drum 7 is
5 equipped with two or more sets of register pins 9, which are
located at an axial distance from one another, and the strip of
cards 4 includes two or more rectilinear patterns 20 of register
holes running parallel to and at a distance from one another,
corresponding to the sets of register pins 9. With, for example,
10 two such sets 9, each in the vicinity of one longitudinal edge
of the strip of cards 4, the operational reliability of the
machine 1 is improved. It has been found that the shoe 8 or
equivalent element only has to be used at one of the sets of
register pins 9.

15

The introduction of the strip of cards 4 into the machine has
also been simplified.

It should be clear that, on the basis of what has been disclosed
20 above, or in response to it, the average person skilled in the
art will be readily able to provide further variants which are
based on this knowledge and also form part of the invention, for
example obtained by omitting and/or replacing with an equivalent
aspect one or more aspects from an embodiment described above or
25 derived therefrom and/or combining one or more aspects of a
first embodiment with one or more aspects of a second
embodiment.

CLAIMS

1. Method for conveying a strip of cards in a card-sticking machine, comprising the steps of:
 - 5 providing a driven register drum with pins which project radially with respect to its surface; and
 - guiding the strip of cards over the surface of the register drum, the pins being adapted to interact with register holes which are present in the strip of cards,
 - 10 characterized in that the pins make the register holes in the strip of cards.
2. Method according to claim 1, in which the pins have a cutting, perforating or puncturing ability.
- 15 3. Method according to claim 1 or 2, in which the pins make register holes which are such that a tearable perforation or other weakened line is formed in the strip of cards.
- 20 4. Method according to claim 1, in which the pins act on register holes which are present in the strip of cards in such a manner that a tearable perforation or other weakened line is formed in the strip of cards.
- 25 5. Method according to claim 3 or 4, in which the tearable perforation or other weakened line extends in the longitudinal direction of the strip of cards.
6. Method according to any of the preceding claims, in which
30 the size of the register holes is narrower or shorter by at least a factor of 10 than the register holes of world standard format.
7. Method according to any of the preceding claims, in which
35 the width of the register holes is less than 10%, in particular less than 5%, of their length.
8. Method according to any of the preceding claims, in which the width of the register holes is less than 0.5 mm.

9. Method according to any of the preceding claims, in which the length of the register holes is less than approx. 2 mm, in particular less than approx. 1 mm, and more particularly less
5 than approx. 0.5 mm.

10. Method according to any of the preceding claims, in which the register holes are in the form of slots or incisions.

10 11. Method according to claim 10, in which the slots or incisions do not extend through the full thickness of the strip of cards.

12. Device for conveying a strip of cards in a card-sticking
15 machine, comprising a driveable register drum with pins projecting radially with respect to its surface, the pins being adapted to interact with register holes which are present in the strip of cards,
characterized in that the pins are adapted to make the register
20 holes in the strip of cards.

13. Device according to claim 12, in which the pins are pointed, toothed or in blade form.

25 14. Device according to claim 12 or 13, in which the pins are elongate when seen from above.

15. Device according to any of claims 12-14, in which the pins are triangular when seen from the side.

30 16. Device according to any of claims 12-15, in which the pins have one or more cutting edges.

17. Device according to any of claims 12-16, in which the pins
35 are formed on the circumference of a wheel which is coaxial with the register drum.

18. Device according to any of claims 12-17, in which a pressure-exerting means is arranged opposite the register drum,

which pressure-exerting means is adapted to hold the strip of cards pressed onto the register pins.

19. Device according to claim 18, in which the pressure-exerting means acts in the region of the register pins.

20. Device according to claim 18 or 19, in which the pressure-exerting means acts over less than 25%, in particular less than 15%, of the width of the strip of cards.

10

21. Device according to any of claims 18-20, in which the pressure-exerting means is formed by a stationary pressure-exerting surface, in particular a pressure-exerting shoe, with a sliding surface along which the strip of cards slides.

15

22. Device according to claim 21, in which the pressure-exerting means is provided with a low-friction sliding surface, in particular a Teflon® sliding surface.

20 23. Device according to claim 21 or 22, in which the sliding surface is of elastically yielding design.

24. Device according to any of claims 18-23, in which the pressure-exerting means is brush-like or loop-like.

25

25. Device according to any of claims 12-24, in which there is no frictional coupling between the strip of cards and the register drum.

30 26. Card-sticking machine, comprising a conveyor device for conveying a strip of cards in the card-sticking machine, the conveyor device comprising a driveable register drum with pins which project radially with respect to its surface, the pins being adapted to interact with register holes which are present in the strip of cards,

35

characterized in that the pins are suitable for making the register holes in the strip of cards.

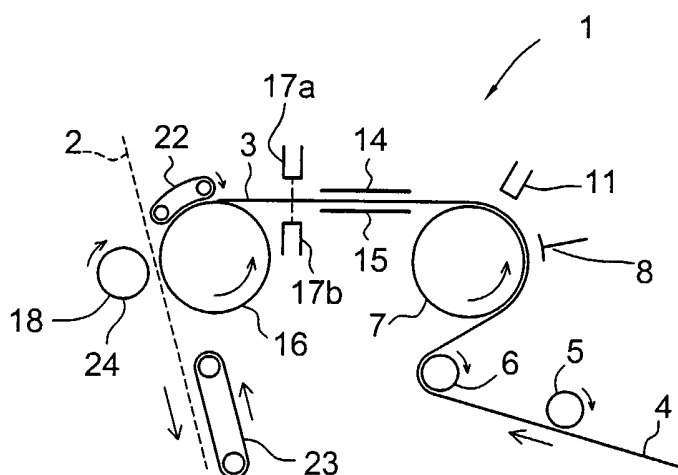


Fig. 1

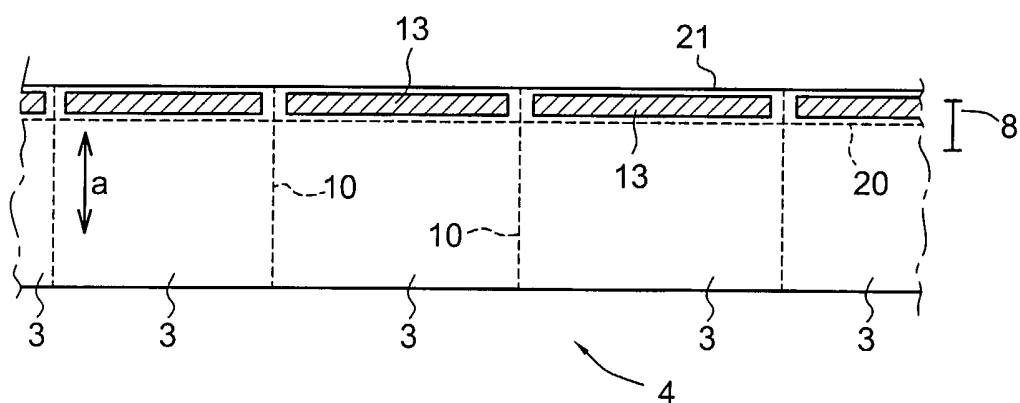


Fig. 2

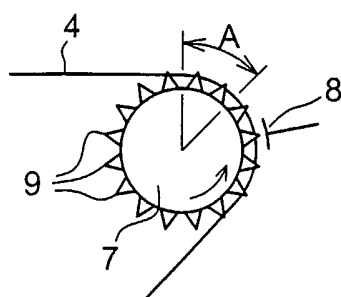


Fig. 3

INTERNATIONAL SEARCH REPORT

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A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 B65H39/14

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 B65H B41J B65C B31B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	GB 990 140 A (MIDLAND ROSS CORP) 28 April 1965 (1965-04-28) cited in the application page 3, line 10 - line 54; figure 1	1,2, 12-14, 18-21, 23,24,26
Y	PATENT ABSTRACTS OF JAPAN vol. 1999, no. 04, 30 April 1999 (1999-04-30) & JP 11 021005 A (SANSEI MACH KK), 26 January 1999 (1999-01-26) abstract	1,2, 12-14, 18-21, 23,24,26
P,A	EP 1 312 570 A (COMMCARD BV) 21 May 2003 (2003-05-21) column 4, line 24 - line 29; figure 1	1,12,26



Further documents are listed in the continuation of box C.



Patent family members are listed in annex.

* Special categories of cited documents:

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Date of the actual completion of the international search

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Date of mailing of the international search report

04/10/2004

Name and mailing address of the ISA

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INTERNATIONAL SEARCH REPORT

Information on patent family members

PCT /NL2004/000352

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
GB 990140	A	28-04-1965	NONE	
JP 11021005	A	26-01-1999	NONE	
EP 1312570	A	21-05-2003	EP 1312570 A2	21-05-2003