

(19)



Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number:

0 375 538
A1

(12)

EUROPEAN PATENT APPLICATION

(21) Application number: **89403545.0**(51) Int. Cl.⁵: **B65C 9/22, G09F 3/02**(22) Date of filing: **19.12.89**(30) Priority: **19.12.88 JP 318579/88**(43) Date of publication of application:
27.06.90 Bulletin 90/26(84) Designated Contracting States:
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F-75008 Paris(FR)(54) **Method of joining two end portions of a label.**

(57) A method of wrapping a label made of a synthetic resin sheet onto a whole outer periphery of a container and joining two end portions of the label. A front end surface portion(A) of the label is overlapped with a rear end surface portion of the label. The front end surface portion (A) consists of a portion (B) on which an ink is applied and a portion (C) in which the synthetic resin sheet portion of the label is substantially exposed. After a solvent to dissolve the synthetic resin is applied onto the rear end back surface portion of the label, the front end surface portion and the rear end back surface portion are joined together.

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METHOD OF JOINING TWO END PORTIONS OF A LABEL

The present invention relates to a method wherein a label made of a synthetic resin sheet is wrapped around the whole periphery of the side surface portion of a container and both end portions of the label are joined to each other by using a solvent to dissolve the synthetic resin sheet.

Beautiful labels are attached to glass bottles, metal cans, or various containers made of synthetic resin. A machine and a method for attaching those labels to the containers have been disclosed in, for instance, U.S. Patent Nos. 4,567,681, 4,574,020, 4,749,428, etc. All of those methods relate to a method of wrapping a label made of a synthetic resin sheet around the whole periphery of the container and joining two end portions of the label, wherein a solvent to dissolve the synthetic resin sheet is coated onto the overlapped portions and the overlapped portions are joined together.

In general, the surface of the label made of the synthetic resin sheet is printed. However, if those printed inks exist in the overlapped portions to be joined, the adhering force is remarkably reduced. Generally, in order to eliminate those inconvenient phenomena, no printing is performed to the overlapped portions to be joined, so that the synthetic resin sheet portion is exposed to the surface. However, in the conventional techniques, it is difficult that the display or graphic image pattern which was printed in the leading edge portion of the label and the display or graphic image pattern which was printed in the trailing edge portion are completely made continuous in the overlapped portions. Therefore, the display function of characters or graphic image patterns as a main function of the label is remarkably limited and the external appearance is also fairly marred.

In other words, when the label made of a synthetic resin sheet is printed in multicolor, in general, the print positions of respective colors are deviated, so that a width of synthetic resin sheet exposed portion C on an overlapped portion A have to be set wider than a width of the overlapped portion A. Since the difference between those widths must be small, in order to accommodate such small difference, extremely difficult works are inevitably required as compared with the ordinary printing work steps. The foregoing graphic image patterns of the label become discontinuous. The uniformity of the label display function as a feature of the label wrapped around the whole periphery such that the display can be seen from every direction of the whole periphery is remarkably injured.

On the other hand, in the case of cutting out one by one the labels made of a synthetic resin

sheet which were continuously printed, it is cut out in accommodation with the printed positions.

However even in such a cutting process itself, the cutting positions are deviated. Therefore, it is demanded to work at an extremely higher accuracy than that in the ordinary cutting work. Further, the label have to be worked also in consideration of the above-mentioned deviation of the print positions. Therefore, in the case of using the ordinary cutting apparatus, the synthetic resin exposed portion C of the label made of the synthetic resin sheet have to be set to be further wider than the overlapped portion A. An inconvenience such that the display function as a main function of the label is injured becomes further noticeable.

As shown in Fig. 6, in addition to the above technique, as a conventional technique, there has also been known a method wherein the printing is also executed to the overlap portion A and a large amount of solvent is coated onto the rear end back surface of the label and the overlapped portion A is joined. However, in this case, the solvent to dissolve the synthetic resin sheet flows out of the overlapped portion, the external appearance is deteriorated, causing wrinkles, holes or the like in the overlapped portion, so that the external appearance as an important performance of goods of the label is remarkably injured.

On the other hand, in the case where, particularly, after joining, a heating treatment is carried out and the label made of synthetic resin sheet is thermally shrunk and wrapped to a container, since the adhering force of the joined portion is weak, in Fig. 11, there occurs a problem such that the overlap joined portions are stretched to the right and left due to the shrinking force of the label to cause a deviation of the overlap portions (what is called a peel back phenomenon) and, if such a phenomenon is remarkable, the label peels off.

In addition, even in the case where the thermal shrinkage is not executed, a defective phenomenon such as a peel-off or the like may be caused during the conveyance of a container to which the label was attached. On the other hand, in the case of using a large amount of solvent, a problem of the smell of a remaining solvent occurs. Therefore, there is an inconvenience such that after the label was attached to the container, the degassing process must be sufficiently executed and then the container must be packaged.

The present inventors intend to provide a method of joining two end portions i.e. leading edge portion and trailing edge portion of a label wherein in the case of joining the front end surface and the rear end back surface of a label of a

synthetic resin sheet by using a solvent to dissolve the label, the continuous display function of characters or graphic image patterns of the front end surface portion and the rear end back surface portion of the label may be guaranteed without adding any limit condition, the external appearance of the label is not injured at all, the printing and cutting works of the label can be easily performed by the printing cutting works of the ordinary accuracy or even by an apparatus which is simpler than the ordinary one, and after the label was adhered, the adhering strength can be held sufficiently and strongly held.

The above problems are solved by a method wherein front end surface portion A to be overlapped with a rear end back surface portion of a label comprises a printed portion B and a portion C in which the printing is not performed and a synthetic resin sheet portion of the label is substantially exposed, and after a solvent to dissolve the synthetic resin was coated to the rear end back surface portion of the label, the front end surface portion and the rear end back surface portion of the label are joined to each other.

Further, it is desirable that the front end surface portion A of the label contains at the rate of at least 10% thereof, the portion in which no ink exists and the synthetic resin sheet portion is substantially exposed and that after the solvent to dissolve the synthetic resin was coated onto the rear end back surface portion of the label, the front end surface portion and the rear end back surface portion of the label are joined to each other.

Containers mentioned in the present invention denote containers made of various kinds of raw materials such as paper, synthetic resin, metal, glass, or the like. They may be shaped as a cup, a bottle, a tray, a can, or the like, having a straight portion of at least 4mm or more as the side surface.

The synthetic resin sheet mentioned in the invention denotes a film, a foamed sheet, or a laminated sheet having a combination of a film layer and a foamed layer which has a thickness in a range from 0.01 to 1.00 mm. The synthetic resin which is used in the synthetic resin sheet needs to be dissolved by the solvent which is used for adhesion. Therefore, a raw material of the synthetic resin sheet and a solvent are mutually selectively determined. For instance, in the case of using a polystyrene resin as a synthetic resin sheet, various kinds of solvents such as methylene chloride, 1-1-1-trichloroethane, tetrahydrofuran, or the like may be used as solvents. On the other hand, in the case of polyvinyl chloride or the like which is difficult to be dissolved by the solvent, tetrahydrofuran is mainly used as a solvent. As another synthetic resins, polystyrene, polyvinyl

chloride, polyacrylate, polyethylene, vinylidene chloride, EVA, etc. can be employed. As another solvents, methylene chloride, 1-1-1-trichloroethane, tetrahydrofuran, toluene, xylene, or the like can be employed.

As a method of joining the front end of the label to the container, a method of coating an adhesive agent to the label or a method of using a solvent to dissolve the label material may be generally used.

In order to thermally shrink the label made of a synthetic resin sheet in a furnace after the label was attached to a container, a sheet having the shrinkable performance one-directionally is ordinarily used. However, it is also possible to use a sheet such as biaxial-oriented sheet or balance-oriented sheet which hardly shrinks thermally.

In other words, the label which may be used to carry out the invention may be either of thermally shrinkable or nonshrinkable. It is sufficient to properly select a suitable shrinkage ratio in accordance with the shape of container.

For the label, in general, a number of label patterns are successively printed on a long sheet and the long film is wound up like a ring and is fed to a label mounting apparatus in such a state.

The labels are continuously supplied from the ring. In the next step, the labels are cut out to a predetermined length one by one. In the cutting step, a mark provided at the cutting position on the label is read by a reader attached to the label mounting apparatus and, thereafter, the label is cut out at the mechanically controlled position so as not to cause a deviation of the position. Generally, the cutting accuracy is set to a value within a range of about ± 0.1 to ± 2.5 mm. If the cutting accuracy is restricted to a value within a range of 0 to ± 0.1 mm, an extremely expensive and complicated machine is required and the productivity is also remarkably deteriorated.

In general, a photogravure printing system or the like is used as a printing system of the label. However, the positioning printing accuracy of each color lies within a range of about ± 0.3 to ± 1.0 mm. In order to improve the printing accuracy, in a manner similar to the cutting work, it is obliged to fairly reduce the production efficiency and to use an expensive printing machine.

Generally, a resin, a pigment, or a dye which has a good strong resistance for the solvent is used as an ink. Further, a method wherein a top coating is performed on the surface layer on the ink to thereby enhance the solvent resistance is used. Therefore, if the ink exists, the joining force of the solvent to dissolve the label is remarkably weakened. Therefore, if a printing position deviation or a cutting position deviation never occurs, the adhering strength and the continuity of the graphic

image pattern are preferably held. However, in the ordinary production, it is necessary to prevent any ink from interposition thereof on the adhering surface in consideration of such deviations. Therefore, the display of characters or graphic image pattern is limited. Further, the blank non-printed portion continuously remains adjacent the overlap portion.

An embodiment of the present invention will be specifically described hereinbelow on the basis of the drawings, wherein:

Fig. 1 is a perspective view showing a state in which labels which were successively and repetitively printed are wound like a ring.

Figs. 2 and 3 are schematic views showing the front and back surfaces of the label according to the present invention which was cut out one by one.

Fig. 3 indicates a plan view showing the label surface (printed surface).

Fig. 2 is a back view showing the label back surface (a part of the surface is coated with a solvent).

Fig. 4 is a perspective view showing a state in which a label is attached around the outer periphery of a container and shows the overlap relation of the label end portions.

Figs. 5 and 6 are schematic views showing the surface of a label printed surface according to a conventional system.

Fig. 5 is a comparison example in which the exposed portion of the synthetic resin sheet portion is provided for a label.

Fig. 6 shows a comparison example in which the printing is executed on the whole surface of a label.

Fig. 7 is a perspective view showing a state in which the label of the conventional system of Fig. 5 is wound like a cylinder and both end portions of the label are overlapped.

Figs. 8, 9 and 10 are schematic views showing states of the label surfaces in the other embodiments of the invention.

Fig. 11 is a perspective view showing a peel-off (peel back) of the overlapped portion in the case where after the label of the conventional system of Fig. 6 was attached to a container, it is thermally shrunk.

Symbols in the drawing are as shown below.

A Overlapped portion of an adhering surface,

B Printed portion of the overlapped portion,

C Exposed portion of a synthetic resin sheet on which no printing is executed in the overlapped portion,

E Printed portion,

F Portion to which a solvent is coated,

G Container.

L Line indicative of the position where a label rear edge is comes into contact with a label front end portion.

5 L' Line which is formed after the label was peeled off to the right and left owing to the thermal shrinkage.

10 As shown in Figs. 2, 3 and 4, for the label which is used in the present invention, the front end overlapped portion A of the label comprises: the printed portion B; and the portion C in which no printing is executed and the synthetic resin sheet portion is substantially exposed. The printed portion B can be related to characters or graphic image pattern in the label front end portion. On the other hand, the exposed portion C of the synthetic resin sheet is overlapped to the portion of the label rear end portion F which was dissolved by the solvent and is integrated, so that a predetermined stable adhering strength is held.

15 Although slight deviations occur in the printing and cutting works of the label, no problem occurs by properly setting the range of the printed portion B in accordance with the working accuracies.

25 Thus, the function of the label wrapped around the whole periphery can be performed without injuring the display function as a main function of the label in the overlapped portion as in the conventional technique shown in Figs. 5 and 7.

30 According to the label, not only manufacturing working steps of label can be simplified but also, as shown in Fig. 11, when the label is thermally shrunk to adhere onto the container, after the label was attached, the synthetic resin sheet exposed portion C of the label directly and instantaneously reacts to the solvent coated portion F of the rear end back surface portion of the label, so that the adhering strength more than a predetermined limit value can be performed, and therefore, the front and rear end portions of the label can not be peeled off by the contraction force of the label. In general, when a label is attached to a container and, thereafter, it is thermally shrunk, the attachment and heat-shrinkage steps are successively executed on the same line in such a manner that the label is thermally shrunk immediately after it was attached to the container.

40 In one of the conventional techniques shown in Fig. 6, the display functions of the front and rear end portions of the label are continuous in terms of the design. However, since the ink exists on the adhering surface, the overlapped portions of the synthetic resin sheets at both ends of the label are not integrated. Thus, the adhering force is weakened and as shown in Fig. 11, the front and rear edges of the label can be peeled off (peel back phenomenon). In some cases, the overlapped portions can be detached from each other. Although

there is also a case where an amount of solvent is increased in order to enhance the adhering force, in this case, external appearance of the label is deteriorated by the outflowed solvent and the value of goods is remarkable injured as mentioned above.

Example 1

The invention was carried out by using a label made of thermally shrinkable foamed polystyrene sheet and comprising two layers of a skin layer and an foamed layer as a synthetic resin sheet. The label had a thickness of 150 to 180 microns and exhibited a thermal shrinkage ratio of 50 to 60 % at about 120 °C. The ordinary photogravure roll printing was used as a printing system. The printing was executed at a color position accuracy within ± 0.8 mm. For cutting, there was used a system in which the ring as shown in Fig. 1 was attached to the labeling machine and the label was successively cut out of the ring by a fixed knife and a rotating knife. The cutting accuracy was within ± 0.7 mm. As an ink, the ink containing the acrylic resins was used. A solvent of tetrahydrofuran was used.

If the ink exists on the adhering surface as prior art shown in Fig. 6, about 30 minutes was necessary to completely solidify the joined portion. The initial adhering strength of the overlapped portion was 0.05 Kg/cm or less and was not able to resist the thermal shrinkage force of the label of 0.1 Kg/cm or less.

On the other hand, according to the method of the invention, for instance, assuming that widths of A, B, and C are set to 7.5 mm, 1.5 mm, and 6mm, respectively, the tensile strength of the overlapped portion almost instantaneously became 3.0 to 4.0 Kg/cm after it was joined. The adhering strength which was extremely larger than the thermal shrinking force could be performed.

Example 2

Figs. 8 to 10 are schematic views showing another embodiment of the invention and relates to another example in the case where in order to join the label end portions, the portion having the function to hold the adhering force was not provided for the whole surface of the overlapped portion A but an exposed portion of the synthetic resin sheet portion was provided on a partial surface except a pattern or the like to be printed. The portion A comprises a portion coated with an ink (black portion in the view) and a portion with no ink (white portion in the view). An area ratio of the portion to which no print ink was coated was determined in accordance with

the adhering strength which was required.

According to the result of the evaluation of the inventors, the area ratio of the exposed portion of the synthetic resin to the overlapped portion A should be at least 10%. Generally, in order to obtain a good result and to make it possible to stably produce, it is desirable to set the area of the exposed portion to 30 % or more.

Fig. 9 shows an embodiment in the case where in the portion A, the ink portion was set to 50 % and the synthetic resin sheet exposed portion was 50%. The initial tensile strength of the adhered portion was held within 2 ~3 Kg/cm.. In the thermal contraction step, a peel back phenomenon of the overlapped portion did not occur.

In addition, a problem such as a peel-off or the like in the transportation line did not occur.

In general, since the label is attached to the machine at a high speed, if the working accuracy in each step is limited, its efficiency remarkably deteriorates. By carrying out the method of the invention, the inherent function of the labeling machine, that is, the function for stably labeling at a high speed was not lost. Further, no restricting condition is added to the display function as a main function of the label. Those functions can be perfectly made effective.

Claims

1 - A method of wrapping a label made of a synthetic resin sheet onto a whole outer periphery of a container and joining leading edge portion and trailing edge portion of said label, characterized in that a leading edge surface portion (A) to be overlapped with a trailing edge back surface portion of the label comprises a portion (B) on which an ink is coated and a portion (C) in which the synthetic resin sheet portion of the label is substantially exposed, and after a solvent to dissolve the synthetic resin is coated to the trailing edge back surface portion of the label, the leading edge surface portion and the trailing edge back surface portion of the label are joined to each other.

2 - A method of wrapping a label made of a synthetic resin sheet onto a whole outer periphery of a container and joining a leading edge portion and a trailing edge portion of said label, characterized in that a leading edge surface portion (A) to be overlapped with a trailing edge back surface portion of the label includes, at the rate of at least 10% thereof, a portion (C) in which the synthetic resin sheet is substantially exposed without any ink thereon, after a solvent to dissolve the synthetic resin is coated onto the trailing edge back surface portion of the label, the leading edge surface portion and the trailing edge back surface portion of

the label are joined to each other.

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FIG. 1

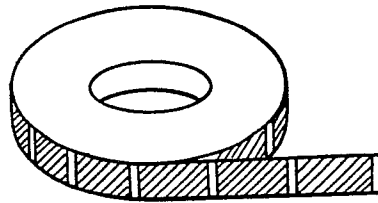


FIG. 2

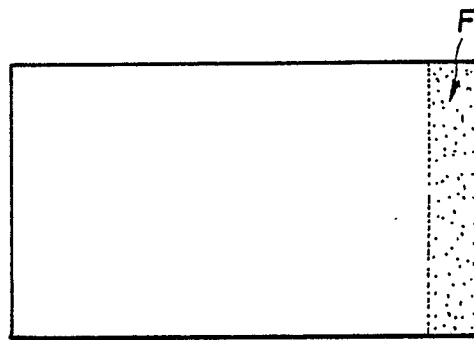


FIG. 3

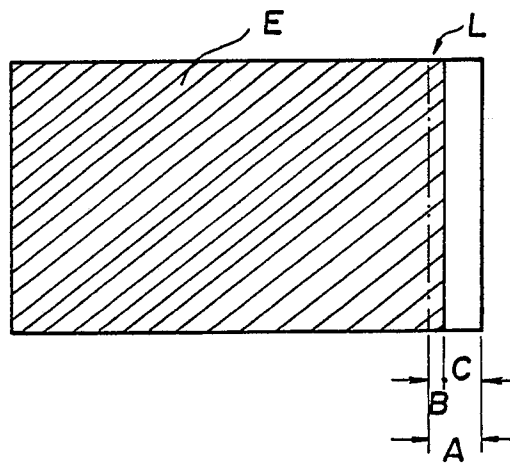


FIG. 4

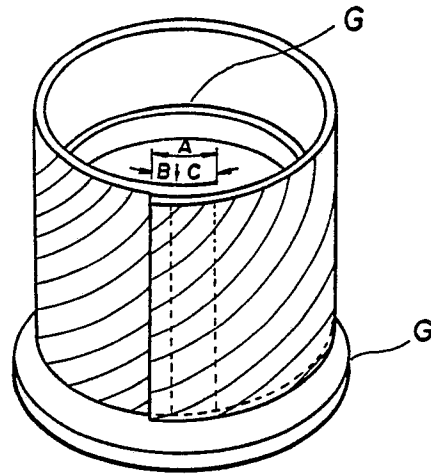


FIG. 5

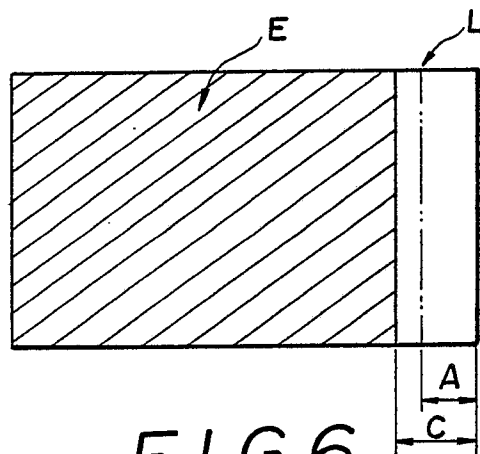


FIG. 6

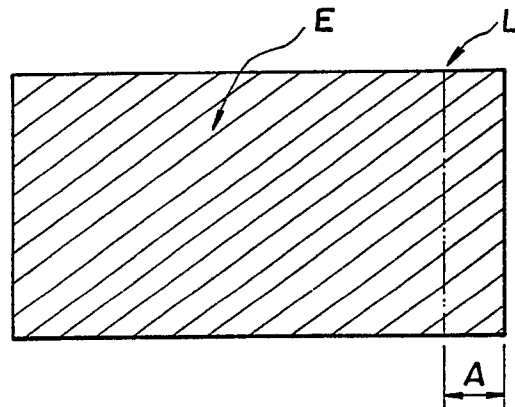


FIG. 7

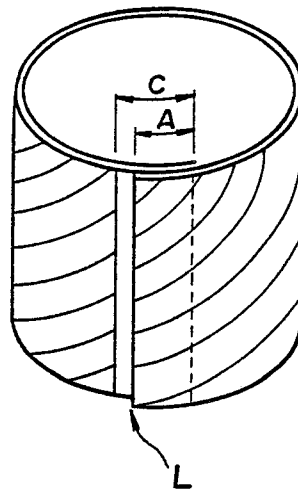


FIG. 11

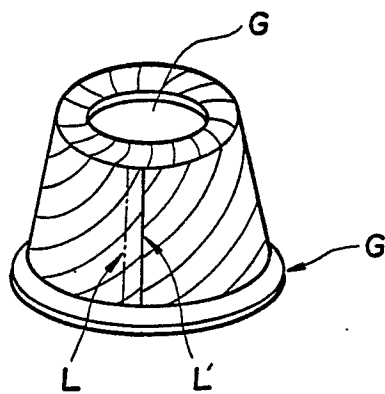


FIG. 8

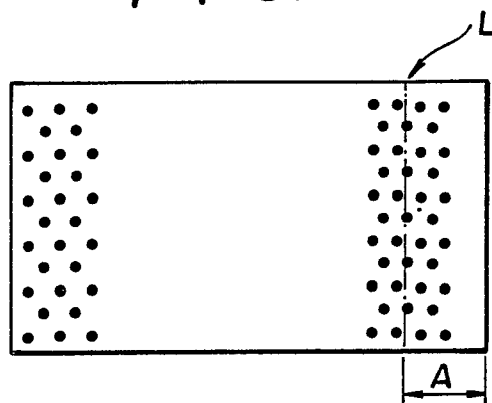


FIG. 9

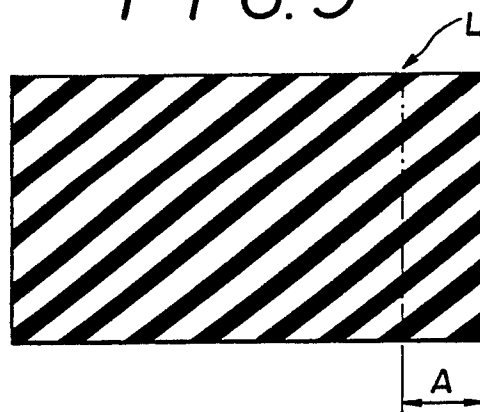
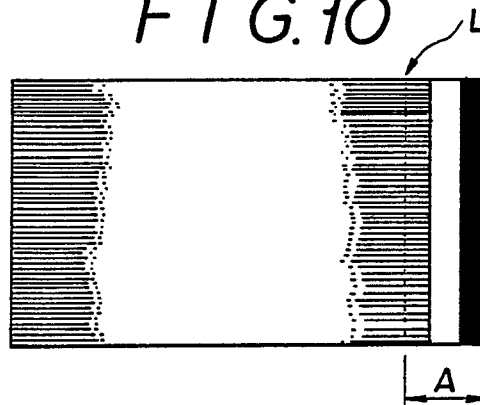


FIG. 10





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	EP-A-0 145 383 (OWENS-ILLINOIS)	1	B 65 C 9/22
A	* Claims 4-7; figures 3,5,6 *	2	G 09 F 3/02

X,D	EP-A-0 143 621 (OWENS-ILLINOIS)	1	
	* Figures 3-6; claims 1,4 * & US-A-4		
A	567 681	2	

			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			B 65 C
			G 09 F
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
THE HAGUE		28-02-1990	DEUTSCH J.P.M.
CATEGORY OF CITED DOCUMENTS			
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