

DECLARATION IN SUPPORT

In support of the (Convention) Application made by:

BRØDRENE HARTMANN A/S

for a patent for an invention entitled:

MANUFACTURE OF COLOURED EGG PACKAGES

of (We)

of and care of the applicant company do solemnly and sincerely declare as follows:

a) I am (We are) the applicant(s) for the patent

or

b) I am (We are) authorised by the applicant(s) for the patent to make this declaration on its behalf.

Delete the following if not a Convention Application.

The basic application(s) as defined by section 141 (142) of the Act was (were) made

on June 19, 1987,

in the Federal Republic of Germany
sub No. P 37 20 265.0

on

in

on

in

by Brødrene Hartmann A/S

The basic application(s) referred to in this paragraph is (are) the first application(s) made in a Convention country in respect of the invention the subject of the application.

a) I am (We are) the actual inventor(s) of the invention.

or

b)

Vagn Center of 35, Høyrups Allé, DK-2900 Hellerup, Denmark,

is (are) the actual inventor(s) of the invention and the facts upon which

BRØDRENE HARTMANN A/S

is (are) entitled to make the application are as follows:

BRØDRENE HARTMANN A/S are the assignees of the above inventor.

Declared at Lyngby this 17th day of January 1989

Signed *Kaj Fauerskov Sørensen* Status Finance Manager

Declarant's Name Kaj Fauerskov Sørensen

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(56) Prior Art Documents
GB 1438903

(57) Claim

1. **Abstract** A method for manufacturing coloured egg packages from wood pulp and/or waste paper (paper pulp), wherein the egg package only receives its final outside colour after the moulding phase by means of subsequent spraying-on a dye and the water content in the dye is evaporated immediately after the spraying-on of the dye, by means of a quick acting heating.

11. Apparatus for carrying out a method as claimed in any one of the preceding claims, comprising de-nesting means for the consecutive delivery of egg packages which not yet have their final colour, from a stack and for depositing said packages on a conveyor device with a pre-determined mutual distance, a spray battery placed above a first processing section of said conveyor device adapted for the spraying-on of a dye on the egg packages, moving below said spray battery and with a drying battery above a further processing section of said conveyor device in the moving direction of this device after said spray battery, adapted to achieve a rapid drying of the sprayed-on dye by means of heating, such as infra-red radiation and/or hot air.



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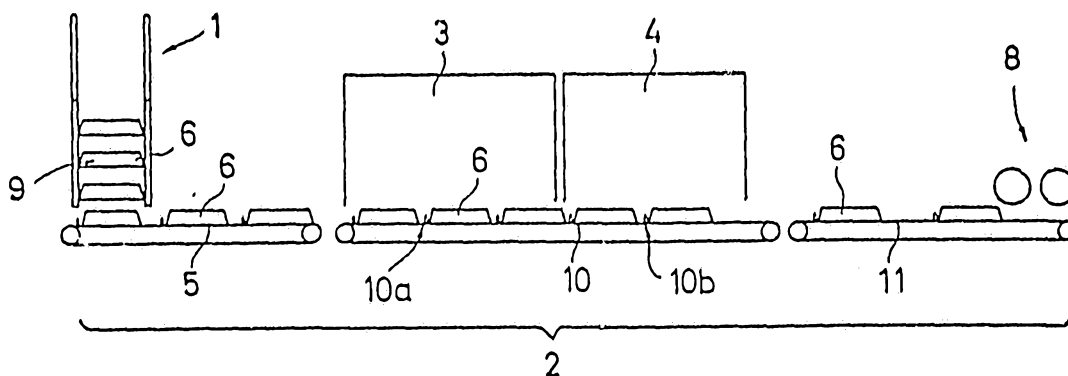
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(54) Title: MANUFACTURE OF COLOURED EGG PACKAGES



(57) Abstract

Method for the manufacture of coloured egg packages, apparatus for carrying such a method into effect and egg packages manufactured by this method. The invention concerns a method for the manufacture of coloured egg packages (6), made from wood pulp and/or waste paper (paper pulp), in which the egg package receives its final outside colour only after the moulding phase by means of subsequent spraying-on (3) a dye, an apparatus for the carrying such a method into effect, and egg packages, manufactured by means of this method.

Manufacture of coloured egg packages

The invention concerns a method for the manufacture of coloured egg packages from wood pulp and/or from waste paper (paper pulp), an apparatus for carrying such a method into effect, and the product, resulting from this method.

Egg packages made from wood pulp and/or waste paper have a white or a more or less grayish ground colour. This grayish colour shade depends among others upon the proportion of waste paper used, as well as upon the degree to which this waste paper was printed. Removal of this grayish shade, or brightening, can be achieved by subjecting the waste paper to a de-inking process, by which a considerable part of the printing ink is removed.

In order to provide coloured egg packages, a chemical dye is added to the white or gray pulp, before egg packages with a corresponding colour are made of said pulp. This procedure has several appreciable disadvantages. For each single colour it is necessary to produce a specially coloured pulp. The egg packages are manufactured in a plant by means of suction moulds, mounted on a suction wheel, and it is necessary that suction moulds for a large number of different types of egg packages must always be at hand. When changing from one colour to another, or when changing from one package type to another, a change-over time for the plant of one hour or more may be necessary. During this time, nothing can be produced in the plant. Another disadvantage is that when colouring the pulp, an additional 99% water must be coloured, which means a very high consumption of dye. For this reason, a considerable amount of coloured water is produced, which is difficult to clarify. Large clarifying reservoirs are needed for this purpose. The waste water of certain colour coming from the production process can only be re-used for new production of a pulp having the same colour. Furthermore it is difficult to adjust the co-

lour shade when using the conventional method of manufacture, because it must be considered on a wet product. This insufficient control possibility leads to scrapping of approx. 10% of the egg packages.

5 Furthermore, the control of the colouring is extremely difficult, as the content of dye in the pulp only amounts to approx. 0.003% for obtaining the desired colour shade. In addition to this, the colour of the pulp will change uncontrollably according to the condition of the waste
10 paper employed, as well as to the proportion of waste paper in the pulp, which is responsible for the various shades of gray to be found in the pulp. Another disadvantage is that once a coloured pulp has been introduced, it must be used up the same day. Because the
15 dye also bonded in the pulp in the finished egg packages, the colour will lose some of its brilliance and soon fade. Nor should it be overlooked that the dye will be in contact with the packed eggs. All these problems have been greatly aggravated with the increasing number of
20 package types and the increasing variety of desired colours. Nevertheless, for lack of alternative solutions, the same manufacturing methods have been used and are still used worldwide today.

On the basis of these considerations, the object
25 of the invention is to suggest a method of the before-mentioned kind, which can be executed in a more economic and more variated manner, and which will lead to
an improved product resulting from the process.

The present invention provides a method for
30 manufacturing coloured egg packages from wood pulp and/or waste paper (paper pulp) wherein the egg package only receives its final outside colouring after the moulding phase by means of subsequent spraying on a dye, and the water content in the dye is evaporated immediately after
35 the spraying-on of the dye, by means of a quick acting heating.

The problems mentioned above are substantially solved by this invention, by the egg packages only



receiving their final colouring after the moulding phase by means of subsequent spraying-on of a dye. The basic body of the egg package, which results from the moulding phase, will be mainly white or gray, and it will be the same for all types of egg packages, independent of the final outward colour thereof.

In this way, a number of advantages is obtained. One and only one paper pulp may be used as the raw material for egg packages having many different
10 colourings. When changing over the plant from one type of



package to another, the later colouring process will be of no consequence, as the type of paper pulp for the manufacture of all the basic bodies for all package types and for all final colours will be the same. Thus, the change-over can be executed rapidly and without problems, just by replacement of the suction moulds. It is also easier to build up a stock. It is also rapid and easy to change over from one colour to another, as the plant only needs to be connected to a container for a different colour. In this way, it is possible to reduce the halt time for the plant considerably, and at the same time scrapping of defectively coloured egg packages is almost done away with. As the dye is sprayed on, differences in the primarily gray or white basic colour of the basic package body are covered by the dye. The surface will appear with the desired brilliance, because the dye is deposited on the surface of the package. The consumption of dye is reduced, as it is not necessary to dye the whole paper pulp. The colour shade of the sprayed package can be measured immediately and positively adjusted, as the pigment content in the dye is approx. 5-10% instead of only 0,003% in the paper pulp according to the conventional method. And it is not necessary to solve waste water problems, which request large clarifying reservoirs. By adopting spray nozzles, the new method according to this invention allows extremely high production rates, for instance it will be possible to manufacture several hundreds of packages per minute.

A further important advantage of the manufacturing process according to this invention, will be obtained if only the outer surface of the egg package is sprayed with dye. If the package is a carton comprising a bottom portion and a lid, and the carton is in its closed position, when said two halves are folded against each other, the package will appear as a whole with only one, i.e. the desired colour. On the other hand, and contrary to coloured egg packages manufactured in traditional ways, the eggs in the carton will not be in direct contact

with the dye, i.e. the possible detrimental effects, which might arise by such a contact, need to be taken in consideration when electing the dye.

Normally, a dye is employed containing an organic pigment material or a dispersion pigment material.

In order to prevent soaking of the dye, the pigment particles in the dye material is preferably surface-treated with a moistening agent. In this way a better moistening with the binder of the dyes is obtained, with the result that the pigment particles cannot break away from the desiccated dye.

The dye normally contains a water-soluble polymer as a binder.

Another specifically advantageous feature of the invention is that the dye contains a wax, preferably a micronized poly-ethylene wax. Several substantial advantages are obtained in this way: If the water, contained in the sprayed-on dye, would be absorbed in the package material, the pulp fibres would inevitably rise at package surface, said surface thus becoming extremely rough. The content of wax in the dye, which may be approx. 0,5 % by weight, will hinder the absorption of the water, and at the same time the possibility of an evaporation of the water content of the dye to the outside will be increased. Furthermore, the wax content will give an extra smoothness to the surface, which will greatly facilitate the de-nesting of the packages from a pile. Moreover, there is less danger of damage to the skin of the fingers of those persons, who constantly handle such packages. Furthermore will the wax content improve the possibility of breathing through the open pores in the surface. The wax will settle almost like a network over the surface. The smoothening of the surface, which is provided by the waxing, results in making it easier to subsequently print the package with information about place of origin, con-

tent etc. Moreover, the wax will improve the brilliance of the shade of colour.

Another specifically preferred feature of the invention is that the particle size of the pigment particles in the dye is somewhere between 0,15 and 0,30 $\times 10^{-6}$ m. The size of the pigment particles is therefore considerably smaller than that of the normally used spray dyes, which are normally of a magnitude of approx. 20-30 $\times 10^{-6}$ m. This feature gives a considerably improved covering and a far better atomization for spray-dye, which is also an important improvement as regards the high production rate of several hundreds of packages per minute.

As it is of importance to hinder penetration of water into the package material, according to the invention the water content in the dye may be evaporated immediately after the spraying-on of the dye, by means of a quick-acting heating, for instance infra-red radiation and/or hot air. By means hereof, it will be possible to obtain the above mentioned high production rate with relatively simple measures.

Immediately after the spray application and drying of the dye, the egg package can be printed with the desired information about place of origin, content etc.

The invention also concerns an apparatus for the carrying-out of the above process, comprising de-nesting means for the consecutive delivery of egg packages, which not yet have their final colour, from a stack and for depositing said packages on a conveyor device with a pre-determined mutual distance, a spray battery placed above a first processing section of said transport device, adapted for the spraying-on of a dye on the egg packages, moving below said spray battery, and with a drying battery above a further processing section of said transport device, in the moving direction of theis device after said spray battery, adapted to achieve a rapid drying of the sprayed-on dye by means of heating, e.g. infra-red ra-

diation and/or hot air. The dye itself may be sprayed on at a raised temperature, e.g. by means of pre-heated nozzles, which may be advantageous in regard to the wax content and increases the evaporation speed of the water content after the spray-dying.

Preferably, the egg packages will be transported from said de-nesting device to said first processing section of the conveyor device with a greater mutual distance and with a higher speed, than below the spray battery and below the drying battery. In this way, regard will be paid to the greater distance necessary for the de-nesting. The lower transport speed and the smaller distance under the spray battery and the drying battery are advantageous because of the longer stay time in the spray cabin and the drying cabin, which means a longer spray time and drying time, and in addition the loss of dye between each single egg package is reduced.

According to the invention, this may be advantageously achieved by shifting the egg packages on their way of transport before the spray battery from a faster moving conveyor belt to a slower moving conveyor belt, which moves the egg packages below the spray battery, and below the drying battery.

After the dye drying process, the egg packages may be shifted to a third conveyor belt, which preferably runs at a higher speed than the conveyor belt below the spray battery and below the drying battery, and to which belongs a printing apparatus. The egg packages will then again have a greater mutual distance, which is necessitated in order to leave sufficient room for the printing cylinder.

This invention furthermore comprises an egg package, which is manufactured by means of the above mentioned method. Such an egg package consists of a basic body, made of wood pulp and/or waste paper (paper pulp), the surface of which carries a coat of sprayed-on dye.

The sprayed-on coat of dye is preferably only on the outer package surface of the basic body.

The sprayed-on coat of dye contains preferably an organic pigment dye respectively a dispersion dye.

In another version of this invention, the sprayed on coat of dye contains a water-soluble polymer as a binder.

Based upon the above mentioned reasons, a special advantage may be achieved if the sprayed-on coat of dye contains a wax, preferably a micronized poly-ethylene wax.

In order to obtain a particularly good covering, it is important that the pigment particle size in the sprayed-on coat of dye is preferably between approx. 0,15 and 0.30×10^{-6} m.

In the drawings, fig. 1 illustrates in a schematic way a possible embodiment of an apparatus for carrying the method of this invention into effect, and fig. 2 an embodiment of an egg packing formed as a carton.

From a de-nesting device 1 egg package bodies, which have not yet been given their final colour and therefore are gray or white, and which comprise an egg-receiving bottom part and a lid hinged to said part, are placed with a pre-determined mutual distance on a conveyor device 2, in opened condition, and with the outward surface of the packages upwards. The distance between the bodies is relatively great in order to facilitate the de-nesting of the individual egg trays 6, and is determined by the relatively high speed of a first conveyor belt 5 in the complete conveyor device 2, placed below the de-nesting device 1. A second conveyor belt 10 follows the first conveyor belt 5 in the conveyor device 2. Above the first process section 10a of the conveyor belt 10 is placed a spray battery 3, which sprays dye on the outer surface of the egg packages 6, which are opened as shown in fig. 2 for providing a coat of sprayed-on dye 7. Above another process section 10b of the conveyor belt 10 is placed a drying battery 4, containing a number of infra-red radiators and/or hot air blowers, which will

evaporate the water content in the sprayed-on coat of dye-7 on the egg packages 6 as rapidly as possible. The conveyor belt 10 runs at a lower speed than the conveyor belt 5. Because of this, the distance between the egg packages is reduced, when they move from the first conveyor belt 5 to the second conveyor belt 10. This means that the egg packages 6 move below the spray battery 3 and the drying battery 4 with a smaller mutual distance, and at a lower speed, which means that there is sufficient time for the spraying process and for the drying process. As the egg packages 6 are placed closer together on the conveyor belt 10, less dye is lost between the egg packages 6 during the spraying process. From the conveyor belt 10, the sprayed and dried egg packages 6 move over to a third conveyor belt 11 in the conveyor device 2, which runs below a printing apparatus 8. In this section the egg packages 6 are on their outside provided with the necessary information about place of origin and content. As the third conveyor belt 11 again runs faster than the second conveyor belt 10, the distance between the egg packages 6 increases when they shift from conveyor belt 10 to conveyor belt 11, whereby the distance between the egg packages needed for the proper operation of the printing cylinders on the printing apparatus 8 is achieved. After this, the egg packages 6 provided with the desired colour are transported to a store room or prepared for shipping. If egg packages of another colour are wanted, it is only necessary to feed a different dye through the spray nozzles in the spray battery 3, and this change can be undertaken rapidly.

CLAIMS:

1. A method for manufacturing coloured egg packages from wood pulp and/or waste paper (paper pulp), wherein the egg package only receives its final outside colour after the moulding phase by means of subsequent spraying-on a dye and the water content in the dye is evaporated immediately after the spraying-on of the dye, by means of a quick acting heating.
2. A method as claimed in claim 1 wherein the quick acting heating is achieved by means of infra-red radiation or hot air.
3. A method as claimed in claims 1 or 2, wherein the egg package is sprayed with dye only on its outer surface.
4. A method as claimed in any one of claims 1 to 3, wherein a dye is employed, which contains an organic pigment material.
5. A method as claimed in any one of the preceding claims wherein a dye is employed, which contains a dispersion pigment material.
6. A method as claimed in claims 4 or 5, wherein the pigment particles in the dye material have been surface-treated with a moistening agent.
7. A method as claimed in any one of the preceding claims wherein the dye contains a water-soluble polymer as a binder.
8. A method as claimed in any one of the preceding claims wherein the dye contains a wax, preferably a micronized poly-ethylene wax.
9. A method as claimed in any one of claims 4 to 8 wherein the pigment particles in the pigment dye particles have a size between ca. 0.15 and 0.30×10^{-6} m.
10. A method as claimed in any one of the preceding claims wherein the egg packages are printed immediately after spraying and drying of the dye.



11. Apparatus for carrying out a method as claimed in any one of the preceding claims, comprising de-nesting means for the consecutive delivery of egg packages which not yet have their final colour, from a stack and for depositing said packages on a conveyor device with a pre-determined mutual distance, a spray battery placed above a first processing section of said conveyor device adapted for the spraying-on of a dye on the egg packages, moving below said spray battery and with a drying battery above a further processing section of said conveyor device in the moving direction of this device after said spray battery, adapted to achieve a rapid drying of the sprayed-on dye by means of heating, such as infra-red radiation and/or hot air.

12. Apparatus as claimed in claim 11, wherein the egg packages are transported from said de-nesting device to said first processing section of the conveyor device with a greater mutual distance and with a higher speed, than below the spray battery and below the drying battery.

13. Apparatus as claimed in claim 12, wherein the egg packages on their way of transport before the spray battery are shifted from a faster moving conveyor belt to a slower moving conveyor belt, which moves the egg packages below the spray battery and below the drying battery.

14. Apparatus as claimed in any one of claims 10 to 13, wherein the egg packages after the drying of the dye are shifted to a third conveyor belt, which preferably runs at a higher speed than the conveyor belt below the spray battery and below the drying battery, and to which belongs a printing apparatus.

15. Egg package manufactured by means of a method as claimed in any one of claims 1 to 9, wherein they consist of a basic body, made from wood pulp and/or waste paper (paper pulp), which carries a sprayed-on coat of dye on its surface.

16. Egg package as claimed in claim 15, wherein the



sprayed-on coat of dye is only placed on the outer surface of the basic body.

17. Egg package as claimed in claims 15 or 16, wherein the sprayed-on coat of dye contains an organic pigment colouring material.

18. Egg package as claimed in any one of claims 15 to 17, wherein the sprayed-on coat of dye contains a dispersion colouring material.

19. Egg package as claimed in any one of claims 15 to 18, wherein the sprayed-on coat of dye contains a water-soluble polymer as a binder.

20. Egg package as claimed in any one of claims 15 to 19, wherein the sprayed-on coat of dye contains a wax.

21. Egg package as claimed in claim 20, wherein the wax is a micronized poly-ethylene wax.

22. Egg package as claimed in any one of claims 17 to 21, wherein the particle size of the pigment particles in the sprayed-on coat of dye is between ca. 0.15×10^{-6} m. and 0.30×10^{-6} m.

23. Egg package as claimed in any one of claims 15 to 22, wherein in certain areas of the sprayed-on coat of dye, a printed colour layer is provided.

DATED THIS 4TH DAY OF JULY, 1991

BRODRENE HARTMANN A/S
By Its Patent Attorneys

GRIFFITH HACK & CO.
Fellows Institute of Patent
Attorneys of Australia



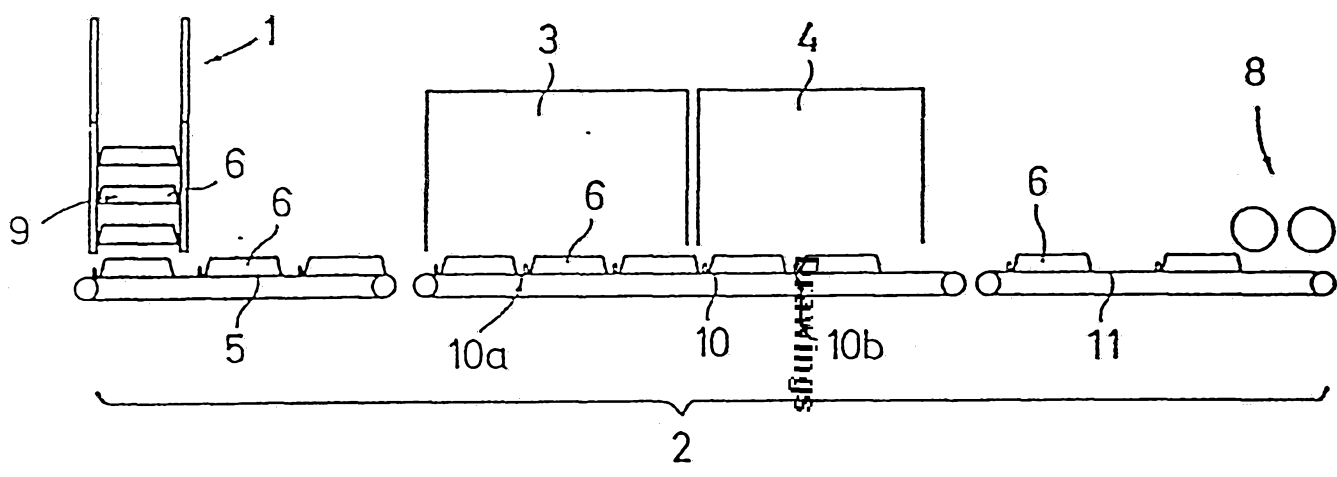


FIG. 1

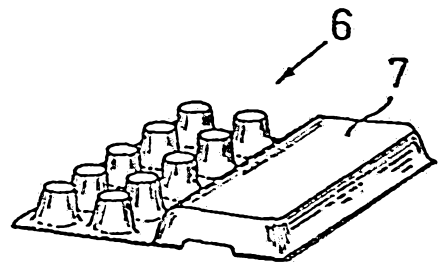
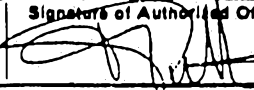


FIG. 2

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INTERNATIONAL SEARCH REPORT

International Application No PCT/DK 88/00090

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) ⁴		
According to International Patent Classification (IPC) or to both National Classification and IPC		
IPC ⁴ : D 21 H 5/00; 1/46; B 65 D 85/32; 1/02; B 41 M 1/40		
II. FIELDS SEARCHED		
Minimum Documentation Searched ⁷		
Classification System	Classification Symbols	
IPC ⁴	B 05 D; B 41 M; B 65 D; D 21 H	
Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched ⁸		
III. DOCUMENTS CONSIDERED TO BE RELEVANT ⁹		
Category ¹⁰	Citation of Document, ¹¹ with Indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³
A	DE, A, 2458443 (IMPERIAL CHEMICAL INDUSTRIES) 17 July 1975, see claims 1,4,6,7,12-14; page 4, last paragraph; pages 5-8,10,11 --	1,6,9-11, 15,19,22
A	FR, A, 801557 (IMPERIAL CHEMICAL INDUSTRIES) 7 August 1936, see page 1, line 1 - page 2, line 49; example 1; page 4, lines 32-77 --	1,3,6,7,9, 11,15,17, 19,20
A	GB, A, 1317881 (IMPERIAL CHEMICAL INDUSTRIES) 23 May 1973, see pages 1,2 --	1,3,4,6,7,9, 11,15,17-20
A	Chemical Abstracts, vol. 96, no. 18, 3 May 1982 (Columbus, Ohio, US) K. KANEKO et al.: "Dyeing of paper. Spray dyeing", see page 114, abstract no. 144781k, & Saitama-ken Seishi Kogyo Shikenjo Gyomu Jisseki Gaiyo 1980, 34-7 --	1,11,15
A	US, A, 2317436 (E.I. DU PONT DE NEMOURS) 27 April 1943, see page 1, right-hand column, lines 6-55; page 3, left-hand	1,5,7,10, 11,15,20,22
¹⁰ Special categories of cited documents: ¹⁰ "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier document but published on or after the international filing date "L" document which may throw doubt on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art. "A" document member of the same patent family		
IV. CERTIFICATION		
Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report	
26th September 1988	19. 10. 88	
International Searching Authority	Signature of Authorized Officer	
EUROPEAN PATENT OFFICE	 P.C.G. VAN DER PUTTEN	

III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)		
Category *	Citation of Document, with indication, where appropriate, of the relevant passages	Relevant to Claim No
	column, lines 37-42, right-hand column, lines 3-41 --	
A	DE, C, 193297 (H. ENGELMANN) 22 October 1905, see the whole document --	7
A	DE, C, 93439 (A.A. WOLBERG) 1 December 1896, see the whole document --	7
A	DE, A, 1923846 (J.R. GEIGY) 11 December 1969, see claims 1,2 --	3,5
A	Abstract Bulletin of the Institute of Paper Chemistry, vol. 53, no. 10, April 1983, (Appleton, Wisconsin, US) D.M. Canfield: "Advangates of electric infrared as a drying supplement for water-borne coatings", see page 1139, abstract no. 10544 & Tappi, Paper Synthetics Conf. (Atlanta) Proc.: 57-64 (Sept. 13-15, 1982) -----	9,11

ANNEX TO THE INTERNATIONAL SEARCH REPORT
ON INTERNATIONAL PATENT APPLICATION NO.

DK 8800090
SA 22954

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report. The members are as contained in the European Patent Office EDP file on 11/10/88. The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE-A- 2458443	17-07-75	NL-A- 7416037	14-07-75
		GB-A- 1438903	09-06-76
		JP-A- 50100305	08-08-75
		SE-A- 7416368	11-07-75
FR-A- 801557		None	
GB-A- 1317881	23-05-73	None	
US-A- 2317436		None	
DE-C- 193297		None	
DE-C- 93439		None	
DE-A- 1923846	11-12-69	FR-A- 2008248	16-01-70
		GB-A- 1211636	11-11-70
		CH-A- 508777	15-06-71