

# PATENT SPECIFICATION

(11) 1 577 694

1 577 694

- (21) Application No. 53723/77 (22) Filed 23 Dec. 1977  
(31) Convention Application No. 2658989  
(32) Filed 27 Dec. 1976 in  
(33) Federal Republic of Germany (DE)  
(44) Complete Specification published 29 Oct. 1980  
(51) INT CL<sup>3</sup> C11D 17/04 A01N 25/00  
(52) Index at acceptance

DIP 1101 1103 1105 1110 1119 1124 1303 1511 1513 1514 1515  
M

A5E 405 408 411 501 503 505 K

- (72) Inventors KARL SCHWADTKE  
WERNER KUNZEL  
RUDOLF WEBER  
ROLF PUCHTA  
ALEXANDER CIOC and  
MICHAEL KIK



## (54) TREATMENT OF WASHED TEXTILES

(71) We, HENKEL KOMMANDIT  
GESELLSCHAFT AUF AKTIEN, a  
German body corporate organised under  
the laws of Germany of 4000 Dusseldorf,  
Germany Henkelstrasse 67, do hereby  
declare the invention, for which we pray  
that a patent may be granted to us, and the  
method by which it is to be performed, to be  
particularly described in and by the  
following statement:—

This invention relates to a device for  
after-treating laundry in the drier after it  
has been washed, more particularly for  
softening and scenting it and rendering it  
antistatic, to a process for producing such a  
device and to a method of using it in a drier.

It is in many cases desirable to improve  
certain wearing properties of items of  
laundry after they have been washed, by  
carrying out an after-treatment, for example  
in order to impart a softer handle and  
pleasant scent, make them easy to iron and  
provide antimicrobial protection. Liquid  
substances are frequently added to the final  
rinse after the washing process for this  
purpose. In order to be suitable for this  
after-treatment, the liquid substances must  
not only be capable of being evenly  
distributed in the cold rinsing water but they  
must also be rapidly absorbed from the  
water by the fabric. Although suitable  
products are on the market which impart  
the desired properties to the laundry when  
added to the final rinse, mainly softening  
and antistatic properties, this method of  
treatment affects all the items of laundry  
equally so that it is necessary to sort out the  
laundry according to the required after-  
treatment before the washing process is  
begun. Moreover, it is necessary, when  
employing this method, to ensure that the  
after-treatment substance is introduced into  
the washing machine at the correct time and

from a special dosing device without coming  
into contact with the detergent used for the  
washing process proper. Another  
disadvantage of these known fabric  
conditioners is that they can only be packaged  
as highly dilute aqueous suspensions  
because stability in storage, pourability and  
rapid distribution in the cold rinsing water  
can only be ensured if the active ingredients  
are in a 10 to 20 times dilution. This results  
in relatively high packaging and transport  
costs. Substances which are insoluble in  
cold water are just as unsuitable as those  
which have no specific affinity for the  
surface of the textile fibre and are therefore  
discharged with the spent rinsing water.  
The number of suitable substances is  
therefore limited.

As the use of laundry driers is constantly  
increasing, not only in industrial laundries  
but also in the home, because of the saving  
in time and space achieved compared with  
traditional methods of drying the washing,  
it becomes possible to change the fabric  
conditioning process so that it is carried out  
in the automatic drier during drying of the  
laundry. Many proposals have therefore  
recently been made for applying both known  
and new active ingredients for the after-  
treatment of laundry in the drier. These  
proposals relate mainly to the use of sheets  
of fabric or paper which are impregnated  
with the active substance, or to foaming or  
non-foaming aerosol mixtures which are  
used for spraying the ingredient over the  
internal wall of the drier or over the moist  
items of laundry. The use of perforated  
hollow bodies which contain a solution of  
the active substance and which move about  
inside the drier together with the laundry,  
and the use of solid particles consisting of  
mixtures of the active ingredients with  
soluble carrier materials which should be

45

50

55

60

65

70

75

80

85

absorbed by the surface of the textile during the drying process have also been proposed. These known forms of application, however, have several disadvantages. It is observed, for example, that when solid fabric softeners are used, they become unevenly distributed and therefore produce patches on the fabric. This problem of even distribution of the treatment substance is not solved by the use of perforated hollow bodies filled with liquid fabric conditioner, and these have the added disadvantages of their unwieldiness and the difficulty of dosing the treatment substance. If the substance is applied in the form of a spray, undesirable deposits frequently form on parts of the apparatus which are important for proper functioning of the drier, such as temperature and moisture sensing devices. Lastly, in the case of impregnated sheets of paper or woven or non-woven fabrics, it is observed that the active substance adhering to the substrate, which is supposed to become detached from the substrate and be absorbed by the textile of the laundry which is in the process of being dried, is only incompletely and unevenly released to the textile, due to the fact that these structures, which have a large surface area, tend to cling to the wall of the drier drum or to a piece of laundry.

It is therefore an object of the present invention to reduce or substantially to obviate these disadvantages pertaining to the known laundry after-treatment substances.

According to the invention, this problem is reduced or substantially solved by means of a device which comprises a bag closed on all sides which is formed from a two-layered composite sheeting, the external surfaces of which bag are formed by a porous, absorbent layer charged with the active substances, in particular softeners and antistatic treatment substances, and the internal surfaces of which bag are formed by a layer which is virtually impermeable to perfume at room temperature but permeable to perfume at the elevated temperatures of the drier, which bag contains perfume.

The device according to the invention will hereinafter be referred to as "conditioner bag" for the sake of simplicity.

The material used for constructing the conditioner bag is a composite sheet consisting of two layers, the inner of which is a thin sheet which is virtually impermeable to perfume at room temperature but permeable to the perfume at elevated temperatures, preferably between 35 and 100°C, but particularly at the temperatures of around 60°C at which the drier operates, while the external layer

of the composite material is preferably a sheet of open celled foam plastics.

Suitable sheets which are impermeable to perfume at room temperature and become permeable to the perfume at elevated temperatures have a thickness of from 0.03 to 0.15 mm, preferably from 0.05 to 0.08 mm. The preferred material for this sheet is polyethylene.

The external sheet of the composite material, which is the one carrying the active substance, preferably consists of an open celled foam and preferably has a thickness of from 0.5 to 3 mm, more preferably from 1.0 to 2.5 mm. The density of preferred foams is from 0.005 to 0.05, more preferably from 0.01 to 0.04, g/cm<sup>3</sup>.

The composite sheet for the conditioner bag may also consist of a structured foam sheet one side of which, in the case of the device according to the invention the external side, consists of a porous, open celled foam which is impregnated with the active substance while the other side consists of a thin, completely non-cellular skin, corresponding to the thin sheet, which is virtually impermeable to perfume at room temperature and permeable to the perfumes at elevated temperature.

This composite sheet could in principle consist of any materials which are stable under the operating conditions of a laundry drier, i.e. at temperatures of up to about 100°C, and which are inert towards the active substances and perfumes with which they come into contact. Suitable materials for the foam sheet include, for example, foamed cellulose acetate, viscose, polyvinyl chloride, polyolefine, polyamide, copolymers of acrylonitrile, butadiene and styrene, natural and synthetic rubber and, particularly polyurethane. The preferred polyurethane foams are produced in known manner by the reaction of diisocyanates with polyether or polyester polyols. The reaction mixtures are in this case foamed up by the addition of water to the excess isocyanate, optionally in the presence of foaming agents, so that carbon dioxide is released, which causes the formation of foam.

The bag which carries the active substances and contains the perfume is preferably in the form of a sachet, the edges of which run round the periphery of the sachet and are sealed together on all sides by glueing or welding of the substance.

The device according to the invention is preferably rectangular or square in top plan view with sides measuring from 5 to 30 cm but it may also be circular, elliptic, oval or polygonal or have any irregular shape.

Other details of the device according to the invention will be explained below with reference to the accompanying schematic

drawings. Figure 1 is a cross-section through the conditioner bag; Figure 2 is a top plan view of the conditioner bag in the preferred form of a sachet.

5 In Figures 1 and 2, layer (1) is the external sheet of open cellular foam resin, preferably polyurethane foam, which is impregnated with the active substances. Together with the thin, internal sheet (2), which may, for  
10 example, consist of polyethylene or may be the closed skin of a structured foam sheet, it forms the composite material. The two sheets together enclose the absorbent perfume carrier material (4), e.g. a non-  
15 woven web, and are sealed together along the edge (3) of the sachet, in particular by glueing or welding. If they are joined together by glueing, the thickness of the edge (3) is the sum of the thicknesses of the two sheets which are glued together and the layer of adhesive whereas if they are welded together, the sheets of foam (1) become compressed and therefore thinner. The internal layer (2) is usually loosely applied to the perfume-impregnated carrier material (4).

The active substances which may be used for impregnating the conditioner bag are in particular, textile softeners and antistatic treatment substances for textiles. Antimicrobial agents, soil release substances, ironing aids, impregnating substances, flame retarding agents and mothproofing agents may also be used. The substances may be used individually or as mixtures.

Suitable textile softeners are quaternary ammonium compounds preferably having two long chain, preferably saturated aliphatic groups each containing from 14 to 26, preferably from 16 to 20 carbon atoms, with at least one quaternary nitrogen atom in the molecule. The long chain aliphatic groups may be straight or branched chain and hence may be derived from fatty acids or fatty amines, Guerbetamines, or from alkylamines obtained by the reduction of nitroparaffins. These quaternary ammonium compounds are mainly derivatives of ammonia, i.e. quaternary salts obtained by the alkylation of long chain secondary amines, e.g. the compounds distearyldimethylammonium chloride or ditallowalkyldimethylammonium chloride, or imidazoline compounds which can be obtained by reacting one mol or an aminoalkylethylenediamine or hydroxyalkylethylenediamine with 2 mol of a long chain  $C_{12}$ — $C_{26}$  fatty acid or an ester thereof, and which are subsequently converted into the quaternary imidazolium compounds by alkylation. In these quaternary ammonium compounds, the anion is generally an acid group obtained from the alkylating agent used for

quaternisation. The anion may therefore be, for example, chloride, bromide, methyl sulphate, ethyl sulphate or methane, ethane or toluene sulphonate. In addition to these quaternary ammonium compounds, the condensation products of 1 to 3 mol of a fatty acid or fatty acid alkyl ester or one third to one mol of fatty acid triglyceride with 1 mol of a hydroxyalkyl polyamine, for example hydroxyethyl ethylene diamine or hydroxyethyl diethylene triamine may also be used as fabric softeners. The product obtained by the reaction of 1 mol of a fatty acid triglyceride, in particular hardened tallow, with 1 mol of hydroxyethylethylenediamine at 90 to 150°C is particularly suitable. The preferred textile softener is a combination of a quaternary ammonium compound of the ammonia series having two  $C_{16}$ — $C_{20}$  alkyl or alkenyl groups and two methyl groups in the molecule and a chloride, bromide or methyl sulphate anion, in particular distearylalkyldimethylammonium chloride, with the fatty acid condensation product of 1 mol of hardened tallow and 1 mol of hydroxyethylethylene diamine, used in proportions of between 4:1 and 1:4. Textiles treated with these combinations show a marked and uniform improvement in their handle without any formation of patches.

The antistatic treatment substances are generally the same or similar types of compounds to those used as fabric softeners. Apart from the quaternary ammonium compounds and fatty acid condensation products described above, quaternary ammonium compounds containing one long chain and three short chain aliphatic groups may also be used as textile antistatic treatment substances. Other suitable antistatic agents are, for example, the reaction products of 1 mol of an aliphatic  $C_6$ — $C_{20}$  alcohol and more than 20 mol, preferably 35 to 50 mol, of ethylene oxide.

Suitable antimicrobial treatment substances, i.e. compounds which have a bactericidal or bacteriostatic or fungicidal or fungistatic action, are in most cases also quaternary ammonium compounds, particularly those which, in addition to one long chain aliphatic and two short chain aliphatic hydrocarbon groups contain an aromatic group which is attached to the nitrogen atom through an aliphatic carbon atom, or an aliphatic organic group which contains double bonds. Typical representatives of such antimicrobial active substances are the compounds, dimethylbenzyl - dodecyl ammonium chloride, dibutyl allyldodecylammonium chloride and ethyl cyclohexyl - allyl dodecyl ammonium chloride. Bromonitroalcohols are also suitable

- antimicrobial substances, e.g. the compounds, 2 - bromo - 2 - nitropropane - 1,3 - diol, 1 - bromo - 1 - nitro - 3,3 - trichloro - 2 - propanol and 2 - bromo - 2 - nitrobutanol. Halogenated and/or trifluoromethyl - substituted phenolic compounds are also suitable antimicrobial substances, particularly the halogenated salicylic anilides, e.g. the compounds, dibromo- and tribromo - salicylic anilide and derivatives of p - phenoxyphenol such as the compound, 2 - hydroxy - 2' - 4,4' - trichlorodiphenylether.
- Suitable active substances for use as soil release finishes for textiles are compounds which allow the dirt to be more easily released from the laundry during the washing process. These include compounds such as polyacrylopolymers, modified fluorinated hydrocarbons and hydrophilic polymers. Polyvinyl acetates and borax are suitable additives which make the laundry easier to iron.
- The conditioner bag generally contains from 0.5 to 10 g, preferably from 1 to 5 g, of active substance per dm<sup>2</sup> of the surface area of the foam.
- The device according to the invention preferably contains the perfumes bound to an absorbent carrier material. Suitable carrier materials are fleeces, e.g. of polyamide, polyvinyl chloride or on a cellulose basis, felt, paper, foam plastics, sponges or textile material. The fleeces are preferably cut to the size and shape of the sachets.
- The perfume may be used in its pure form, as an alcoholic solution or as an aqueous emulsion. It is preferably used as an emulsion, i.e. as a mixture of perfume oil, water and an emulsifier. Any types of perfume which produce the desired aroma and are stable under the conditions of use are suitable.
- Suitable perfume emulsifiers are hydrophilic surface active substances, e.g. hydrogenated castor oil containing 40 mol of ethylene oxide or coconut alcohol containing 4 mol of ethylene oxide.
- The sheets which form the bag are preferably joined together by welding but they may also be glued together. If the bag is in the form of a pouch, it may also be sewn or tied with binding thread or closed with metal wire or plastics fasteners or other possible closing devices.
- The conditioner bag according to the invention is preferably rectangular or square with a length of side of from 5 to 30 cm, as already mentioned above. The thickness is from 0.15 to 1 cm. The edge (3) in Figures 1 and 2 has a width of from 0.1 to 1.5 cm.
- A typical example of the device according to the invention as shown in Figures 1 and 2 is square with a length of side of 10 cm. The weight of the finished conditioner sachet is 12.7 g, of which 5 g are contributed by the active substance and 4 g by the perfume oil emulsion containing 40% of perfume oil. The carrier (4) for the perfume oil emulsion weighs approximately 3.0 g and the enveloping sheet material (1) and (2) 0.7 g.
- For use in standard domestic laundry driers, the size of the conditioner bag is generally calculated so that the active substances and perfumes supplied from it are sufficient for conditioning the usual quantity of laundry taken by a conventional domestic laundry drier, i.e. about 2 to 3 kg of dry weight of laundry. This requires about 0.5 to 5 g of textile softener or antistatic treatment substances, which is the amount given off by a surface area of sachet of from 0.2 to 2 dm<sup>2</sup>. It is, of course, also possible to use more than one conditioner bag for one conditioning process, and a conditioner bag may also be used more than once if the active ingredients are not completely removed in one operation, e.g. if the drier is not fully loaded.
- The conditioner bags used for driers in industrial laundries have a larger surface area to correspond to the greater capacity of the driers of up to about 50 kg, for example they may have a surface area of 18 dm<sup>2</sup>, and they are more heavily loaded with active substances.
- The invention also relates to a process for the manufacture of the devices. In this process a piece of absorbent carrier material, which may be folded is inserted in the bag formed from the composite sheet material, preferably from two identical pieces of this material, the carrier material being impregnated with pure perfume or a solution or emulsion of the perfume either before or after it is inserted into the bag, and the bag is then sealed on all sides. The sealed bag is then immersed in a solution, solvent-free melt or a dispersion of the active substances. If a solution or dispersion is used, the solvent or dispersing agent must subsequently be removed by drying with hot or cold air. If a melt is used, the active substances are preferably solidified by cooling with cold air. Preferably from 0.5 to 10 g, more preferably from 1 to 5 g, of active substance per dm<sup>2</sup> are absorbed in the impregnating process.
- The invention also relates to a process for the after-treatment of washed laundry in a laundry drier. In this process, the moist laundry is introduced into the drum of the drier together with the device according to the invention and the device is left to act on the laundry during the drying process. During the drying process, the conditioner sachet moves in a similar manner to the

pieces of laundry and thus comes into repeated and close contact with the laundry so that the active substances, which are softened or liquefied at the temperatures of the drier, are uniformly transmitted from the device to the pieces of laundry. The perfume substances pass through the internal layer of the bag, which sheet has become permeable at the elevated temperature, and are also fixed on the pieces of laundry. It was particularly surprising to observe that a substantial proportion of the perfume substances finally found on the laundry was deposited during the cooling phase of the drying process, which takes place when the laundry is dried and the heating device of the drier had been switched off while the drier drum is still rotating to avoid crumpling of heated dried laundry.

#### EXAMPLES

These Examples describe the manufacture and functioning of a device according to the invention produced for a standard domestic drier.

##### Example 1

A paper fleece measuring 21×21 cm (weight approximately 70 g/m<sup>2</sup>) was folded into nine layers measuring approximately 7×7 cm and impregnated with 4 ml of a perfume oil emulsion of 40 parts by weight of perfume oil, 5 parts by weight of emulsifier (coconut alcohol containing 4 mol of EO) and 55 parts by weight of water. The impregnated fleece was then sealed in between two pieces of composite sheet each measuring 10×10 cm, consisting of a polyethylene sheet 0.8 mm in thickness and a foam sheet of polyether-polyurethane foam (density 0.019 g/cm<sup>3</sup>) 1.5 mm in thickness, the foam sheet being situated on the outside. The welding edge of the sachet was approximately 0.5 cm in width. The sachet was dipped for about 7 seconds into a solution (temperature 35°C) of 50 parts by weight of ditallowalkyl dimethylammonium chloride and 50 parts by weight of isopropanol and dried at room temperature. The sheet of foam had absorbed approximately 5 g of active substance. The total weight of the device was finally approximately 12.5 g.

This sachet was added to a loading of moist washing (dry weight: 2.8 kg: one third Turkish towelling and two thirds plain cotton goods) together with test strips of polyester/cotton 65:35 in a conventional moisture controlled drier and the washing was dried with the programme "extra dry". The scent, handle and change in electrostatic properties were then determined. The electrostatic properties were determined on the test strips, using a

static Voltmeter R 1020 manufactured by Rothschild, Zurich, Switzerland.

The washing showed a marked improvement in handle a pleasant scent and excellent electrostatic properties, compared with untreated washing.

##### Example 2

Two pieces of structured foam film (density 0.035 g/cm<sup>3</sup>) 0.15 mm in thickness and measuring 12×12 cm were placed with their non-cellular surfaces in contact with each other and sealed together along three of the four edges. A fleece of viscose measuring 10×10 cm was then pushed between the two pieces and impregnated with 4 ml of a perfume oil emulsion of 40 parts by weight of perfume oil, 5 parts by weight of a hydrogenated castor oil containing 40 mol of ethylene oxide and 55 parts by weight of water by means of a pipette. When the fourth edge had been sealed up, the sachet was impregnated with a mixture, which had been melted at 80°C, of 50 parts by weight of ditallow alkyldimethylammonium chloride in the form of a 75% paste, the remainder consisting of isopropyl alcohol and 50 parts by weight of a condensation product of 1 mol of hardened tallow and 1 mol of hydroxyethylethylene diamine. The device was then weighed after it had been cooled in a stream of cold air. It was found to weigh 13.8 g, 8.2 g of which was active substance.

When this device was used and tested as in Example 1 it was found to produce a marked improvement in handle, a more rapid destruction of static charge and a pronounced scent.

#### WHAT WE CLAIM IS:—

1. A device for treating washed laundry in a drier, which comprises a bag formed from two layer composite sheeting and closed on all sides, the external surfaces of the bag being formed by a porous absorbent layer and being charged with active substances for treating laundry and the internal surfaces of the bag being formed by a layer which is substantially impermeable to perfume at room temperature and permeable to perfume at elevated temperatures which bag contains perfume.

2. A device as claimed in claim 1 in which the active substances are textile softeners, antistatic treatment substances, antimicrobial agents, soil release substances ironing aids, impregnating substances, flame retardants and/or moth proofing agents.

3. A device as claimed in claim 1 or claim 2, which is in the form of a quadrangular sachet, the edges of which extend round the perimeter of the sachet and are sealed together on all sides.

4. A device as claimed in claim 3 which is in the form of a square sachet.
5. A device as claimed in claim 3 or claim 4 in which the edges are sealed together by welding or glueing.
6. A device as claimed in any of claims 3 to 5 in which the sachet has a length of edge of from 5 to 30 cm.
7. A device as claimed in any of claims 1 to 6 in which the two-layer composite sheeting consists of two sheets, the external sheet of which is open-celled foam.
8. A device as claimed in claim 7 in which the internal sheet is a polyethylene sheet.
9. A device as claimed in claim 7 or claim 8 in which the external sheet is polyurethane foam.
10. A device as claimed in any of claims 1 to 9 in which the internal sheet is from 0.03 to 0.15 mm in thickness.
11. A device as claimed in claim 10 in which the internal sheet is from 0.05 to 0.08 mm in thickness.
12. A device as claimed in any of claims 1 to 11 in which the external sheet is from 0.5 to 3 mm in thickness.
13. A device as claimed in claim 12 in which the external sheet is from 1.0 to 2.5 mm in thickness.
14. A device as claimed in any of claims 1 to 13 in which the external sheet has a density of from 0.008 to 0.05 g/cm<sup>3</sup>.
15. A device as claimed in claim 14 in which the external sheet has a density of from 0.01 to 0.03 g/cm<sup>3</sup>.
16. A device as claimed in any of claims 1 to 15 in which the two layers of the composite sheeting are bonded together.
17. A device as claimed in claim 16 in which the two layers are bonded together by laminating.
18. A device as claimed in any of claims 1 to 6 in which the composite sheet comprises a structured foam sheet, one side of which consists of a porous open-celled foam and the other side of which is thin, completely non-cellular skin.
19. A device as claimed in any of claims 1 to 18 which contains from 0.5 to 10 g of active substance per dm<sup>2</sup> of surface.
20. A device as claimed in claim 19 which contains from 1 to 5 g of active substance per dm<sup>2</sup> of surface.
21. A device as claimed in any of claims 1 to 20 which contains, as active substance, a quaternary ammonium compound having two C<sub>16</sub>—C<sub>20</sub> alkyl groups and two methyl groups in the molecule and a chloride, bromide or methyl sulphate anion, alone or in combination with the condensation product of 1 mol of hardened tallow and 1 mol of hydroxyethylethylenediamine in proportions of from 4:1 to 1:4.
22. A device as claimed in claim 21 in which the quaternary ammonium compound is distearyl alkyldimethylammonium chloride.
23. A device as claimed in any of claims 1 to 22 in which the perfume is situated on an absorbent carrier material consisting of a woven fabric or a fleece or paper inside the bag.
24. A device as claimed in claim 1 substantially as herein described with reference to any of the Examples.
25. A device for treating washed laundry, substantially as herein described with reference to any of the accompanying drawings.
26. A process for the manufacture of a device as claimed in any of claims 1 to 25, in which a piece of absorbent carrier material, which may be folded, is inserted in the bag formed from the composite sheet, which bag is preferably formed from two identical pieces of the composite sheet material, the carrier material is impregnated with the pure perfume or a solution or emulsion of the perfume before or after it is inserted in the bag, the bag is thereafter sealed on all sides and the sealed bag is immersed in a solution, solvent-free melt or dispersion of the active substances and the coating of active substances thus applied is thereafter dried or left to solidify in cold or hot air.
27. A process as claimed in claim 26 substantially as herein described with reference to any of the Examples.
28. A device as claimed in any of claims 1 to 25 when manufactured by a process as claimed in claim 26 or claim 27.
29. A process for after-treating laundry in a drier, which a device as claimed in any of claims 1 to 25 is introduced into a drier together with moist laundry and left to act on the laundry during the drying process.

ELKINGTON AND FIFE,  
Chartered Patent Agents,  
High Holborn House,  
52/54 High Holborn,  
London, WC1V, 6SH.  
Agents for the Applicants.

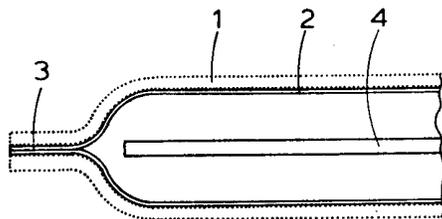


Fig. 1.

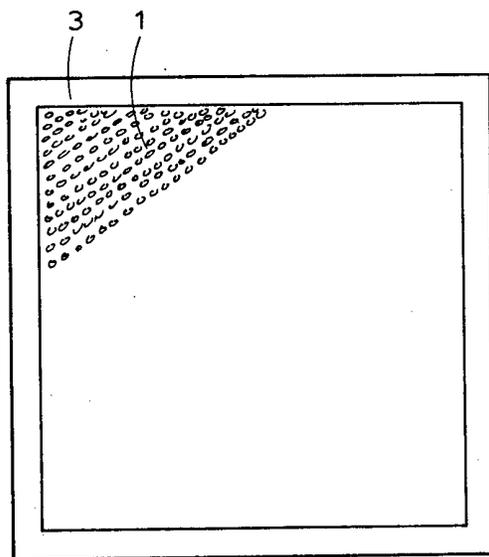


Fig. 2.