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(54) Titre : FEUILLE POUR ETIQUETTES
(54) Title: LABEL SHEET

(57) **Abrégé/Abstract:**

The invention relates to a label sheet, comprising, in the following order, a support material (10), an adhesive layer (12), a release layer (14) and a printable layer (16), whereby the support material is a transparent film and both the printable layer, including the release layer and also the support material including adhesive layer have one or more separation lines which are applied such that partial regions are formed and the separation line(s) in the support layer (20), including the adhesive layer extend(s) beyond the boundary region of the separation line(s) in the printable layer (18) including the release layer. The invention is characterised in that regions of a non-adhesive material (22) are embedded in the surfaces of the adhesive layer adjoining the release layer, and/or regions of a non-adhesive material (22) are applied to the surfaces of the adhesive layer adjoining the release layer, or the adhesive layer (12) is present in the form of a raster, or the printable layer (16) has a surface roughness of 4 to 50 μ m (DIN 4768) on the upper surface thereof (17), or the adhesive layer (12) has a surface roughness which may be obtained by providing the underside (15) of the printable layer (16) with a surface roughness of 4 to 50 μ m (DIN 4768). The invention further relates to a label produced from said label sheet and a method for production thereof.



Abstract

The present invention relates to a label sheet comprising in the following sequence: a support material (10), a pressure-sensitive adhesive layer (12), a release layer (14) and a printable layer (16), the support material being a transparent film, and both the printable layer, including the release layer, on the one hand, and the support material, including the pressure-sensitive adhesive layer, on the other hand, having one or more detachment lines which are attached such that sub-regions are formed and the detachment line(s) in the support layer (20), including the pressure-sensitive adhesive layer, protrude(s) over the detachment line(s) in the printable layer (18), including the release layer, at the edges, characterized in that regions of a non-adhesive material (22) are embedded into that surface of the pressure-sensitive adhesive layer which adjoins the release layer and/or regions of a non-adhesive material (22) are applied to that surface of the pressure-sensitive adhesive layer which adjoins the release layer, or the pressure-sensitive adhesive layer (12) is present in the form of a pattern, or the printable layer (16) has a roughness of 4 to 50 μm (DIN 4768) on its upper side (17), or the pressure-sensitive adhesive layer (12) has a roughness that is obtained by providing the underside (15) of the printable layer (16) with a roughness of 4 to 50 μm (DIN 4768). The invention also relates to a label produced from the label sheet in accordance with the invention and to a method of producing the label.

A LABEL SHEET

The invention relates to a label sheet, a label produced therefrom and a method of producing the label from the label sheet.

Inkjet desktop and laser printers are widely used to individually print paper materials. These printers do, however, suffer from the drawback that the inks fade with time and offer only limited resistance to water, dirt, chemicals, UV radiation and mechanical impact, with the result that the use of such printed materials is unsuitable for long-term applications either indoors or outdoors. Moreover, if exposed to air for a fairly long period of time, paper labels become discolored, with the paper typically turning yellow.

To make materials, such as labels which have been printed by means of an inkjet desktop or laser printer, suitable for long-term applications as well, methods are being sought that improve the resistance of the label and its imprint with respect to the aforementioned possible influences.

To enhance a label's resistance to water it is well known that special-purpose inkjet coatings should be applied to paper, which simultaneously improves the quality of printing. Such an approach, however, is unable to achieve a degree of water resistance that would permit use outdoors. A further drawback of this embodiment is that the light resistance is not enhanced by the special-purpose coating. In consequence, an indoor or outdoor application which lasts several months usually causes the inks to fade away to such an extent that it is no longer possible to read the colored lettering or to discern the original picture.

It is also known in the prior art that the resistance of materials can be improved by lamination using a film. For example, DE 1 296 363 describes a process in which a sheet of paper, while being heated, is bonded to a flexible, tough and transparent plastic film by means of an adhesive coating on that side of the plastic film which faces towards the sheet of paper. This kind of plastic film is resistant to solvents, such as acetone, carbon tetrachloride and heptane, and do not undergo any degradation when exposed to the effect of water. All the same, the process suffers from the disadvantage that from a technical point of view, the lamination technique is complicated and the plastic coating first has to be activated at 50 to 85 °C before bonding occurs.

In addition, it is known that pigmented inks should be used in the case of industrial printers in order to enhance the resistance of the inks to light. Nonetheless, the use of such pigmented inks, apart from the color black, has so far not been feasible in inkjet desktop printers.

Furthermore, DE 40 03 129 describes a styrene-based film that contains a benzophenone type or benzotriazole type ultraviolet (UV) absorber and/or a sterically hindered amine type light stabilizer. The products are free of fish-eye gel, do not discolor in conditions of humid heat, can be readily printed and are resistant to weathering. Nevertheless, there is the disadvantage that styrene-based films can be printed only by using a special-purpose printing ink for polystyrene, but not by using commercially available inkjet desktop or laser printers.

It is, moreover, known in principle that a label's resistance can be improved by lamination using a transparent film. Nevertheless, this kind of lamination has proved to be very complicated because the label and the film are present

as separate sheets or rolls and the film has to be tailored to the size of the label in an additional procedural stage. Since, moreover, lamination takes place on the basis of a visual estimation, it is frequently the case that the label is bonded lopsidedly with the film, which detracts from the appearance of the resultant laminated label. It is not possible to reposition the film either, because once bonded with the surface of a paper label, the adhesive sticks tightly and cannot be peeled off again. Additionally, large-format labels, in particular, suffer from the problem that during bonding, air bubbles or pockets form between the label and the laminating film; such air pockets likewise cause the label to look unattractive.

To permit a label to be laminated with a film in as positionally accurate a manner as possible, the Nichiban company developed a label sheet in which the label and the transparent laminating film are integrated within a single sheet. The label sheet comprises the following layers: laminating film, pressure-sensitive adhesive layer, release layer, paper layer. The label sheet further comprises punch lines, by means of which sub-regions the size of the label are formed. The sub-regions that are formed in the paper layer, including the release layer, are smaller than the sub-regions formed in the laminating film, including the pressure-sensitive adhesive layer, the latter protruding over the former at the edges. To laminate a label, the sub-region corresponding to the label is removed from the paper layer and, having been turned upside down, re-affixed into the resultant window onto the pressure-sensitive adhesive layer, thereby causing the printable layer to be bonded to the pressure-sensitive adhesive layer. Afterwards, the sub-region of the laminating film, together with the stuck-on label, is removed from the label sheet. The laminating film's protruding edges, which project over the stuck-on label, cause the composite to be in turn affixed to any kind

of object. Nichiban's above-described label sheet does, however, suffer from the drawback that only relatively small labels can be bonded effectively in this way. Larger labels are faced with the problem that, during lamination, air pockets may be trapped between the label and the laminating film, which air pockets considerably detract from the appearance of the resultant laminated label. Furthermore, it is not possible to re-adjust the position of a paper label once it has been stuck on.

US 2002/0011306 describes adhesive labels which provide areas non-adhesive material within the adhesive layer to allow the removal of entrapped air pockets. For the same reason, the adhesive layer may be provided with a Sheffield-roughness of at least 10 or at least 70 or at least 150.

DE 197 24 648 A1 describes a self-adhesive area-measured product comprising a substrate, a non-stick coating on the upper side of the substrate, and an adhesive coating on the underside of the substrate, and being characterized in that the adhesive coating is present in the form of a pattern and that the upper side of the substrate having the non-stick coating has a roughness of at least 1 μm (measured according to ISO 8791-4).

To overcome the aforementioned disadvantages, the object upon which the invention is based lies in the provision of a label sheet which can be used to laminate labels with a film in a simple, effective and extremely accurate manner, by means of which the labels are made resistant, for example to light, UV radiation, ozone, dirt, water, chemicals and mechanical impact, and are thus ideally suited to long-term application both indoors and outdoors. Additionally, the labels produced from the label sheet are intended to be free of entrapped air pockets between the laminating film and the printable layer, particularly whenever large-format A4 or A3

labels are required. An additional aim of the present invention is for it to be possible to reposition the laminating film if need be.

The above object is solved by a label sheet, comprising in the following sequence: a support material, a pressure-sensitive adhesive layer, a release layer and a printable layer, the support material being a transparent film, and both the printable layer, including the release layer, on the one hand, and the support material, including the pressure-sensitive adhesive layer, on the other hand, having one or more detachment lines that are attached such as to form sub-regions and such that the detachment line(s) in the support layer, including the pressure-sensitive adhesive layer, protrude(s) over the detachment line(s) in the printable layer, including the release layer, at the edges, characterized in that the pressure-sensitive adhesive layer is present in the form of a pattern, or the printable layer has a roughness of 4 to 50 μm (DIN 4768) on its upper side.

The label sheet according to the invention may be of any size, though it preferably has the size of an A4 or A3 format.

The transparent film in the label sheet according to the invention has the function of a support material and acts as a protective laminate within the label that can be produced from the label sheet, thereby protecting the layers located therebelow from moisture.

The inventors of the present application found that, after lamination of the printable layer with the transparent film, non-adhesive regions are formed between the laminating film and the printable layer either by applying the pressure-sensitive adhesive in the form of a pattern or by using a printable layer which has a roughness of 4 to 50 μm (DIN

4768) on its upper side. These non-adhesive regions are able to move any air bubbles that are inevitably trapped between the laminating film and printable layer during the laminating stage towards the edges of the laminate, for example by manually smoothing them out.

Any kind of known film can be used as the transparent film. To enable the label sheet according to the invention to be printed using a laser printer, the transparent film should be heat-resistant, such as polymethyl pentene (TPX) or polyethylene terephthalate (PET) films. A PET film is particularly preferred for use as a transparent film. The transparent film preferably has a thickness of 26 to 200 μm , with particular preference for 50 μm .

The transparent film may include known HALS compounds ("hindered amine light stabilizers") for the purpose of stabilization. In a particularly preferred embodiment, moreover, the transparent film is UV-stabilized, i.e. it contains one or more UV-absorbing components. Such UV-absorbing components are known to the person skilled in the art and may, for example, be benzophenone or benzotriazole compounds.

The term "printable layer" is defined as a layer that can be printed using an inkjet desktop printer or laser printer. The printable layer is preferably an uncoated paper, an uncoated cardboard or a paper or cardboard coated with an inkjet or laser printer coating. The paper or cardboard preferably has a grammage of 70 to 200 g/m^2 .

A release layer is applied to the back of the printable layer, in other words, in the label sheet according to the invention, the release layer is located between the printable layer and the pressure-sensitive adhesive layer. The release layer is preferably a silicone layer. To stop

the print quality from being impaired due to the migration of silicone while the release layer is being applied to the back of the printable layer, it is advisable, in accordance with a preferred embodiment, to first of all bond the underside of the printable layer to a PET film. Afterwards, the PET film is coated with the release layer. Alternatively, it is possible to use a pre-siliconized PET film as well, i.e. one that is coated with a release layer.

The detachment lines are applied such as to form sub-regions. These sub-regions may be polygonal, e.g. quadratic or rectangular, round or oval. It is essential to the invention that the detachment line in the support layer should protrude over the detachment line in the printable layer at the sides, preferably by 5 to 50 %, with particular preference for 10 to 30 %. This means that the sub-regions produced by the detachment line in the transparent film are larger than the sub-regions of the printable layer. The detachment line may be a sectional, punched or perforated line. Particularly in the case of those sub-regions that are formed in the support layer, including the pressure-sensitive adhesive layer, the detachment line may also correspond to the outer edges of the label sheet. If all the detachment lines which form the partial area of the support layer and pressure-sensitive adhesive layer correspond to the outer edges of the label sheet, this partial area is the same size as the label sheet itself. In accordance with a preferred embodiment, the sub-region of the support layer, including the pressure-sensitive adhesive layer, has the size of an A3 or A4 format. The corresponding sub-region in the printable layer is then 10 to 30 % smaller.

The label sheet as specified by the invention comprises a layer of pressure-sensitive adhesive. In certain applications, the adhesive may also be of the heat-activated type. The pressure-sensitive adhesive usually has a

thickness of 10 to 125 μm , preferably approx. 25 to approx. 75 μm or 10 to approx. 50 μm , the specific thickness being dependent on the actual application. In one embodiment, the weight of the pressure-sensitive adhesive coating ranges from approx. 10 to approx. 50 g/m^2 and in a preferred embodiment from approx. 20 to 35 g/m^2 . The pressure-sensitive adhesive may be any known pressure-sensitive adhesive. This type of adhesive includes rubber-based pressure-sensitive adhesives, acrylic pressure-sensitive adhesives, vinyl ether pressure-sensitive adhesives, silicone adhesives and mixtures of two or more thereof. Such pressure-sensitive adhesive materials are described in "Adhesion and Bonding", Encyclopaedia of Polymer Science and Engineering, Vol. 1, pages 476-576, Interscience Publishers, 2nd edition, 1985. Suitable pressure-sensitive adhesive materials contain a polymer as a principal constituent, for instance acrylic type polymers, block copolymers, natural or recovered rubbers, styrene butadiene rubbers, random ethylene and vinyl acetate copolymers, ethylene vinyl acrylic terpolymers, polyisobutylene poly(vinyl ethers) etc. The pressure-sensitive adhesive materials are typically characterized by their glass transition temperatures ranging from approx. $-70\text{ }^\circ\text{C}$ to approx. $10\text{ }^\circ\text{C}$.

In addition to the aforementioned resins, other materials may be present in the pressure-sensitive adhesive materials. These include antioxidants, filler materials, pigments, waxes etc. The adhesive materials may contain a mixture of solid tackifying resins and liquid tackifying resins. Particularly preferred pressure-sensitive adhesives are described in U.S. 5,192,612 and U.S. 5,346,766.

Particular preference is given to the use of an adhesive which does not unfold its full adhesive strength until after 1 to 5 min, so as to enable the affixed partial area of the printable/printed layer to be repositioned. This type of

adhesive includes low-temperature adhesives and are known in principle to the person skilled in the art.

The pressure-sensitive adhesive can be applied by using standard coating techniques, such as curtain coating, gravure coating, reverse gravure printing, offset gravure printing, roller coating printing, brushing, knife-over-roll coating, air-brush roller coating, metering-roller coating, reverse roll coating, roller coating with bottom-action doctor blade, immersion, jet coating, spraying and the like. The use of these coating techniques is well known and can be performed effectively by a person skilled in the art. Further information on coating techniques is to be found in "Modern Coating and Drying Technology", by Edward Cohen and Edgar Guttoff, published by VCH Verlag, 1992.

In accordance with a preferred embodiment, conventional UV blockers may be present in the pressure-sensitive adhesive layer.

The light-absorbing components contained in the transparent film and/or the pressure-sensitive adhesive layer and/or the non-adhesive material bring about a substantial improvement of the light resistance of an imprint that was applied to the printable layer by means of an inkjet desktop printer or laser printer.

An alternative embodiment of the label sheet according to the invention is characterized in that the pressure-sensitive adhesive layer exists in the form of a pattern. The pattern-like coating of pressure-sensitive adhesive itself gives rise to non-adhesive regions, i.e. non-adhesive channels. The pressure-sensitive adhesive is present in the form of dots or lines, whereby attention should be paid to the fact that channels which extend as far as the edge of the sub-regions, i.e. as far as the detachment lines, are

formed, without any adhesive, by the pattern, so as to ensure the repositioning of any air pockets that might have been trapped between the printable layer and the transparent film after lamination.

The resultant patterns are referred to as dot patterns, line patterns (also designated as dash patterns) or net-like patterns. Dot or line patterns are preferred.

The above-described type of pressure-sensitive adhesive is used as a pressure-sensitive adhesive. In this case, as well, particular preference is given to the use of an adhesive that permits repositioning. Furthermore, adhesive dispersions such as aqueous dispersions, organosols or plastisols can be used. Dispersions that have a solids content of at least 45 per cent by weight are taken as a basis. (Meth)acrylate esters having C₄-C₁₂ alkyl radicals are preferably chosen as a dispersion for application of the pressure-sensitive adhesive. Amounts of acrylonitrile or acrylamides as well as crosslinker additives such as N-methylol acrylamide or glycidyl methacrylate, in combination with hydroxyl-group carrying or polyfunctional (meth)acrylate esters, for instance butanediol bis-acrylate, are able to enhance the cohesion or stability of the dispersion of a plastisol or organisol. Part of the methacrylate ester can, moreover, be replaced by copolymerizable compounds such as vinyl acetate or vinyl propionate. In addition, small amounts (up to approx. 12 %) of (meth)acrylic acid and/or other copolymerizable acids such as itaconic acid, fumaric acid or maleic acid can be included in the polymer. Furthermore, one or more known UV blockers can be added to the pressure-sensitive adhesive.

The pressure-sensitive adhesive pattern can be applied by way of flexographic, screen or gravure printing. In the case of screen printing, by means of which a dot pattern is

preferably produced, it is possible to use a flat screen or a revolving screen (rotary screen printing).

The pressure-sensitive adhesive is present in a pattern of 12 to 80, particularly 24 to 50 lines/cm substrate. It is well known that the shape of the pattern elements, such as diameter and height of the dots or lines, and hence the adhesive forces are chiefly influenced by the following factors: type of coating process, parameters affecting the coating process (e.g. mesh size and depth in the case of screen printing) and any physical parameters affecting the compound that is applied (e.g. hot-melt adhesive or dispersion adhesive), particularly its viscosity and thixotropy.

In this embodiment, the pressure-sensitive adhesive is preferably applied with a grammage of 5 to 20 g/m² (particularly 8 to 15 g/m²).

The roughness of the printable layer can be generated mechanically, for example by embossing, or by chemically modifying the surface of the printable layer, for example by applying a porous layer. Inkjet or "microporous" coatings that are known to the skilled person can be mentioned here as examples of such a porous coating.

In accordance with a further alternative embodiment of the label sheet according to the invention, the upper side of the printable layer has a roughness of 4 to 50 μm (DIN 4768), preferably 10 to 25 μm . If the upper side of the printable layer has a roughness in the above-mentioned range, non-adhesive regions/channels are produced between the printable layer and the pressure-sensitive adhesive layer during lamination whenever the rough surface is bonded to the pressure-sensitive adhesive layer. In turn, these

non-adhesive regions/channels cause any entrapped air pockets to be smoothed out towards the edges.

It is self-evident that the aforementioned embodiments can be combined together as well, for example, that the printable material is roughened on both the upper and lower sides.

If the aforementioned label sheet is used, the label according to the invention can be made by means of the following technique comprising the steps of:

(a) separating a partial area of the printable layer, including the release layer, from the aforementioned label sheet in accordance with the invention,

(b) affixing the partial area that was separated in step (a), with the side of the printable layer, to the pressure-sensitive adhesive layer at the same site in the label sheet at which the printable layer, including the release layer, was previously separated in step (a), and

(c) separating the label comprising a partial area of the transparent film, a partial area of the interposed pressure-sensitive adhesive layer, and the partial area of the printable layer, affixed thereto in step (b), including the release layer applied thereto.

In the above-described method of producing the label according to the invention, the transparent film simultaneously fulfils the function of a support material in the label sheet. The printable layer and transparent laminating film are therefore integrated within a single label sheet. This embodiment is advantageous because handling is very simple and it is not necessary to use two

separate sheets, a label sheet and a laminating film sheet, when the label according to the invention is being made. Furthermore, after the partial area of the printable layer has been separated, the resultant window gives rise in step (b) to a centering aid, which enables the printable layer to be laminated with the film in a positionally accurate manner. Moreover, any unwanted air pockets can be removed from the laminate as a result of the application of the pressure-sensitive adhesive layer in the shape of a pattern or as a result of the use of a printable layer that exhibits a roughness of 4 to 50 μm (DIN 4768) on its upper side. This is particularly important whenever large-format laminated labels are to be produced, for example with A4 or A3 format.

The invention's embodiments will now be explained in more detail on the basis of the attached drawings, in which

Fig. 1a represents a label sheet, the printable layer of which has a porous upper side, and Fig. 1b represents the laminated label that was produced therefrom.

Figure 1a represents a label sheet according to the invention; this label sheet has a transparent support material (10), a pressure-sensitive adhesive layer (12), a release layer (14), a PET film (44), a pressure-sensitive adhesive layer (42) and a printable layer (16). A coating that exhibits a roughness in the range indicated above is applied to the upper side (17) of the printable layer. The label sheet comprises punched lines, thereby forming partial areas. These partial areas are composed, on the one hand, of the release layer (14), the PET film (44), the pressure-sensitive adhesive layer (42) and the printable layer (16) coated with the porous layer (40), and, on the other hand, of the pressure-sensitive adhesive layer (12) and the transparent film (10). The partial area of the pressure-sensitive adhesive layer (12) and of the transparent film

(10) is larger than the partial area of the release layer (14), PET film (44), pressure-sensitive adhesive layer (42) and coated printable layer (16). A repositionable adhesive is preferably used as the adhesive in the pressure-sensitive adhesive layer (12).

During the lamination step, the partial region that contains the release layer (14), PET film (44), pressure-sensitive adhesive layer (42) and coated printable layer (16) is cut out of the label sheet and, having been turned upside down, is bonded into the resultant window onto the uncovered pressure-sensitive adhesive layer (12), with the result that the porous layer (40) now directly adjoins the pressure-sensitive adhesive layer (12). The roughness of the porous layer (40) gives rise to non-adhesive regions or channels between the porous layer (40) and the pressure-sensitive adhesive layer (12), thereby removing entrapped air pockets.

Separating the thus bonded partial areas from the label sheet produces a label whose structure is depicted in Fig. 1b: transparent laminating film (10'), pressure-sensitive adhesive layer (12'), porous coating (40'), printable layer (16'), pressure-sensitive adhesive layer (42'), PET film (44'), release layer (14').

Instead of a porous coating (40), use can also be made of a printable layer (16) that already has a rough surface, for example a paper which naturally has a roughness in the range indicated above or a roughness produced by embossing.

Specific structural designs for the label sheet according to the invention, in which use is made of a printable layer that has a rough surface, if necessary as a result of coating, are described below.

1. A structure for signs

The structure comprises layers in the following sequence:

- transparent film: 50- μ m PET film
- permanent repositionable adhesive, coated all over
- release layer: silicone layer
- 36- μ m PET film
- permanent adhesive
- printable layer: 70 g/m² laser and inkjet compatible material having a Sheffield roughness (ISO/DIN 8791-3) of 85

An A4 sheet is produced using the structure indicated above. Punched lines are applied to the printable layer so as to produce 2 partial areas (labels) that are 150 x 100 mm in size. Punched lines are also applied to the transparent film, thereby obtaining 2 partial areas 180 x 130 mm in size. A laminated sign 150 x 100 mm in size can be produced therefrom. The support film juts out by 15 mm all around the printable label.

Of course, any other formats can be produced as well.

2. Structure for photographic labels

The structure comprises layers in the following sequence:

- transparent film: 50- μ m PET film
- permanent repositionable adhesive, coated all over
- silicone layer
- 36- μ m PET film
- permanent adhesive
- printable area: 90 g/m² inkjet-coated paper having a Sheffield roughness (ISO/DIN 8791-3) of 40

An A4 sheet is produced using the structure indicated above. Punched lines are applied to the printable layer so as to produce 2 partial areas (labels) that are 150 x 100 mm in size. Punched lines are also applied to the transparent film, thereby obtaining 2 partial areas 160 x 110 mm in size. A laminated photograph for affixing into an album 150 x 100 mm in size can be produced therefrom. The support film juts out by 5 mm all around the printable label/photograph.

Of course, any other formats can be produced as well.

The label sheets in accordance with the invention can be used, for example, to make signs or photographic labels.

Patent Claims

1. A label sheet comprising

in the following sequence: a support material (10), a pressure-sensitive adhesive layer (12), a release layer (14) and a printable layer (16),

said support material being a transparent film, and

both said printable layer, including said release layer, on the one hand, and said support material, including said pressure-sensitive adhesive layer, on the other hand, having one or more detachment lines which are applied such that sub-regions are formed and the detachment line(s) in said support layer (20), including said pressure-sensitive adhesive layer, protrude(s) over the detachment line(s) in said printable layer (18), including said release layer, at the edges,

characterized in that

regions of a non-adhesive material (22) are embedded into that surface of said pressure-sensitive adhesive layer which adjoins said release layer and/or regions of a non-adhesive material (22) are applied to that surface of said pressure-sensitive adhesive layer which adjoins said release layer, or

said pressure-sensitive adhesive layer (12) is present in the form of a pattern, or

said printable layer (16) has a roughness of 4 to 50 μm (DIN 4768) on its upper side (17), or

said pressure-sensitive adhesive layer (12) has a roughness that is obtained by providing the underside (15) of said printable layer (16) with a roughness of 4 to 50 μm (DIN 4768).

2. A label sheet according to claim 1, wherein said detachment lines in said support layer, including said pressure-sensitive adhesive layer, are the outer edges of said label sheet.
3. A label sheet according to claim 1 or 2, wherein the surface of said non-adhesive material ends at the surface of said pressure-sensitive adhesive layer.
4. A label sheet according to claim 1 or 2, wherein the surface of said non-adhesive material is lower or higher than the surface of said pressure-sensitive adhesive layer.
5. A label sheet according to one or more of the preceding claims, wherein said transparent film and/or said pressure-sensitive adhesive layer and/or said non-adhesive material includes a light-absorbing component.
6. A label sheet according to one or more of the preceding claims, wherein said non-adhesive material has an average thickness of 30 nm to 100 μm .
7. A label sheet according to one or more of the preceding claims, wherein said non-adhesive material comprises a plurality of dots or lines or a combination of both.
8. A label sheet according to one or more of the preceding claims, wherein said non-adhesive material is porous.

9. A label sheet according to one or more of the preceding claims, wherein a PET film (44) and a pressure-sensitive adhesive layer (42) are applied between said release layer (14) and said printable layer (16).
10. A label sheet according to claim 1 or 2, wherein said printable layer (16) has a roughness of 10 to 25 μm on its upper side.
11. A label comprising in the following sequence: a transparent film (10'), a pressure-sensitive adhesive layer (12'), a printable layer (16') and a release layer (14') applied thereto,

characterized in that

embedded regions of a non-adhesive material (22') are located in said pressure-sensitive adhesive layer, or

said pressure-sensitive adhesive layer (12') is present in the form of a pattern, or

said printable layer (16') has a roughness of 4 to 50 μm (DIN 4768) on its upper side (17'), or

said pressure-sensitive adhesive layer has a roughness that is obtained by providing the underside (15') of said printable layer with a roughness of 4 to 50 μm (DIN 4768).

12. A method of producing the label according to claim 10, said method comprising the following steps

(a) separating a partial area of said printable layer (16), including said release layer (14), from said aforementioned label sheet in accordance with claim 1,

(b) affixing the partial area that was separated in step (a), with the side of said printable layer (16), to said pressure-sensitive adhesive layer (12) at the same site in the label sheet at which the printable layer, including the release layer, was previously separated in step (a), and

(c) separating said label comprising a partial area of said transparent film (10'), including a partial area of said interposed pressure-sensitive adhesive layer (12'), and further comprising that partial area of said printable layer (16') which was affixed thereto in step (b), including said release layer (14') applied thereto.

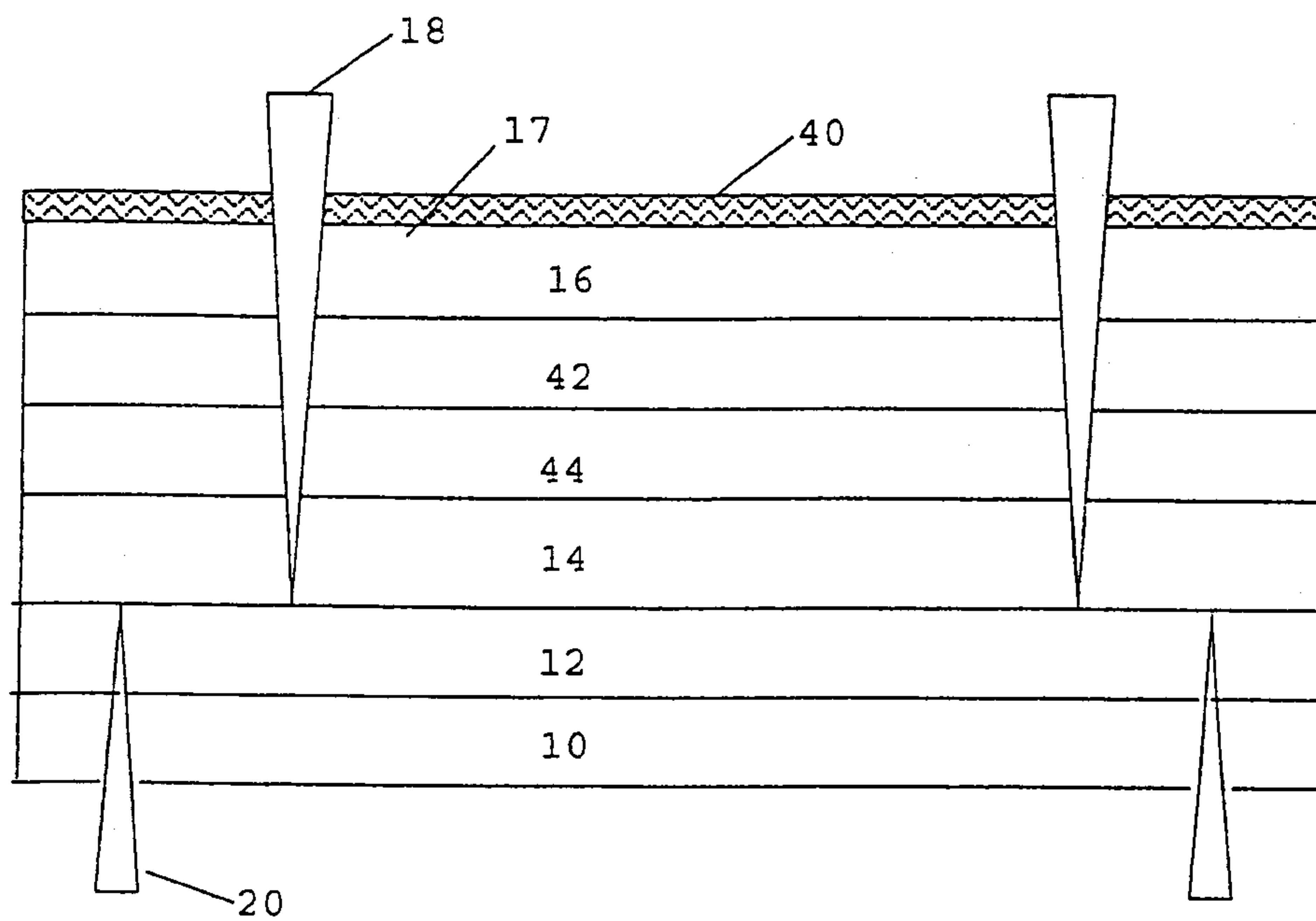


Fig. 1a

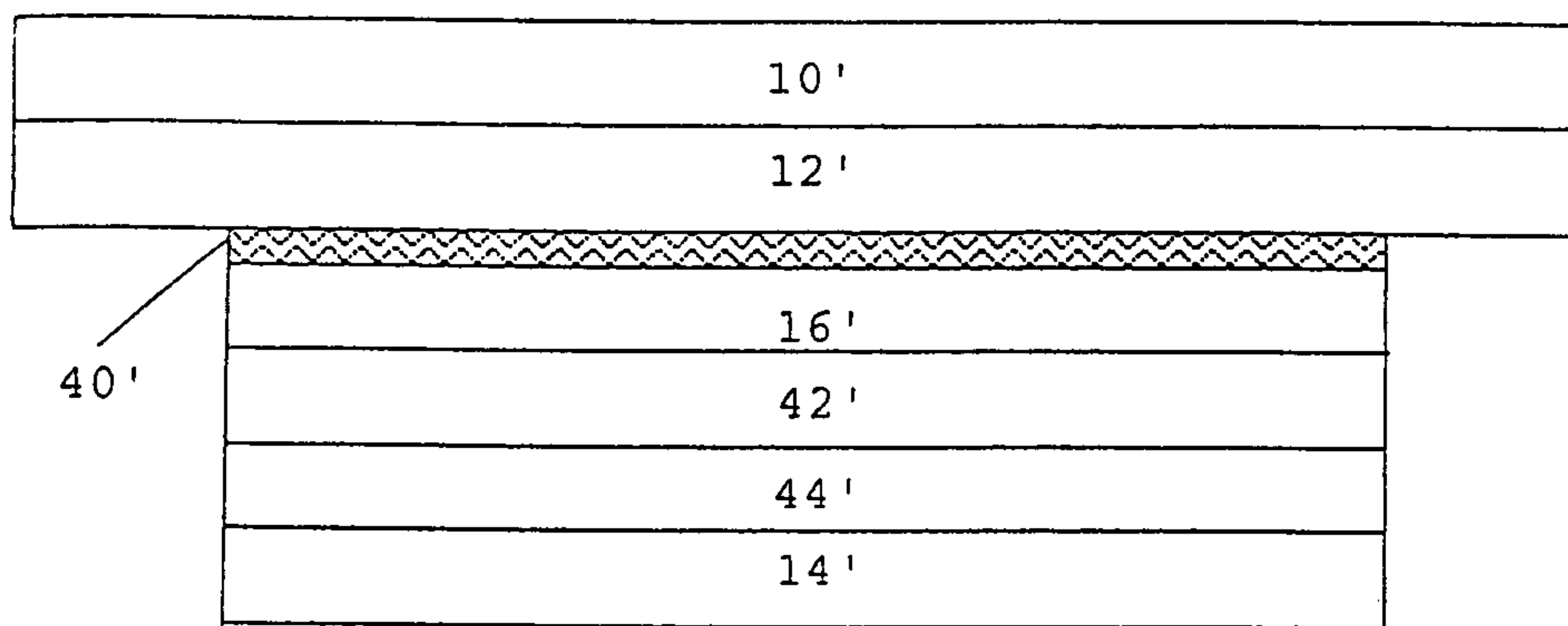


Fig. 1b