

The invention concerns a method for transferring a pattern onto a substrate wherein the pattern, as a pattern layer known per se from hot process blocking foils, is arranged on a carrier film and is, under the effect of heat and/or pressure, both detached therefrom and fixed on the substrate by means of an adhesive layer. The object of the invention is, moreover, the use of a foil consisting of a carrier web and a layer detachable therefrom in the above mentioned method.

A method of the kind mentioned at the outset is usually effected by means of so-called hot process blocking foils. A hot process blocking foil is built up in such a way that a pattern layer, which may by all means comprise several layers, is deposited on a carrier film. The side of the pattern layer remote from the carrier film then carries a further adhesive layer. For transferring the pattern layer, the hot process blocking foil with the adhesive layer is then deposited on a substrate and is exposed at least to pressure, but generally to pressure and heat. In this process, a bond is produced by means of the adhesive layer between the surface of the substrate to be decorated and the pattern layer. After the pattern layer has been fixed on the substrate, the carrier film is then peeled off from the pattern layer which remains on the substrate, in which process the peeling off of the pattern layer is possibly facilitated by a separating layer, generally a wax coating.

Very special manufacturing devices are necessary for manufacturing hot process blocking foils. In particular, the varnishing processes which are always necessary, require workshops with appropriate safety and environmental protection devices, which are not cost effective in manufacturing blocking foils in small quantities, for example. In recent times, blocking foils are for example, increasingly used to apply special security marks to paper, cards, etc., for example, bank notes, credit cards and so on. Now, hot process blocking foils used for this purpose must understandably be subjected to increased security controls both during manufacture and processing, which can only be ensured at the manufacturers of hot process blocking foils with a disproportionately large input of labour. For this reason, quite a few processors of blocking foils prefer to affix the necessary security marks to the blocking foils on their own premises, especially since a special know how is also required for this purpose. Users of hot process blocking foils may, for example, provide the pattern layer with a special design, for example a hologram, even when an appropriate semifinished product is supplied to them. However, they usually do not have the facility of subsequently applying the adhesive layer, mostly formed by one or several layers of varnish, onto the portion of the inserted security mark. Because of this, it is in such cases necessary to return the semifinished blocking foils provided with

the security marks to the manufacturer, which is understandably undesirable because of the risk this entails. Another possibility would be to provide the manufacturer of the hot process blocking foils with the tool or appliance required for affixing the security marks. However, this is also generally undesirable because of the security risks this entails. Finally, it is frequently desired, precisely in the case of hot process blocking foils used for security purposes, to use special adhesives for the application.

From the US-A 3 607 525, a method is known for transferring an image from an initial carrier to a new carrier which lies in pressing a sheet covered with an adhesive layer onto a printing ink layer on an original carrier, in then removing this sheet so as to leave the adhesive layer on the printing ink layer, in thereupon bringing an intermediate carrier into contact with the adhesive layer, which carrier has superposed on one another: a clear varnish layer, a fixing layer that can be easily removed from the varnish layer and a base carrier layer. The original carrier is then removed and the intermediate layer with the printing ink layer attaching thereto is deposited on a new carrier, and the base carrier layer is removed from the intermediate carrier.

From the GB-A 1 301 779 a method is known for transferring images, signs, etc. printed on a sheet of paper onto a carrier surface which includes the following steps:

- a) depositing a film of a sticky contact adhesive on a detaching sheet for producing a unit consisting of the carrier layer and detaching sheet;
- b) applying the detaching sheet unit to the paper sheet, in which process the carrier layer lies against the signs etc., whereby the surface of the paper and the signs adhere to the carrier layer and form a layered arrangement;
- c) softening the layered arrangement in water until the paper has been softened, whereupon the paper is removed, whereby the carrier layer holds the signs etc., but does not, in the main, become sticky;
- d) attaching the carrier surface to the carrier layer holding the signs or the like;
- e) applying the carrier layer holding the signs or the like against the supporting surface, whereby the carrier layer adheres thereto,
- and
- d) removing the detaching sheet.

For the states of BE, CH, DE, ES, FR, GB, IT, LI, NL and SE, the EP-A 0 375 609 represents the state of the art in accordance with article 54(3) (4) of the EPU.

5 The manufacture of a film adhesive is described therein, according to which adhesives are deposited, for example poured, onto a detaching surface, for instance paper treated with silicone.

10 The invention is, therefore, based on the object of proposing a method and the use of a film suitable for this purpose which allow all the above mentioned special requirements to be met that is to say, to provide a user of a hot process blocking foil in particular, with the opportunity to provide the foil
15 with security marks independently of the manufacturer of hot process blocking foils, and then also to apply the pattern layer complemented in this way reliably to the item to be safeguarded, for example, a bank note or a credit card.

20 Now, in accordance with the invention, it is proposed to proceed as it were, in two stages, that is to say, that the optionally multilayer adhesive layer is applied to a special carrier web whence it is easily detachable, in which process the adhesive layer is subsequently deposited under the effect
25 of pressure and/or heat from the carrier web either onto the free surface of the pattern layer remote from the carrier film or onto the surface zone to be decorated of the substrate, and subsequently the carrier web is detached from the adhesive layer, in which process, the pattern layer disposed on the
30 carrier film is finally fixed under the effect of pressure and/or heat by means of the adhesive layer on the surface of the substrate to be decorated, and thereupon the carrier film is detached from the pattern layer.

35 Thus the fundamental idea of the invention aims to provide the user on the one hand, with a film that consists of a carrier film and the pattern layer fixed thereon, usually via a separating layer and on the other hand, a film that carries the adhesive layer on a carrier web. In the processing, the adhesive layer must then be at first either deposited on the
40 upper side of the pattern layer that is remote from the carrier film or onto the surface of the substrate to be decorated. After the carrier web has been detached, the pattern layer can then be fixed by the adhesive layer on the substrate in the usual way. With such a separation of the pattern layer
45 on the one hand and of the adhesive layer on the other hand, there arise a number of opportunities for the user that have so far been unknown. In particular, after delivery of the partial blocking foil merely comprising the pattern layer,
50 there exists the opportunity, as far as the user is concerned, of modifying or complementing the pattern layer in his own processing equipment, for example, by an applied hologram, a special vapour deposit etc. In spite of such further proces-

5 sing, the appropriately modified pattern layer can then be
fixed on the substrate by the processor by means of the other
partial blocking foil comprising in the main the adhesive
layer in the manner that is usual to date. Thus the processor
is provided with a simple possibility of applying the adhesive
layer without any special devices and security measures, this
depending on whichever process is more favourable for the
processor, either by application to the pattern layer, for
example in a roller mechanism, or by applying the adhesive
layer to the substrate and the subsequent blocking on of the
partial blocking foil having the pattern layer. Of course,
in a procedure in accordance with the invention, the processor
has for example, also the opportunity of using very special
adhesives.

15 If, as is further provided in accordance with the invention,
the adhesive layer is only zonally applied to the carrier web,
the processor has an opportunity of making provision for
special patterns for the blocked on or applied image, because
the pattern layer then only adheres in the zones on the sub-
strate where there is some adhesive.

20 The application of the adhesive layer to the carrier web can
be effected in different ways, for example, in a roller appli-
cation or a casting method. However, it is particularly ex-
pedient if the adhesive layer is applied in a printing process
that is basically known.

25 The pattern layer to be deposited by means of the adhesive
layer can be built up in accordance with the pattern layers in
known blocking foils. It may, for example, consist of non-
pigmented transparent varnish layers, pigmented varnish layers
and/or metal layers, for example aluminium, chromium, tin,
zinc, copper, silver, gold, titanium. The pattern layer can,
of course, also comprise several layers, in which arrangement
there exists the additional opportunity of providing the pat-
tern layer also with a spatial pattern, either in its surface
pointing towards the carrier film or in a zone between various
varnish layers where specifically for security applications, a
mode of embodiment is advantageous wherein there exists a
reflecting metallic layer.

30 A film for use in the method in accordance with the invention
consists of a carrier web and an optionally multilayer ad-
hesive layer that is detachable therefrom, the adhesive layer
expediently having a thickness of 1 to 100 μm , preferably 1 to
10 μm .

35 For the adhesive layer one may definitely use the adhesives
usually used in the manufacture of blocking foils, in which
process the adhesive layer can preferably be formed by a sol-
vent varnish, an aqueous synthetic resin dispersion and/or a
hot-melt adhesive. For the individual adhesive layers, there

qualify single or multi-component mixtures of the following binders: PVC, PVC copolymers, chlorinated polyolefins, polyesters, polyurethanes, polyvinyl acetates, vinylacetate copolymers, polyacrylates, acrylate copolymers, polystyrenes, butadiene-styrene-copolymers, polystyrene-copolymers, colophonium resins, shellac and polyamides.

Since the adhesives are mostly deposited in a printing process, it may possibly be advisable to add varnish adjuvants known per se for improving the printing or running behaviour and for the defoaming. For certain applications, additives of filler substances, pigments or dyes may also be added, the pigments and dyes being added, above all when the adhesive layer is visible after the film has been processed, either if the film has been deposited on a transparent substrate or if the adhesive layer shows through the pattern layer.

The carrier web of the film having the adhesive layer may expediently be formed, if required at least on the side of the adhesive layer, by a paper web or synthetic film carrying a coating which facilitates the detachment of the adhesive layer. To facilitate the detachment of the adhesive layer, one may, for example, consider silicone-coated paper. One must, in any case, ensure that during the processing, the adhesive layer is readily and completely detached from the carrier web, since, after all, a clean transfer of the pattern layer is only ensured in that case. If a synthetic film is used, the surface carrying the adhesive layer should be self-contained. For example, synthetic films of PET, PE, or PP may be used in this connection.

If reference is respectively made to an adhesive layer, this does not preclude the adhesive layer from being composed of several layers.

For special applications it is also possible for the film carrying the adhesive layer to be designed in such a way that apart from the adhesive layer, there is arranged on the carrier web a metallic layer, the metallic layer carrying on one or both sides an adhesive layer, this depending on whether the pattern layer or the substrate itself have adhesive properties or not. If the pattern layer or the substrate are adhesive, it is possible for the metallic layer, to adhere to the substrate or the pattern layer without the interposition of an adhesive layer.

Further features, details and advantages of the invention will emerge from the following description of some examples of embodiments of adhesive-layer films as well as of the method, with reference to the drawings. There are shown in :

Fig. 1 the basic structure of a partial blocking foil consisting of a carrier film and pattern layer, as

well as of an adhesive layer film consisting of a carrier web and an adhesive layer;

5 Figs. 2a and 2b a schematic representation of the depositing of a pattern layer on a substrate by means of an adhesive layer film according to a first mode of procedure and

10 Figs. 3a and 3b a schematic representation of the depositing of a pattern layer on a substrate by means of an adhesive layer film according to a second mode of procedure.

15 Figure 1 shows at the top a partial section through a layer sequence designated by A as a whole, which consists of a carrier film 1, a separating layer 2, a first varnish layer 3 and a second varnish layer 4. In the case of the carrier film, one is concerned with a carrier film that is usual per se for blocking foils, for example a PET film of a thickness of approximately 19 μm .

20 The detaching layer 2 is also a layer known in principle from blocking foils, for example a wax coating of a small thickness, which permits an easy detachment, particularly with a heat effect, of the pattern layer 5 formed by the two varnish layers 3 and 4.

25 The varnish layer 3 lying closer to the carrier film 1 forms the free surface after the pattern layer 5 has been deposited on a substrate, which is the reason why this varnish layer 3 should have an appropriate wear resistance. Moreover, because of the existence of the further varnish layer 4, the varnish layer 3 must be at least translucent. On the other hand, the varnish layer 4 of the pattern layer 5 will usually be a pigmented and/or dyed layer having a chemical composition such that the adhesive layer serving to fix the pattern layer 5 readily adheres to it.

30 Figure 1 shows, moreover, that the separating layer 6 between the varnish layers 3 and 4 is in the main not even. On the contrary, this separating layer 6 is provided with a spatial pattern, indicated by the corrugations 7 which, because of the transparency of the varnish layer 3, is visible after the pattern layer 5 has been deposited on a substrate. The spatial pattern 7, may, for example, be formed by a hologram etc.

35 Instead of the second varnish layer 4, it would also be possible to make provision in the zone of the separating layer 6 for a metallized portion, in which case, the adhesive layer would then have to be formulated in such a way that it adheres well to the metallized portion. But the metallized portion could also be arranged between two varnish layers 3, 4.

Figure 1 shows at the bottom an adhesive film designated as a whole by B, which consists of a carrier web 8 and the adhesive layer 9 serving to fix the pattern layer 5 on the substrate.

5 The carrier web may, for example, be formed by coated paper, for example, silicone-coated paper, but it may also be formed by uncoated paper. However, for the carrier web 8 one may also use a synthetic film that is uncoated or provided with a
10 detachable layer, for example of PET, PE, PP or a film of suitable substances.

The adhesive layer 9 is chosen in accordance with the respective field of application. The thickness of the adhesive layer 9 also depends on the purpose of the application and the
15 adhesive used. It lies between 1 and 100 μm , preferably between 1 and 10 μm . As adhesives one may expediently use solvent varnishes, aqueous dispersions or hot-melt adhesives. The respective method used for applying the adhesive to the
20 carrier web 8 depends on the viscosity, the methods that are usual and known for the manufacture of blocking foils being used, for example intaglio printing, screen printing, casting, etc. Further details as regards the formulations for the adhesives will be mentioned below.

25 Figures 2a and 2b on the one hand, and 3a and 3b on the other hand schematically show the methods for depositing the pattern layer 5 on a substrate 10.

In the first mode of procedure (Figures 2a, 2b), the adhesive layer 9 is first deposited in the way sketched in Figure 2a on
30 the free surface of the pattern layer 5 that is remote from the carrier film 1. This deposit may be effected in a process known per se from the processing of blocking foils under the effect of heat and pressure. As soon as the adhesive
35 layer 9 adheres to the free surface of the pattern layer 5, the carrier web 8 is peeled off from the adhesive layer 9. One then obtains a laminate consisting of the pattern layer film A and the adhesive layer 9, which can then be deposited
40 on the substrate 10 in the way known per se from the processing of blocking foils. As indicated in Figure 2b, in this process the carrier film 1 is blocked together with the separating layer 2, the pattern layer 5 and the adhesive layer 9 onto the surface 11 of the substrate 10 to be decorated, this
45 blocking being effected with the effect of heat and pressure. In this way, the pattern layer 5 is fixed to the surface 11 of the substrate 10, by means of the adhesive layer 9. As soon as the adhesive layer 9 adheres to a sufficient extent, the carrier film 1 can be detached from the pattern layer 5, so
50 that one obtains the surface 11 of the substrate 10 decorated with the pattern layer 5.

In the second mode of procedure, one at first deposits (Figure 3a) the adhesive layer 9 on the surface 11 of the substrate 10

to be decorated. As soon as the adhesive layer 9 adheres to the surface 11, the carrier web 8 is then peeled off.

5 One now has a free adhesive surface formed by the adhesive layer 9 (Figure 3b), against which the free surface of the pattern layer 5 can then be pressed on under the effect of heat, if required. The pattern layer 5 adheres in this way to the surface 11 of the substrate 10 to be decorated. As soon as this has been achieved, the carrier film 1 is then peeled off from the pattern layer 5.

Some examples of adhesive layers are indicated below.

15 Example 1: Solvent Varnish A Proportions by Weight

	PVC/PVA copolymers (acid number 10-15)	50
20	Polyester resin (acid number 15-20)	8
	SiO ₂ as filler	1
25	Methylethylketone	200
	Toluene	200
30	Alcohol	100

Example 2: Solvent Varnish B Proportions by weight

35	Thermoplastic polyamide resin (softening point 140°C)	75
40	Methyl-/butylmethacrylate (acid number 2-3, melting point approximately 145°C)	25
	Butylmethacrylate (acid number 1, melting point approximately 150°C)	15
45	SiO ₂ as filler	15
	TiO ₂ as filler	50
	Ethanol	600
50	Toluene	200

Example 3: Dispersion Varnish Proportions by weight

5	Polyvinylacetate-/ethylene dispersion (50% in H ₂ O, minimum film formation temperature: 0°C)	110
10	Butadiene styrene copolymer dispersion (50% in H ₂ O, minimum film formation temperature: 100°C)	550
	Rheological additive (non-ionic polyurethane- based product, 25% in water/butyldiglycol 80:20; d = 1.03 g/cm ³)	25



Patent Claims

1. A method for transferring a pattern onto a substrate wherein the pattern, as a pattern layer known per se from hot process blocking foils, is arranged on a carrier film and is, under the effect of heat and/or pressure, both detached therefrom and fixed on the substrate by means of an adhesive layer,

characterized in that

the optionally multilayer adhesive layer is applied to a special carrier web (8) whence it is easily detachable, that the adhesive layer (9) is then deposited under the effect of pressure and/or heat from the carrier web (8) onto the free surface of the pattern layer (5) remote from the carrier film (1) or onto the surface zone (11) to be decorated of the substrate (10), and subsequently the carrier web (8) is detached from the adhesive layer (9) and that finally, the pattern layer (5) disposed on the carrier film (1) is fixed under the effect of pressure and/or heat by means of the adhesive layer (9) on the surface (11) to be decorated of the substrate (10), and thereupon the carrier film (1) is detached from the pattern layer (5).

2. A method according to claim 1,

characterized in that

the adhesive layer (9) is only zonally applied to the carrier web (8).

3. A method according to claim 1 or 2,

characterized in that

the adhesive layer (9) is printed onto the carrier web (8).

4. Use of a film consisting of a carrier web and an optionally multilayer adhesive layer (9) detachable therefrom for transferring a pattern onto a substrate in a method according to one of claims 1 to 3.

5. Use according to claim 4,

characterized in that

the film has an adhesive layer (9) with a thickness of 1 to 100 μm , preferably 1 to 10 μm .

6. Use according to claim 4 or 5,

characterized in that

the film has an adhesive layer (9) formed by a solvent varnish.



7.. Use according to claim 4 or 5,

characterized in that

5 the film has an adhesive layer (9) formed by an aqueous synthetic resin dispersion.

8. Use according to claim 4 or 5,

10 characterized in that

the film has an adhesive layer (9) formed by a hot-melt adhesive.

15 9. Use according to one of claims 4 to 8,

characterized in that

20 a paper web serves as the carrier web (8) of the film.

10. Use according to one of claims 4 to 8,

characterized in that

25 as the carrier web (8) of the film, there serves a synthetic film whose surface carrying the adhesive layer (9) is self-contained.

30 11. Use according to claim 9 or 10,

characterized in that

35 the carrier web (8) of the film is provided, at least on the side of the adhesive layer (9), with a coating facilitating the detachment of the adhesive layer (9).

40 12. Use according to one of claims 4 to 11,

characterized in that

45 the adhesive layer (9) of the film only covers some zones of the surface of the carrier web (8).

13. Use according to one of claims 4 to 12,

45 characterized in that

50 the carrier web (8) of the film carries a metallic layer covered on one or both sides with an adhesive layer (9).