Final Diploma

Patent Examination Board

Drafting of Specifications FD2

Thursday 12 October 2017 10:00 to 14:00

INSTRUCTIONS TO CANDIDATES

1. The whole assessment task is to be attempted.
2. The marks to be awarded are given at the end of the assessment task.
3. The total number of marks available for this paper is 120.
4. Start each part of your answer on a new sheet of paper.
5. Write your answers on alternate lines.
6. Do not state your name anywhere in the answers.
7. Write clearly, as examiners cannot award marks to answer scripts that cannot be read.
8. The scripts may be photocopied for marking purposes.
   a) Use only **blackink**.
   b) Write on one side of the paper only.
   c) Write within the printed margins.
   d) Do not use highlighter pens on your answer script.
9. Instructions on what to do at the end of the examination are on the Candidate Cover Sheet.
10. Any candidate script removed from the examination room will not be marked.
11. This question paper consists of 7 sheets, including this sheet, and comprises:
    Assessment task (1 sheet)
    Client's letter (3 sheets)
    Client's drawings (1 sheet)
    Blank set of drawings for use in your answer (1 sheet).

Assessment Task

Your client sends you the correspondence listed on the Instructions to Candidates sheet regarding a new idea.

Your task is to prepare a complete patent specification that is ready for filing at the UK Intellectual Property Office. The specification should be drafted with a view to obtaining a UK patent.

Note the following:

a) You should assume that the client's description of the prior art in the field is complete.

b) You should not make use of any other prior art or special knowledge that you may have of the subject matter concerned.

c) You should also assume that the client's description of the device and its operation is accurate, i.e. that the device works as described.

Allocation of marks

Introduction and Description: 56 marks
Claims: 60 marks
Abstract: 4 marks
Total: 120 marks

Client's letter

Improving the security of passports is important to every nation. In the past, a physical photograph of the bearer would be cut out and stuck onto a specific page of a passport, usually with other information about the holder. To prevent tampering, the photograph and information would be covered and protected with a sealing layer adhered over the top. The sealing layer is typically a varnished or polished plastic with one sticky side protected by a waxed paper which is peeled off to adhere the plastic to the passport page. The sealing layer may also include additional security information printed on the sticky side. However, with time, the plastic can wear or start to lift and separate away from the passport page, so it becomes possible to peel it off. Details on the underlying page could then be changed.

Nowadays the physical photograph has largely been overtaken by the use of digital photos printed onto the sealing layer or the passport page itself. Some nations have started using special inks to print on the sealing layer which may be invisible in normal light, providing an additional layer of security to passports. However, these special inks are overly glossy compared to the passport page itself and so hidden additional security information can be seen through the plastic, so a counterfeiter can easily spot whether there are hidden indicia to look for.

As an industrial printer we have a large amount of equipment which we thought might improve anti-counterfeiting and we have found a way to configure our existing machines to produce passports, driving licences, ID cards and the like that we think are harder to tamper with and which look the same as existing printed security documents.

What we do sounds complex but is actually quite easy thanks to the high-tech nature of standard modern printing machinery. We build up a series of layers, on to some of which we can print security information, which we call security indicia. The layers are assembled in the most appropriate order and heat-transferred to a substrate such as one or more pages of a passport. We can build complexity into the process to ensure even those nations with very high requirements for specific types of security indicia can be catered for. We can incorporate special security inks, such as ordinarily invisible fluorescent or UV-sensitive ink, even holograms, that can be screen printed because the different layers we use have different properties. This has given us a few headaches to overcome to make sure we use the right method of printing onto each layer taking into account the different properties of each layer, but we're confident we now have a robustly defined way of dealing with any requirement any government could possibly have.

We started by experimenting with the usual array of cloths and other fine materials that we usually print on, but came to the conclusion we wanted a base on which to build up all the layers and so, to gather it together, we needed a carrier sheet. Ordinary 80 gsm A4 paper of the type that you'd probably have in your home or office printer is just as good as anything and can easily be removed and recycled.

The beauty of paper is that we can coat it with acrylic copolymer varnish, which is widely available and cheap and, after heating, can be easily peeled from paper. This creates a layer of varnish onto which we print security indicia. The varnish layer also needs to be releasable from the carrier as a transfer sheet. An important feature of the varnish layer, therefore, is its properties at different temperatures because printing and transferring to a passport occur at

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different temperatures. So, when security indicia are applied to the layer, it must be done at a low temperature, or using low temperature printing methods, to ensure clarity of the indicia. However, higher 'transfer' temperatures are needed to release the layer cleanly from the carrier. Also, a varnish layer provides a relatively hard, protective outer coat to the final product, preventing damage to the underlying security indicia and making it harder to tamper with than a plastic sheet. It also gives a consistent sheen to the finish so, if any special inks are used, they cannot be seen like they can through ordinary plastic.

The total thickness of varnish is ideally up to 12 µm and, individually, each layer is a maximum of 3 µm each to allow clean transfer from the carrier paper to the passport and to provide a more tamper-evident surface. As you can imagine, the thinner this layer is, the more difficult it is to lift or remove during counterfeit attempts. To that end, thanks to our equipment, we use a varnish layer with security indicia so that it at least does what the known plastic covers do, plus another clear one on top to give an added layer of protection. Naturally, we can put more than one type of security indicia on to a varnish layer. The only constraint is that it must be something which can be screen printed. We could choose one type of acrylic on which to provide visible security indicia in the form of lustrous or optically-variable print or a range of other types which can be seen in normal light and cannot be reproduced by toner or lithographic printing, and another suitable for printing invisible security features on, and apply both layers.

The final thing we do to the laminate is add a layer of temperature-sensitive polyurethane to act as an adhesive. This is especially important as we've worked out that while we can just use it as a way of gluing the varnish to the substrate, we are also able to print on to it with our standard printers, so long as the image is formed by a toner, as these printers don't get even as hot as a screen printer. This is useful as we can take auxiliary indicia such as photo images or other personal data, e.g. a name, identity number, bar code, or signatures, and print them on to the adhesive layer without affecting the finish of the varnish. Laser printers do this well. Standard but high-tech printers, like ours, can print some or all of this information in colour if required, which is obviously useful for photos, but different nations have different standards, some insisting the text in their passports is the same colours as those from their national flag.

While the laminate and the things we can do to build up the layers is important, how we use the sheet with our industrial machinery is critical to ensure we are able to provide security indicia on a substrate. We can literally take a blank sheet of passport paper, position our laminate on to it, then we heat everything to 120–140 degrees centigrade. We also apply a pressure in the range 10–50 psi (roughly 69–345 kPa) for up to 10 seconds using standard thermal transfer settings in one of our commercial industrial presses to make sure everything is stuck properly. The adhesive will melt and stick to the substrate and we can pull the paper off cleanly, thermally transferring everything in one go, as well as sealing the indicia to the passport page. Using matt finished paper results in a matt top surface to the finished product. Temperature-sensitive polyurethane adhesive is probably best for our laminate as we know it won't melt when we put toner images on to it.

We know that some governments might give us just a photo to use, whereas others give us personal data only and keep the photo themselves. In fact, some give us some generic

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security information and keep the personal data and photo. Depending on what we have to apply, we might have to print the data in reverse, i.e. as a mirror image, so that on transfer it appears the right way round on the substrate. Any type of glue that melts at over 120 degrees centigrade works with our setup. Toner printing will not melt this glue but is no good for clarity on fine detail. To save time we could buy ready varnished paper. We also know some governments will supply us with a passport page which has security features pre-printed on it, which basically forms a template pattern and is raised from the surface. This means when we position our laminate on to it we must ensure our toner image, which is also slightly raised from the adhesive, is in exactly the right place so the two mesh together properly, looking as they should. When the adhesive melts, it does so around both of these, so there is a completely smooth finish. I've attached a couple of figures to show you what I mean.

As we operate a Government-accredited fully secure site, if we were given the substrate to make passports or identity cards and so on, as well as the personal data to be added, all of which we can hold securely, we could supply the finished security document, or just the laminate if need be.

Please file a patent application for this today as I'm busy at a trade show all day showing our idea to the great and good.

Client's drawings

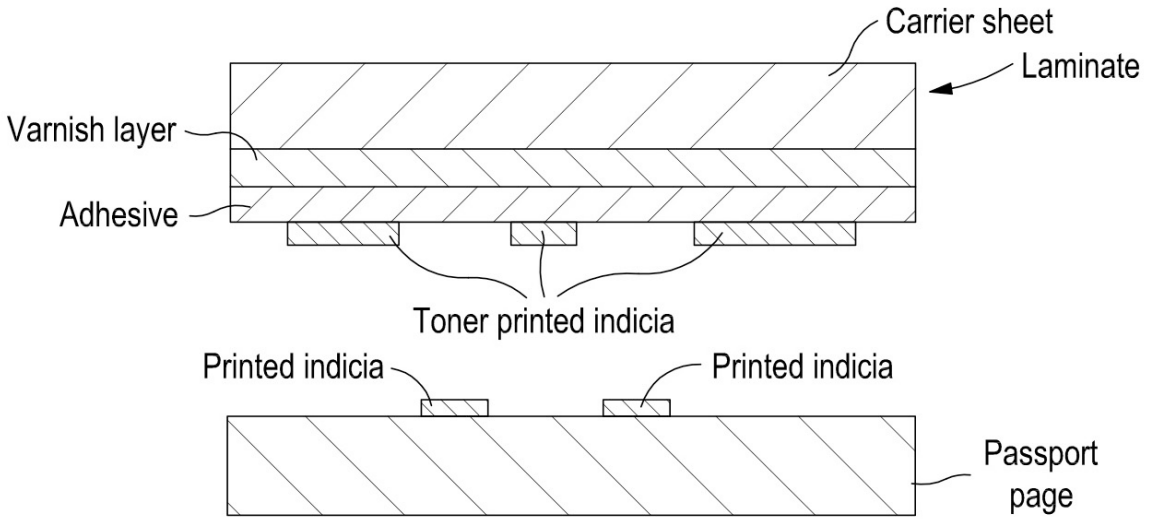


Fig. 1

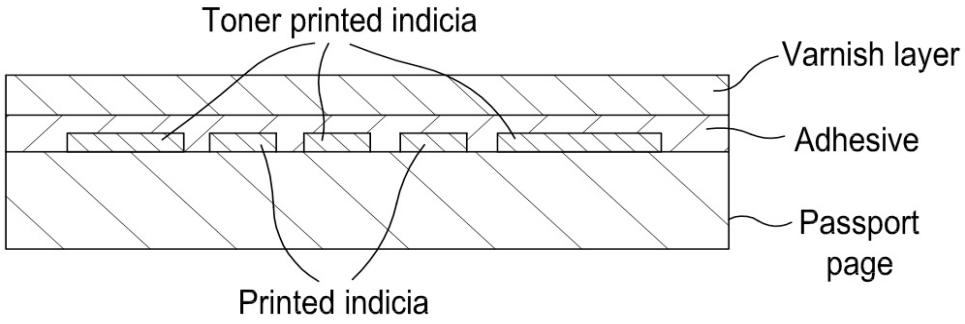
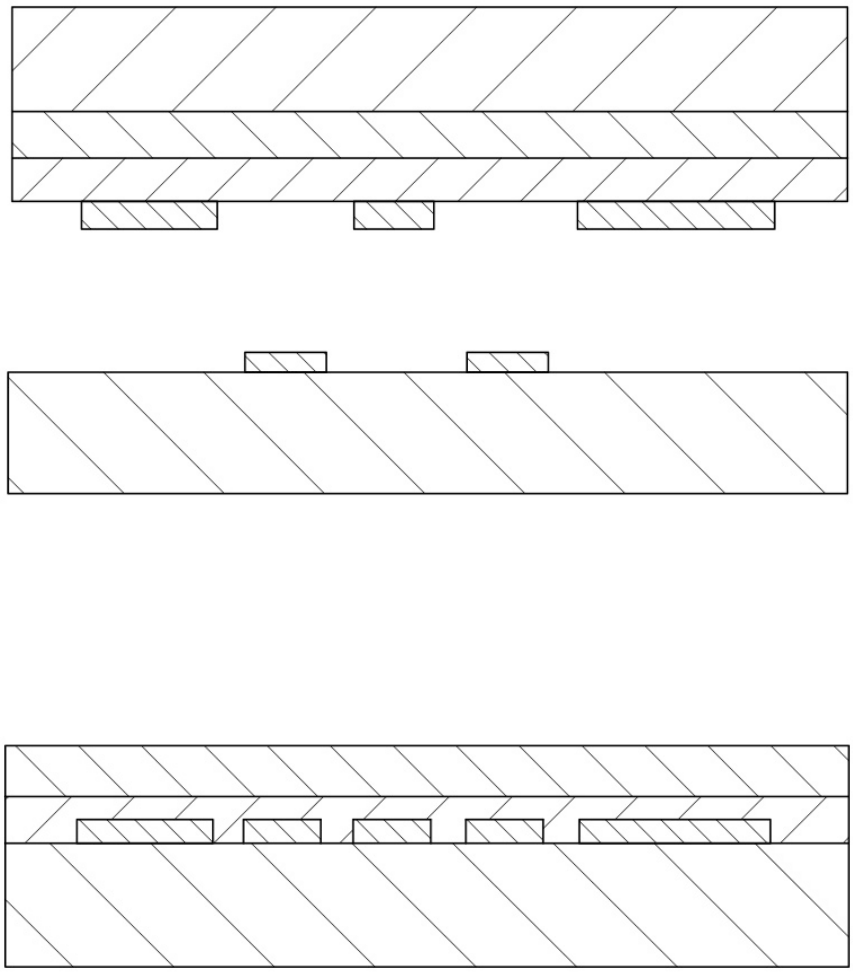


Fig. 2



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