

OPINION UNDER SECTION 74A

Patent	EP 0951393 B1
Proprietor(s)	Domino Printing Sciences PLC
Exclusive Licensee	
Requester	Williams Powell
Observer(s)	
Date Opinion issued	25 September 2014

The request

1. The comptroller has been requested by Williams Powell (“the requester”) to issue an opinion on whether EP (UK) 0951393 B1 (“the patent”) is valid in terms of novelty and inventiveness in light of the following documents:

US 4417256 (FILLMORE et al.)

US 5523778 (FICKLING)

Allowance of the request

2. The request for an opinion on the validity of the patent is allowable in part, as discussed below.
3. Rule 94 (1)(b) states that the comptroller shall not issue an opinion if the question upon which the opinion is sought appears to him to have been sufficiently considered in any relevant proceedings. In decision BLO/370/07 the hearing officer stated that “It is an intrinsic part of the substantive examination process to assess the novelty and obviousness of the claims, as properly construed, in the light of the prior art. In this context “prior art” means documents cited in the search report (at least under category “X” or “Y”, which indicate possible relevance to novelty or inventive step) as well as material which has come to the examiner’s attention in some other way. I think it reasonable to suppose in general that the examiner will have done his or her job properly in the absence of indication to the contrary, and I see no reason why this assumption should not apply even if the examiner has decided not to raise objection on the basis of any citations at substantive examination.”
4. US 5523778 was cited on the European Patent Office (“EPO”) search report as one

of five category “A” documents i.e. background art only. The requester submits that US 5523778 was not referred to by the primary examiner at the EPO and therefore should be taken into account on the grounds that it contains relevant disclosure apparently not appreciated during the course of the EPO examination.

5. The requester does not provide any supporting evidence to the assertion that the primary examiner at the EPO did not refer to US 5523778. On the contrary, in the International Preliminary Examination Report of 21 September 1998 the EPO examiner discusses the problem to be overcome and the solution proposed by the patent. The EPO examiner further states EP 0153436 (as cited on the EPO search report) is considered to be the closest prior art and that the solution to the problem is “neither disclosed, nor suggested in the prior art cited in the search report.”
6. From the above I consider it reasonable to assume that the EPO examiner has given due consideration to US 5523778 during the examination process. I shall therefore not consider US 5523778 in this opinion.
7. US 4417256 was not considered by the EPO examiner prior to grant of the patent and was published before the priority date of the patent. Therefore I will consider the relevance of US 4417256.

Observations

8. No observations were received.

The Patent

9. The patent, EP 0951393 B1, is titled “Continuous Inkjet Printer”. It was filed on 18th December 1997, published on 27th October 1999 and granted on 22nd May 2002. The patent remains in force.
10. The patent describes a continuous inkjet printer (“CIJ”) of the multi-nozzle type. According to the patent multi-nozzle CIJ printers have been developed to provide high quality, high speed printing. In order to control the printing process accurately, it is known to detect both the velocity and phase charge of ink droplets. Phase detection and velocity detection electrodes are known and can be disposed between the charge electrodes and the deflection electrode(s). Accurate positioning of the phase and velocity detection electrodes with respect to the charge electrode is very important to ensure accurate phase and velocity detection.
11. The invention disclosed in the patent is aimed at ensuring accurate location of the phase and/or velocity detector electrodes in a CIJ printer.
12. Figure 1 of the patent below illustrates a CIJ printer. The printhead has an electronics sub-system 1 by means of which are controlled the piezoelectric oscillator 2 forming part of a droplet generator 3 which has a nozzle plate 4 from which, in use, plural streams 5 of ink are dispensed. The closely spaced nozzles are arranged in a row normal to the plane of the drawing. The streams of ink break up into individual droplets which pass respective charge electrodes 6 also arranged in a

row in the same direction, where they are selectively charged and then passed between a pair of deflection electrodes 7, 7' which establish, in use, an electric field by means of which charged droplets are deflected from their straight-line path into a gutter 8.

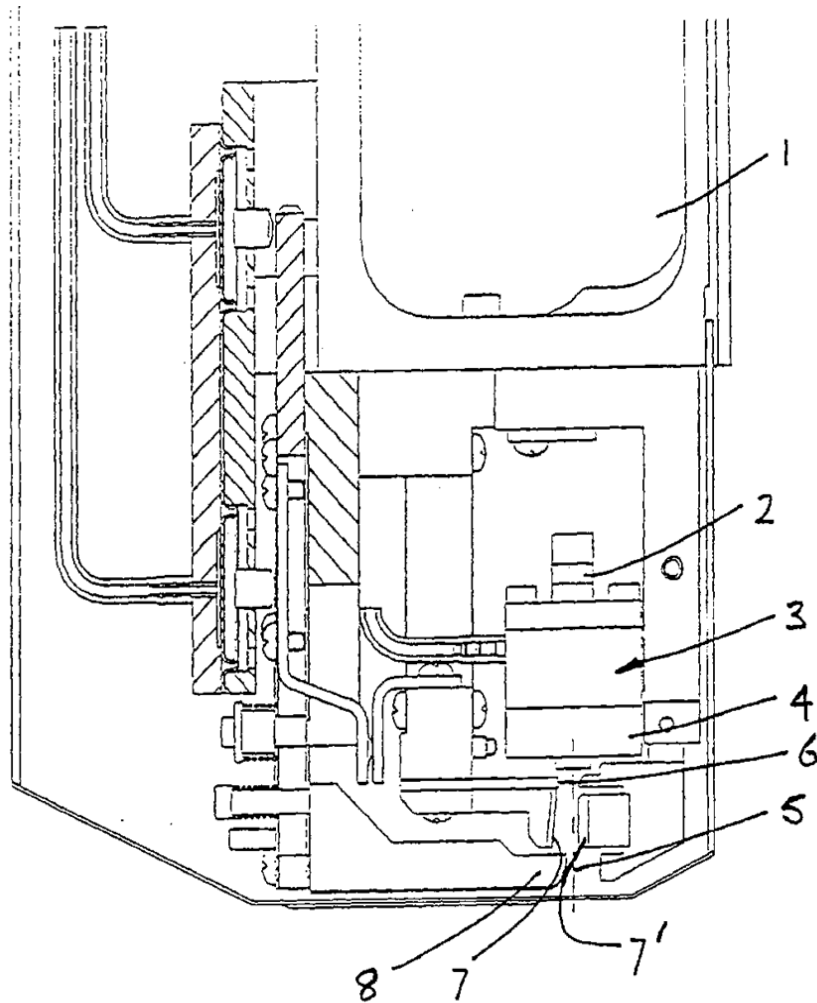
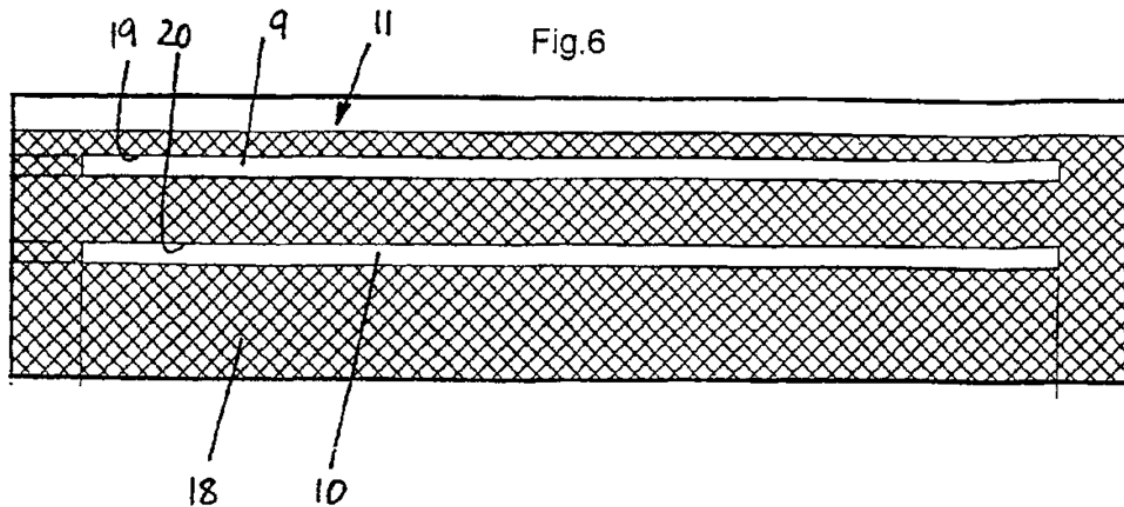


Fig.1

13. In the invention of the patent a phase detector electrode and velocity detector electrode (neither of which is shown in figure 1) are formed in the face of the deflection electrode 7, which are used to detect the charge applied to droplets by the charge electrode 6 and the speed of the droplets respectively.
14. According to the patent locating the phase detector and/or velocity detector electrode(s) within the face of the deflection electrode 7 not only achieves a compact design, but also, since the deflection electrode is located accurately with respect to the charge electrodes, achieves corresponding accuracy of location of the phase detector and/or velocity detector electrodes with respect to the charge electrodes.
15. Figure 6 of the patent below illustrates the phase detector electrode 9 and velocity detector electrode 10 formed within the face of the deflection electrode. During manufacture of the deflection electrode 7, 7' the plate 11 is plated with a conductive material 18 with a pair of "windows" 19, 20 being left to expose the phase detector

electrode 9 and velocity detector electrode 10 underlying the conductive material 18.



16. I agree with the requester that the crux of the invention resides in the placement of one of the detector electrodes within the deflection electrode.

17. The patent has nine claims including two independent claims. Independent claims 1 and 4 read as follows:

1. A deflection electrode (7,7') for a continuous inkjet printhead, the deflection electrode being characterized by having a window (19,20) formed therein, and a phase or velocity detector electrode (9,10) disposed within the window.

4. A method of manufacturing a phase or velocity detector electrode (9, 10) and a deflection electrode (7,7') for a continuous inkjet printhead, characterized by forming the deflection electrode (7,7') with a window (19,20) therein and forming the phase or velocity detector electrode within the window.

18. I shall discuss the dependent claims later on, if I find that claims 1 and 4 are invalid.

Claim construction

19. Before considering US 4417256 I will need to construe the claims of the patent following the well known authority on claim construction which is *Kirin-Amgen and others v Hoechst Marion Roussel Limited and others* [2005] RPC 9. This requires that I put a purposive construction on the claims, interpret it in the light of the description and drawings as instructed by Section 125(1) and take account of the Protocol to Article 69 of the EPC. Simply put, I must decide what a person skilled in the art would have understood the patentee to have used the language of the claim to mean.

20. Section 125(1) of the Act states that:

For the purposes of this Act an invention for a patent for which an application has been made or for which a patent has been granted shall, unless the context otherwise requires, be taken to be that specified in a claim of the specification of the application or patent, as the case may be, as interpreted by the description and any drawings contained in that specification, and the extent of the protection conferred by a patent or application for a patent shall be determined accordingly.

21. And the Protocol on the Interpretation of Article 69 of the EPC (which corresponds to section 125(1)) states that:

Article 69 should not be interpreted in the sense that the extent of the protection conferred by a European patent is to be understood as that defined by the strict, literal meaning of the wording used in the claims, the description and drawings being employed only for the purpose of resolving an ambiguity found in the claims. Neither should it be interpreted in the sense that the claims serve only as a guideline and that the actual protection conferred may extend to what, from a consideration of the description and drawings by a person skilled in the art, the patentee has contemplated. On the contrary, it is to be interpreted as defining a position between these extremes which combines a fair protection for the patentee with a reasonable degree of certainty for third parties.

22. The requester argues the claims are not limited to a CIJ printer but that the point is unimportant as US 4417256 relates to a CIJ printer. Since the word “for” is non-limiting and merely requires the deflection electrode be suitable for use in a CIJ printer I agree with the requester on both these points.
23. As discussed above the crux of the invention lies in the accurate location of the phase and/or velocity detector electrodes. This is achieved by forming a “window” in the deflection electrode and locating the phase or velocity detector electrode within the window. The feature of the window having the phase or velocity detector electrode disposed therein is the characterising feature of independent claims 1 and 4.
24. In order to determine if the claims are invalid in light of US 4417256 it is necessary to consider what is meant by the feature of a “window”. Looking at the term “window” I agree with the requesters comment that the claims do not specify the structure or form of the window or how the or each detector electrode fits within the window. Paragraph [0017] of the patent when describing part of the manufacturing process for the deflection electrode 7, 7' states:

“...then (see figure 6) the major part of the face of the plate is plated with a conductive material 18, with a pair of "windows" 19,20 being left above each of the detector areas 9,10 before the detector areas are partly exposed within the "windows".

Also paragraph [0008] describes:

“...Further dielectric layers are laid over the detectors and then the face of the plate is plated with a conductive material, to provide the deflection

electrode, with a pair of windows being left above each of the detector areas before the detector areas are partly exposed within the windows.”

These are the only two paragraphs that describe the “windows” 19, 20 with figure 6 (reproduced above) being the only figure to illustrate the “windows”.

25. In the absence of any technical features of the window in the claims I consider the skilled reader would construe the window to be an opening to expose the detector electrodes disposed in the face of the deflection electrode. This construction is consistent with the aim of the invention to accurately locate the detector electrodes within the face of the deflection electrode.
26. Independent claim 4 relates to “a method of manufacturing a phase or velocity detector electrode and a deflection electrode for a CIJ printhead”. The claim defines the method as “comprising forming the deflection electrode with a window therein and forming the phase or velocity detector electrode within the window”. The wording of the claim suggests that the window is formed in the deflection electrode and subsequently the phase or velocity detector electrode is formed within the window. However this is opposite to the embodiment described in the patent and defined in detailed dependent method claim 5 which requires the detectors 9, 10 are plated on top of a dielectric material with further layers of dielectric material and conductive material laid down over the detectors 9, 10 with windows 19, 20 being left above each of the detectors 9,10. I consider the skilled reader would understand claim 4 to define a method of manufacturing a deflection electrode and as part of the manufacturing process a phase or velocity detector electrode is formed on the deflection electrode and subsequently a window is formed in a face of the deflection electrode so as to expose the phase or velocity detector electrode.
27. I can see no issue with the construction of the dependent claims. The dependent claims are clear and a person skilled in the art would have no difficulty in construing the scope of said claims.

Novelty

28. I will now consider the disclosure of US 4417256 and its relevance to the claims of the patent. Figure 3 of US 4417256 below shows a CIJ printer 14 having charge electrode 32, upper and lower deflection plates 36, 38 and gutter assembly 40. Print fluid 30 is broken up into a series of droplets with uncharged droplets travelling along print path 46 to a print media 16 and unwanted charged droplets entering gutter assembly 40.
29. The CIJ printer 14 also includes drop charge sensors 48, 50. Drop charge sensor 48 is mounted within the gutter assembly 40 and drop charge sensor 50 is positioned in the lower deflection plate. The drop charge sensors 48, 50 measure drop charge and due to their spaced relationship determine the velocity and/or flight time of a droplet. With regard to the drop charge sensors 48, 50 column 2, lines 40-42 states:

“An electrical signal is generated or induced as the charged droplet passes over the sensing means.”

And further column 5, lines 46-48 describes:

“...in the preferred embodiment of this invention the drop charge sensor is a single conductor. As charge droplets pass over the wire, a current is induced therein. A more detailed description of an inductive type sensor which may be used in this invention, is described in U.S. Pat. No. 3,977,010.”

Thus drop charge sensors 48, 50 are electrical sensors and they are considered to meet both requirements of the claims of a phase or velocity detector electrode.

30. It can be seen that drop charge sensor 50 is positioned within a recess in the face of the lower deflection plate 38. The recess provides an opening in the face of the lower deflection plate 38 through which the drop charge sensor 50 is exposed.

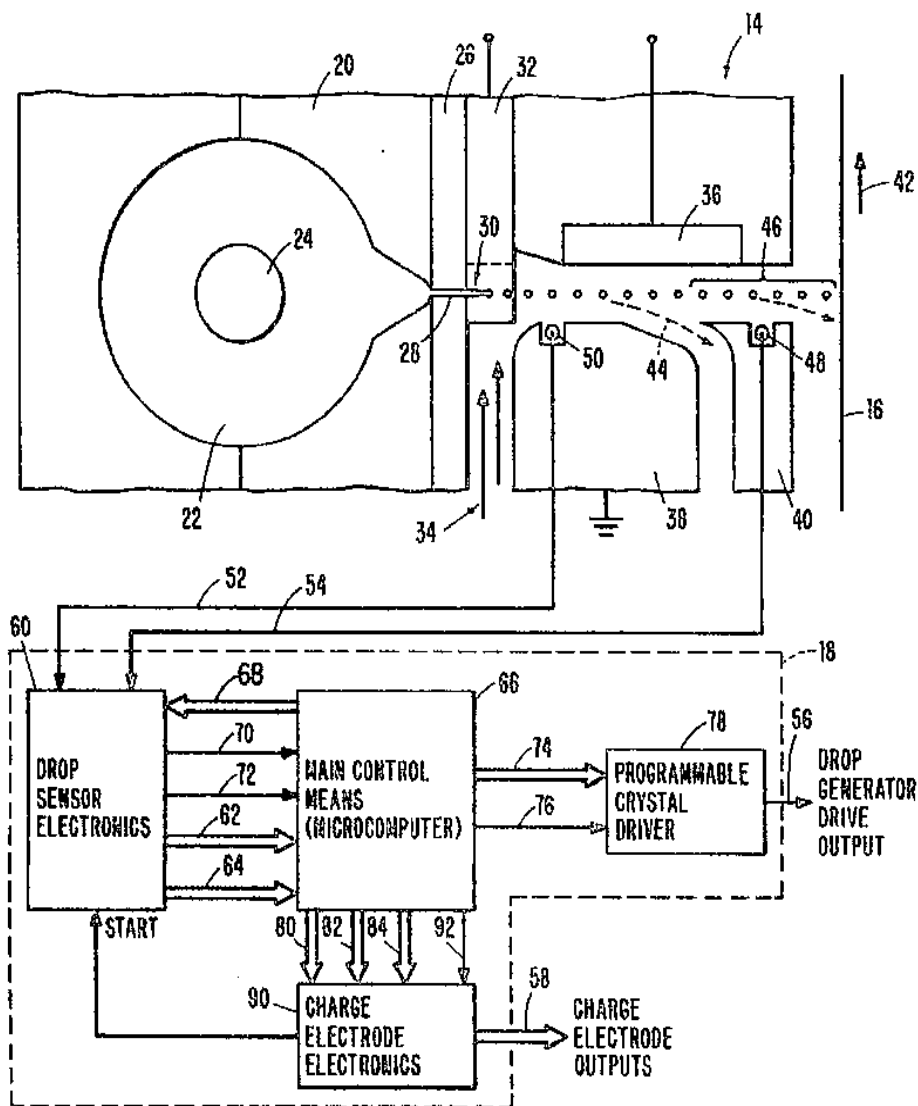


Fig.3

31. US 4417256 discloses a deflection electrode 38 for a CIJ printhead, the deflection electrode 38 having a window (recess opening as discussed above) formed therein, and a phase or velocity detector electrode 50 disposed within the window. Therefore

US 4417256 anticipates independent claim 1.

32. Dependent claims 2 and 3 are as follows:

2. A multi-jet continuous inkjet printhead having a deflection electrode according to claim 1.

3. A continuous inkjet printer having a printhead according to claim 2.

As US 4417256 relates to a CIJ printer it anticipates claims 2 and 3.

33. Turning to independent claim 4. The requester argues that claim 4 is anticipated by US 4417256. However no argument is provided beyond that which relates to apparatus claim 1. The requester states that “drop charge sensor 50 is positioned within the face of the deflection electrode, and such that the sensor 50 is exposed at the face of the deflection electrode through a window or opening. This achieves precisely the same as what is described in the patent, namely the placement of the sensor 50 within the deflector plate.”

34. Whilst US 4417256 discloses a deflection electrode that anticipates claims 1-3 it does not disclose any methods of manufacture of the drop charge sensor 50 or the deflection plate 36. As discussed above in paragraph 26, claim 4 requires a method of manufacturing a phase or velocity detector electrode and a deflection electrode including forming a detector electrode and forming a window in the deflection electrode to expose the detector electrode. The deflection plate 36 is shown with a recess opening containing the drop charge sensor 50 and as such it is implied that during manufacture of the CIJ printer 14 the recess opening has to be formed. However there is no disclosure of forming the sensor 50. Therefore claim 4 is not anticipated by US 4417256.

35. As claims 5-9 are dependent upon claim 4 there are also novel.

Inventive step

36. I will now consider whether claims 4-9 are inventive in light of the disclosure in US 4417256.

37. In the UK the law to determine whether or not an invention defined in a particular claim is inventive over the prior art and that which I must follow is set out in *Pozzoli SPA v BDMO SA [2007] EWCA Civ 588*, in which the well known Windsurfing steps were reformulated:

(1)(a) Identify the notional “person skilled in the art”;

(1)(b) Identify the relevant common general knowledge of that person;

(2) Identify the inventive concept of the claim in question or if that cannot readily be done, construe it;

(3) Identify what, if any, differences exist between the matter cited as forming part of the “state of the art” and the inventive concept of the claim or the claim as construed;

(4) Viewed without any knowledge of the alleged invention as claimed,

determine whether those differences constitute steps which would have been obvious to the person skilled in the art.

38. The requester has not provided any detailed argument regarding inventive step.
39. The person skilled in the art is a designer and manufacturer of printers. In that role their common general knowledge would include prior art CIJ printers and methods of manufacture.
40. Looking at claim 4, the inventive concept is manufacturing a deflection electrode for a CIJ printer having a phase or velocity detector electrode formed on the deflection electrode and a window to expose the phase or velocity detector electrode.
41. As mentioned above the requester has argued that claim 4 was anticipated by US 4417256 and so has not provided any argument regarding the obviousness of claim 4. Whilst US 4417256 does not disclose any methods of manufacture for the drop charge sensor 50 or the deflection plate 36 it is considered obvious to a person skilled in the art that the drop charge sensor 50 and the recess opening in the deflection plate 36 would be formed during manufacture of the CIJ printer 14 in order to obtain the embodiment disclosed in US 4417256. Therefore I consider claim 4 to be obvious in light of US 4417256.
42. Looking now at dependent claims 5-9. Claim 5 reads as follows:

A method according to claim 4, comprising the steps of:

- a) providing a non-conductive dielectric substrate;*
- b) providing at least one hole through the substrate;*
- c) plating a conductive material, through the at least one hole;*
- d) plating one side of the dielectric substrate with a conductive layer in such manner as to avoid connection with the plating through the at least one hole;*
- e) filling the interior of the at least one hole with a dielectric material to create a liquid tight barrier;*
- f) forming a dielectric layer surrounding the at least one hole;*
- g) plating, on top of the dielectric layer, a conductive material to form at least one detector, the at least one detector being connected to the conductive plating through the at least one hole;*
- h) providing a further dielectric layer over the at least one detector;*
- i) plating the face of the substrate with a conductive material to provide a deflection electrode, leaving a window above the at least one detector; and*

j) partly exposing the at least one detector within the window.

43. The requester argues that dependent claims 5-9 “specify nothing more than conventional circuit fabrication techniques which furthermore have no bearing on the overall structure disclosed in the patent. A skilled person, having knowledge from US 4417256 that the sensor electrodes can be disposed in the volume of the deflector plate and accessible through a window thereof, would adopt a fabrication method in accordance with the method steps of claims 5-9 as a matter of routine and standard procedure.” I am not convinced by this argument. Whilst I agree US 4417256 does teach the skilled person that sensor electrodes can be disposed in the volume of the deflector plate and accessible through a window therein it does not teach or suggest forming the sensor electrodes on the deflection electrode and subsequently plating the face of the deflection electrode and leaving a window above the sensor electrode as part of a method of manufacture as required by claim 5.
44. US 4417256 does not disclose any methods of manufacture for the drop charge sensor 50 or the deflection plate 36 and I have no prior art before me that would suggest the method of manufacture of claims 5-9 was conventional at the filing date of the patent in 1997. There is nothing in US 4417256 to suggest to the person skilled in the art that the deflection plate 36 and charge sensor 50 could be manufactured using the manufacturing steps defined in claim 5. Therefore I consider claim 5 and claims 6-9, as they are dependent upon claim 5, to be inventive.

Conclusion

45. I conclude that claims 1-3 are anticipated by and claim 4 is obvious in light of US 4417256. However in my opinion claims 5-9 are both novel and inventive over US 4417256.

Application for review

46. Under section 74B and rule 98, the proprietor may, within three months of the date of issue of this opinion, apply to the comptroller for a review of the opinion.

Mr Marc Collins
Examiner

NOTE

This opinion is not based on the outcome of fully litigated proceedings. Rather, it is based on whatever material the persons requesting the opinion and filing observations have chosen to put before the Office.