

Examiners' Report on Paper A/1995 (Electricity/Mechanics)

1. Introduction

The present Report is divided into three main sections, dealing with the three aspects of Paper A, namely the independent claim or claims - section 2, the dependent claims - section 3 and the description - section 4. Some general comments will be made under section 5.

2. The Independent Claims

2.1 Basic Considerations

A study of the basic printing device shown with respect to Figs. 1 to 4 of the Client's Letter and the nozzle head disclosed in Document I should have led the candidate to the following considerations:

The two devices have in common the ejection of an ink droplet from an outlet provided in an ink supply passage by means of a pressure pulse acting on the ink in the ink supply passage.

The Client's invention, however, uses a completely different principle of producing this pressure pulse in the ink, namely, the production of a vapour bubble which acts on the ink in the ink supply passage. This is stressed by the Client himself in his letter (see 95/A(E/M)/e/2, 5th paragraph), where it is said that his invention is concerned with the way in which the ink droplets are generated. This statement could also be interpreted as a hint to the fact that the invention also referred to a method of ejecting a droplet from a supply passage.

Having identified this fundamental difference candidates were expected to consider the various embodiments described by the Client, which embodiments can be divided into the two following basic groups:

The embodiments in which the vapour bubble is formed in the ink directly and
The embodiments in which the vapour bubble is formed in a separate working fluid.

It had also to be borne in mind that said two basic groups include "end-shooter" embodiments (in which the outlet is provided at the end of a respective ink supply passage) and "side-shooter" embodiments (in which the outlet is provided at a side of the ink supply passage) and that one ink supply passage could divide up into several end-shooter outlets (as in the Fig. 5 embodiment) or could have several outlets along the side thereof (Figs. 6 to 9).

Bearing this in mind the principle task of Paper A was to formulate an independent claim or independent claims which on the one hand included all the embodiments described and on the other hand did not unduly restrict the scope of protection. In the "Instructions to Candidates" the candidates are required to draft an independent claim (or claims) offering the applicant the broadest protection possible. For the task set it was felt that this requirement could best be met by drafting an independent apparatus claim or claims and an independent method claim directed to a method for ejecting droplets.

However, it was considered that apparatus claims were the most appropriate for achieving adequate protection and consequently the main considerations in marking the independent claims were directed to the apparatus claim or claims. This was reflected by the marking schedule: half of the full marks were available for the independent claim or claims and these 24 marks were available for candidates who had drafted an apparatus claim or apparatus claims and a method claim. However, only a few marks were lost by candidates who drafted an apparatus claim or apparatus claims only. Claims directed to a method of manufacturing a printing head were not considered as useful and consequently did not attain any marks.

It is to be noted that it was possible to draft one single independent apparatus claim (somewhat along the lines of Claim 1 proposed in Paper B) which covered all the above embodiments. It was, however, considered almost equally as good when the above basic groups were separately claimed in two independent claims. A main concern in marking was directed to the question of whether all the embodiments were actually covered by the independent claim or claims. An independent claim or independent claims which did not cover all the embodiments (e.g. a single independent claim stating that the vapour bubble is formed in the ink - thus excluding the separate working fluid embodiments) lost a considerable number of marks.

With respect to the above two basic groups (ink - separate working fluid), an acceptable independent claim could also have specified that the bubble is formed in a "fluid", provided it was made clear, for example by the presence of appropriate dependent claims, that the term "fluid" was meant to include both the ink itself and a separate working fluid.

2.2 Proposals for Separate Applications

Although it was not expected that proposals were to be made for separate applications the award of a small bonus was not excluded for worthwhile proposals. However, candidates who proposed separate applications for subject-matter which was included or could have been included easily in the claims of the main application lost marks.

2.3 Clarity

In view of what has been said above under 2.1 care had also to be taken that the drafted independent claim or claims had the necessary clarity, i.e. the independent claim or claims should have referred at least to:

- some kind of ink supply passage,
- an outlet,
- a pressure pulse in the ink and
- the formation of a vapour bubble (or the respective means therefor) which acts on the ink in the ink supply passage so as to cause the pressure pulse.

Formulations such as "means for heating a liquid/the ink", "means to give an amount of liquid/ink a certain velocity" and the like without a reference to a pressure pulse caused by a vapour bubble were not considered sufficient for a clear definition of the invention. Consequently, marks were lost for such or similar formulations. However, in spite of the

ambiguity of expressions such as "local superheating" of the ink, it was decided that such phrases implied vapour bubble formation.

It was also important to clearly differentiate between apparatus and method claims. In other words, care should have been taken as to clearly define in an apparatus claim the respective features of the apparatus and in a method claim the respective steps of the method. An example for a claim which is not clear in this respect is "A printing head for ejecting droplets of ink ... characterised in that a vapour bubble is formed which acts ...".

As to the use of functional terms, the following points (which have also been explained in previous Examiners' Reports) are to be kept in mind:

- (i) the function itself must be clearly specified and
- (ii) the skilled person would have no difficulty in providing some means of performing the function without exercising inventive skill.

2.4 Other Solutions

Summarising what has been said up to now under 2.1 to 2.3 the preferred solution to Paper A was considered to include an apparatus claim somewhat along the lines of the one suggested in Paper B in combination with an analogous method claim.

Other solutions, e.g. an independent claim directed to the capillary ink supply, were considered much less valuable: these solutions were clearly against the Client's wishes expressed in his letter.

2.5 Unnecessary Limitations

The following major unnecessary limitations of the independent claim or claims were identified by the Examiners with respect to the preferred solution:

The independent claim or claims being directed to a printer. The Client's Letter clearly states that it is possible to integrate the printing head into a disposable ink cartridge, which when empty is replaced, thus being completely independent from a printer.

The independent claim or claims specifying the capillary ink supply. This is clearly described as an option (see Client's Letter, 95/A(E/M)/e/4, 2nd paragraph). Equal or similar considerations apply for the following unnecessary limitations of the independent claim or claims: the ink supply passage consisting of two portions (a substrate and a cover block), a thin film resistor being used for producing the vapour bubble, an ink reservoir, the location of the means for producing the vapour bubble and a reference to a relative movement of the printing head and the surface to be printed. A severe limitation of an independent claim was also the mention of any kind of electronic control means (see Client's Letter, 95/A(E/M)/e/4, 10th paragraph).

All these limitations are not relevant to the preferred solution and mentioning them would unduly restrict the scope of protection. Consequently - when such limitations were included in the independent claim or claims - marks were lost.

Less serious, but still unnecessary restrictions, were considered to be the mention of a resistor as a heating element, its connectors and contact pads, its position close to the outlet and the mention of parallel ink supply passages. On the other hand, a reference to heating was considered acceptable provided that the vapour bubble formation as such was made clear in such a claim.

Independent claims which were not restricted to printing and/or the use of ink (e.g. an "Apparatus for dispensing droplets of liquid") were not expected, but were awarded a small bonus, especially, as the apparatus of the invention could be regarded as a micro-pump.

2.6 Formal Matters

A few marks were lost when no reference numerals were used in the claims and when the two-part form of claim was not used without justification or was incorrect.

3. The Dependent Claims

The dependent claims presented in Paper B should not be regarded as a good solution or even an ideal solution to the Paper A task.

The following are considered to be the most important aspects for which dependent claims should be present:

- The formation of the bubble in the ink, the formation of the bubble in a separate working fluid, the end-shooter, the side-shooter, the capillary ink supply and the single-use type cartridge comprising the printing head.
- Of course, further details can be made the subject of dependent claims, such as the details of the two-part ink supply passage (substrate and capillary block), the trough described with reference to Fig. 7 and the location of the resistor close to the outlet.
- The Examiners also directed their attention to the fact that the dependent claims should claim the features separately. Consequently, dependent claims combining in a single claim features which should have been claimed separately lost marks.

4. The Description

In accordance with the current instructions it was expected from the candidates to firstly discuss the relevant state of the art, then to identify a problem which arises in the state of the art (the list of advantages provided on 95/A(E/M)/e/4 being a rich source for that purpose) and finally to explain the manner in which the invention solves that problem. The

solution presented in the introductory portion of the description should of course be made entirely consistent with the solution specified in the independent claim or claims.

5. General Comments

The main purpose of the task set in Paper A was, as usual, to test whether a candidate knows how to draft claims, and for this reason half of the available marks were reserved for the independent claim or claims. Just over half of the remaining marks were available for the dependent claims.

Candidates should therefore identify those aspects of the disclosure which could be broadly claimed, carefully consider first the general content and then the detailed wording of the independent claim or claims, perhaps at this stage drafting the introduction to ensure that everything in the independent claim or claims will be clearly supported and consistent with the problem and solution with which the envisaged invention is concerned and then draft dependent claims, concentrating on those features which appear most likely to satisfy the requirement to provide a good, well-structured fall-back position.

Although the quality of the hand-writing in general has improved in the last years candidates are nevertheless reminded to write legibly.

EXAMINATION COMMITTEE I

Candidate No.

Paper A (Electricity/Mechanics) Schedule of marks

Category	Maximum possible	Marks awarded by first examiners		Revision of marks / grade (if any) or marking of further examiners (if appropriate)	
		Exr	Exr	Exr	Exr
Independent claims	24				
Dependent claims	14				
Description	10				
Total	48				
Corresponding Grade					

Translation
of marks
into grades

	Grade
0 - 11	7
12 - 17	6
18 - 23	5
24 - 29	4
30 - 35	3
36 - 41	2
42 - 48	1

Remarks by examiners which must be given if both the following requirements are fulfilled:

- (a) the grades awarded by the two first examiners before their discussion differ by two grades or more;
- (b) the marks awarded by at least one of the two first examiners have been changed during their discussion.

If marks are revised, brief explanation should be given.

Sub-Committee for Electricity/Mechanics

☐ Sub-Committee agrees on _____ marks and grade _____

☐ Sub-Committee does not agree on a grade

Remarks by Sub-Committee which must be given where the Sub-Committee does not agree on a grade

Grade recommended to Board by Committee I _____

Remarks by Committee I

07.09.1995

Date

Signature of Chairman of Committee I