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File Number: T 593/90 - 3.4.1

Application No.: 87 200 369.4

Publication No.: 0 239 150

Title of invention: Device for projecting a television picture onto a screen

Classification: H01J 29/00

**D E C I S I O N**  
of 24 June 1991

Applicant: N.V. Philips' Gloeilampenfabrieken

Headword: Television cooling/PHILIPS

EPC Article 56

Keyword: "Inventive step - yes, after amendment"

**Headnote**



**Case Number : T 593/90 - 3.4.1**

**D E C I S I O N**  
**of the Technical Board of Appeal 3.4.1**  
**of 24 June 1991**

**Appellant :** N.V. Philips' Gloeilampenfabrieken  
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**Decision under appeal :** Decision of Examining Division 047 of the  
European Patent Office dated 19 February 1990  
refusing European patent application  
No. 87 200 369.4 pursuant to Article 97(1) EPC.

**Composition of the Board :**

**Chairman :** G.D. Paterson  
**Members :** U.G.O.M. Himmler  
H.J. Reich

## Summary of Facts and Submissions

- I. This European patent application was refused by a decision of the Examining Division dated 19 February 1990.
- II. The decision was based on Claims 1 to 11 submitted by the Applicant with letter of 6 October 1989. The reason for the decision was that the subject-matter of said claims, in particular the subject-matter of Claim 1, then on file lacked inventive step having regard to the state of the art according to the following documents  
D1: GB-A- 2 134 702  
D2: EP-A- 0 162 971
- III. An appeal was lodged against the said decision on 21 March 1990, and oral proceedings were requested. The Statement of Grounds of Appeal was filed on 15 June 1990, together with an amended independent claim.

The Statement of Grounds contained the following arguments:

The reasoning of the impugned decision is contested that the application of the principle described for a single picture tube in D2 results in a device according to the subject-matter of Claim 1 when applied to three picture tubes. Further the argumentation of the Examining Division is contested that the close juxtaposition of three tube screens leads naturally to the provision of one large display window or one large screen without providing special correction means.

- IV. In a communication accompanying a summons to oral proceedings the Board made proposals for the formulation of an independent Claim 1 which would comply with the

requirements of the EPC, in particular having regard to Articles 84 and 56 EPC.

- V. In response the Appellant accepted the said proposals and requested that the appealed decision be set aside and a patent be granted on the basis of the following text (including minor amendments agreed by telephone):

**Claims:**

No. 1 to 10, filed with letter of 17 April 1991 and amended in ink.

**Description:**

Pages 1, 2 and 2a, filed with letter of 17 April 1991, Pages 3 to 7 as originally filed - with clerical errors amended in ink.

**Drawings:**

Sheets 1/5 to 5/5 as originally filed.

With the same letter of response the Appellant withdrew his request for oral proceedings, provided the Board considered Claim 1 allowable. The scheduled oral proceedings were therefore cancelled.

- VI. The only independent Claim 1 reads as follows:

"1. A device for projecting colour pictures onto a projection screen comprising three juxtaposed picture tubes (1, 2, 3) forming an assembly, each picture tube comprising a display window (6) having a display screen provided on the inside thereof and a light transmissive element (19) arranged at a distance in front of the display window (6) which element (19) together with the display window (6) bounds a cooling space (30) in front of the display window (6) for passing through a coolant, in

said device the centre lines of the screens of the juxtaposed picture tubes (1, 2, 3) enclose an angle, characterized in that

said device comprises a common frame (8, 9, 10, 11, 12, 13) supporting and surrounding the assembly of the three picture tubes (1, 2, 3), said frame forming a closed cooling system for passing through the coolant through said cooling spaces (30) and for returning the coolant from outlet openings (31) to inlet openings (29) of said cooling spaces (30) via a back flow system, said back flow system common to the three picture tubes integrally includes a first duct (25) extending along a first side common to all three display windows (6) of the three juxtaposed picture tubes, said first duct (25) being in direct communication via said inlet openings (29) with said cooling space (30) of each picture tube (1, 2, 3), and a second duct (26) extending along a second common side, opposite to the first common side of the three display windows (6), said second duct (26) being in direct communication via said outlet openings (31) with said cooling space (30) of each picture tube, said outlet openings (31) being situated on the side opposite to the inlet openings (29), and at least one connection duct (27,28) connecting said first and second ducts (25, 26) and extending respectively along one side of the assembly which is common to only one display window of the three juxtaposed picture tubes (1, 2, 3)."

The dependent Claims 2 to 10 relate to particular embodiments of the device according to Claim 1.

## Reasons for the Decision

1. The appeal is admissible.
2. Allowability of the amendments

New Claim 1 differs from the originally filed Claim 1, apart from mere clarifications, by the following additional features:

- (a) The centre lines of the screens of the juxtaposed picture tubes enclose an angle;
- (b) the device comprises a frame supporting the three picture tubes, said frame forming a closed cooling system for passing through the coolant through the cooling spaces;
- (c) the frame is common to the three picture tubes and surrounds the assembly;
- (d) the cooling system comprises a back flow system common to the three picture tubes and integrally including a first and a second duct extending along a first and a second side, respectively, common to all three display windows;
- (e) the connection duct extends along one side of the assembly which is common to only one display window of the three picture tubes.

Feature (a) is mentioned, in particular, on page 2, lines 7 to 10 of the original description.

Feature (b) is derived from the original Claim 3 when related to the original Claim 2 as well as from the description of figures 1 to 5, cf. in particular page 3, lines 25 to 34, with respect to the feature "frame supporting the three picture tubes and forming a cooling system", and page 4, line 36, to page 5, line 11, with respect to the feature "closed cooling system".

Feature (c) is derived from figures 1, 6 and 7 in connection with the relevant parts of the description, cf. in particular page 5, line 37, to page 6, line 1, with respect to the feature "common to the three picture tubes".

Feature (d) is a logical consequence of the features (b) and (c) when read in combination with a reasonable technical interpretation of figures 1 to 5 and 7, cf. in particular page 2, line 34, with respect to the feature "the cooling system.....integrally including.....".

Feature (e) indirectly follows from the original Claim 2 in combination with the figures 1 and 7.

Claims 2 to 10 correspond to the originally filed claims 2 and 4 to 11.

The amended claims therefore satisfy the requirements of Articles 84 and 123(2) EPC.

3. The only issue in this appeal is that of inventive step.
- 3.1 The description of the application under appeal starts from D1 which is the only document showing an assembly of three juxtaposed picture tubes for projecting colour pictures onto a projection screen, having a closed common cooling system for passing a coolant through the space

between the display window and a light transmissive element, i.e. part of a lens system, arranged at a distance in front of the display window of each tube.

The Board is of the opinion that this document D1 constitutes the closest prior art. With regard to this prior art the problem underlying the present application is not simply to obtain the smallest possible distortions in the image on the projection screen, as achieved in D1 by avoiding the occurrence of the Schlieren effect caused by a turbulent flow of the cooling fluid in the space between the display window and the light transmissive (lens system) element; cf. the abstract of D1. Contrary to this known problem the particular objective problem of the application under appeal is to achieve the smallest possible image distortions and therefore to arrange the smallest possible angles between the centre lines of the juxtaposed tubes, (the optical axis of each tube - lens system ) i.e. to arrange the tubes as closely together as possible; cf. the description of the application, page 2, lines 6 to 10.

This problem, which is not mentioned in any prior art document, is solved according to the features of the characterising part of Claim 1 in combination with the known device according to the preamble of Claim 1.

- 3.2 None of the cited prior art documents contains any suggestion to arrange an assembly of display tubes cooled by a closed cooling system as defined in Claim 1:

D1 proposes to connect the cooling spaces of the system of the three tubes in series and to provide cooling fluid distribution chambers (reference sign 12) between the individual tubes. Thus, the teaching of D1 leads away from the solution given by the subject-matter of Claim 1

because it is a principle of the present invention to omit separating coolant tanks or ducts (such as the fluid distribution chamber 12 in D1) between the juxtaposed picture tubes. Therefore, document D1 could even mislead the technician who tries to solve the above identified problem, because D1 starts from a cooling system where the cooling spaces are connected in series, which necessitates collecting tanks and distribution chambers between the cooling spaces.

Thus document D1 cannot contribute to the solution of the special problem of the application under appeal, in particular because it only provides a cooling system and is not concerned with the provision of a framework which is functionally cooperating with the cooling system.

Document D2 concerns a projection colour picture tube for an output power up to 30 Watts (cf. page 2, line 30), but avoiding any cooling ducts, heat exchangers and pumps outside of the projection picture tube (cf. page 2, lines 32 to 34, and page 3, lines 23 to 24). Thus, the principle of this cooling system is restricted to an individual tube. The remark in the description on page 1, line 10, that the invention also refers to an image reproducing assembly with three projection picture tubes indicates only that three such tubes can be arranged side by side independently of each other because all embodiments of this document describe tubes which are independent from each other, each tube having its own closed cooling system. There is no indication of the possibility of an interrelationship between the cooling systems of three tubes. Additionally, there is no mention of any kind of frame. Consequently, the man skilled in the art cannot

derive from this document any incentive to combine the functions of a supporting framework and of a cooling system and thus to solve the above identified problem, which is not known from any prior art.

- 3.3 Furthermore a combined consideration of D1 and D2 by a skilled man seeking to solve the above problem does not suggest the claimed invention. As set out above, D1 proposes the provision of cooling in series which necessitates the provision of distribution chambers between adjacent tubes: this would be contrary to the stated aim of the present application to arrange the tubes as closely together as possible.

Consequently the skilled man would have to start from D2. When arranging three tubes of this type side by side he might recognize that the coolant returning channel (reference sign 9 in figures 1 to 4 or sign 56 in figure 6) prevents the close arrangement of the three tubes which is necessary for avoiding image distortions (this recognition already presumes that the problem underlying the application under appeal is known what, indeed, is not the fact). Therefore, the skilled man might consider to omit the separating channel 9 and to connect the collecting chamber 17 with the equivalent collecting chamber of the neighbouring tube from where the coolant could pass through the cooling space 7 to its ground level. But such a coolant circulation would be contrary to the manifest intention of document D2 to use natural convection and to avoid any pump for circulating the coolant.

- 3.4 Therefore, in the Board's judgement the subject-matter of Claim 1 involves an inventive step in the sense of Article 56 EPC.

4. Dependent Claims 2 to 10 refer to particular embodiments of the invention as defined in Claim 1 and they are, therefore, likewise allowable.

#### Order

For these reasons, it is decided that:

1. The decision under appeal is set aside.
2. The case is remitted to the Examining Division with the order to grant a patent on the basis of the text set out in paragraph V above.

The Registrar:

The Chairman:

M. Beer

G.D. Paterson