COMMISSIONER'S DECISION

INSUFFICIENCY-DISCLOSURE & CLAIMS: Ambiguity and Inoperativeness
Ss. 2(d) and 36

Argument and some of the new claims accepted as overcoming the objections of the Final Action; the entry of other new claims refused for failing to include limitations advanced to overcome the objections.

FINAL ACTION: Overcome by Amendment.

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This decision deals with a request for review by the Commissioner of Patents of the Examiner's Final Action dated June 21, 1972 on application 007,989. This application was filed on December 19, 1967 in the name of Varian Associates (William Edward Spicer) and refers to "X-RAY IMAGE INTENSIFIER TUBE".

In the prosecution terminated by the Final Action the examiner refused claims 1 and 2, the only claims on file, for non-compliance with Rule 25 of the Patent Rules, and Section 36(2) and Section 2(d) of the Patent Act. Rejected claims 1 and 2 read:

1. An image intensification tube responsive to stimulation by gamma radiation, comprising an evacuated envelope within which is located adjacent the input end a dish-shaped substantially crystalline sheet of photo-luminescent material serving as a light emissive layer for emitting photons in response to stimulation by gamma radiation, the envelope also containing a dish-shaped electron emissive layer deposited near the inner surface of the light emissive layer for emitting electrons in response to stimulation by the photons, and means for accelerating the electrons against an output phosphor.

2. A tube according to claim 1 in which the sheet is of caesium iodide.

In the Final Action the examiner stated in part:

> Claims 1 and 2 are again refused under Rule 25 of the Patent Rules which states that a claim shall not be allowed unless the disclosure describes all the characteristics of an embodiment of the invention that are set out in the claim. There is no teaching in the disclosure, drawings or original claims of this application of the limitation defined in lines 2 to 3 (3 and 4 above) of claim 1 "a dish-shaped substantially crystalline sheet of photo-luminescent material (located adjacent the

input end of an evacuated envelope)". The phrase "crystalline sheet" in the absence of any specific teaching must be given its ordinary meaning as in a paper or metal sheet with the implication of a unitary self-supporting structure. The claim does not define any underlying supporting substrate for the crystalline sheet. At page 2 paragraph 2 applicant teaches that "the spherical pick-up screen is formed by evaporation of an alkali halide material....in vacuum onto the inside of the spherical pick-up face of the image intensifier tube." At page 2 paragraph 4 "the alkali halide screen is evaporated and condensed in place". At page 2 paragraph 6 "an alkali metal halide screen material is evaporated in vacuum onto a curved X-ray transparent substrate". At page 3 last paragraph "the ...scintillator layer is vapor-deposited upon an X-ray transmissive window portion of the tube envelope or a suitable internally mounted X-ray transmissive substrate". In every object and feature of applicant's invention on pages 2, 3, 3A, and in every embodiment of the disclosure applicant's scintillator layer is vapor-deposited on a supporting substrate. Nowhere is it suggested that the scintillator layer is or could be a self-supporting "crystalline sheet". Indeed applicant disclaims at page 1 lines 24 and 25 and page 2 lines 1 to 4, and at page 7 paragraph 3 and page 9 paragraph 1 the use of thin self-supporting sheets of single crystal alkali metal halide material as scintillators because the deformation of the sheets into a dish-shaped form would impair the conversion efficiency and resolution of the converted X-ray image.

Claims 1 and 2 are further refused under Section 36(2) as indefinite and incomplete in that the claims fail to define any supporting substrate for the dish-shaped crystalline sheet of photo-luminescent material defined at line 3 of claim 1 which is defined at line 2 only as "located adjacent the input end (of an evacuated envelope)". It is thus not clear if the "crystalline sheet" is a layer evaporated on and supported by a substrate as taught in every embodiment of the invention, or if the sheet is a self-supporting structure formed by evaporation on a substrate which has been subsequently removed, or if the sheet is a thin slab of alkali metal halide bulk material deformed into a dish-shaped sheet.

...

Claims 1 and 2 are further refused under Section 2(d) of the Patent Act as so broad as to include inoperable combinations. The limitation in claim 1 at line 3 "a dish-shaped substantially crystalline sheet of photo-luminescent material" is so broad as to read on a thin slab of single crystal which has been deformed into a dish-shaped sheet. Applicant has disclaimed such scintillators as inoperable as pointed out above because they would seriously degrade the conversion efficiency and resolution of the image.

The applicant, in his response dated September 21, 1972 to the Final Action, stated in part:

The Office is requested to cancel Claims 1 and 2 and to substitute, therefor, Claims 1 to 34 submitted herewith in duplicate.

...

In order to overcome the Examiner's objections to Claims 1 and 2, Claim 1 has been amended to recite that the photo-luminescent sheet is vacuum evaporated, that it is disposed on a substrate and that it is formed from a selected one of the group comprising cesium iodide, cesium bromide, sodium iodide and rubidium iodide.

Claim 2 now recites that the cesium iodide is activated.

It is noted that the Examiner rejected Claims 1 and 2 under Section 36(2) as indefinite and incomplete. This goes to the issue of whether or not the sheet is self-supporting. If the Claims are interpreted self-supporting, then Applicant would concur with the rejection under Section 36(2). However, it must be remembered that a "sheet of ice" is not generally self-supporting but deposited upon a substrate as in this Application.

Claims 1' and 2 were further refused under Section 2(d) as being so broad as to include inoperable combinations. Applicant did not state in his application and does not believe now that a single crystal as deformed into a dish-shaped sheet is inoperable. It is true that such a sheet has degraded resolution of the image. We have tested such sheets and the image has less resolution than that obtained by an evaporated layer because the light is trapped inside the crystal by reflection from the opposite faces of the deformed single crystal. It is not seen how the language of the application, cited by the Examiner, can be interpreted to state that such scintillators would be inoperable. Thus, it is not believed that Claims 1 and 2 should be refused under Section 2(d) as it has not been shown that such a thin slab so deformed would be inoperable, nor did applicant state that it was inoperable.

With regard to Rule 25, the Examiner apparently is stating that the subject matter cannot be claimed unless the disclosure describes all the characteristics of the invention. It is respectfully submitted that the crystalline nature of the evaporated layer is invariably inherent. In the United States something that is invariably inherent can be added to the specification by amendment and can also be claimed, provided it is shown that it is inherent. The cited publications were for the purpose of showing that such vacuum evaporated layers are crystalline.

The applicant in a second response, dated December 19, 1972,stated in part:

It was understood that Claims 1 and 2, as amended September 21, 1972, are now acceptable to the Examiner; Claim 1 having been amended to recite that the photo-luminescent sheet is vacuum evaporated, that it is disposed on a substrate and that it is formed from a selected one of the group comprising cesium iodide, cesium bromide, sodium iodide and rubidium iodide, and that Claim 2 now recites that the cesium iodide is activated.

> Furthermore, in view of the foregoing, the Commissioner is further requested to confirm that the arguments filed in respect of Claims 1 and 2 also overcome the Examiner's objections to entering Claims 7 to 18.
>
> Applicant would like to place on record that upon receiving confirmation that Claims 1 and 2 are allowable, Claim 1 will be further amended to include lithium iodide and potassium iodide for forming a light emissive layer since these two additional compounds are mentioned at Page 15, line 25, of the Disclosure, as filed.
>
> In conclusion, Applicant will make every effort to advance the prosecution of this Application and will consider any suggestions the Commissioner might wish to make in connection with such further prosecution and in particular, Applicant would appreciate notification on the question of which of Claims 3 to 34 would be allowable along with Claims 1 and 2 as now amended.

This application relates to pick-up screens for X-ray image intensifier tubes. Amended claims 1 and 2 read:

1. An image intensification tube responsive to stimulation by gamma radiation, comprising an evacuated envelope within which is located adjacent the input end a dish-shaped substantially crystalline vacuum evaporated sheet of photo-luminescent material, disposed on a substrate, serving as a light emissive layer for emitting photons in response to stimulation by gamma radiation, wherein said light emissive layer is formed from a selected one of the group comprising cesium iodide, cesium bromide, sodium iodide and rubidium iodide, the envelope also containing a dish-shaped electron emissive vacuum evaporated layer deposited near the inner surface of the light emissive layer for emitting electrons in response to stimulation by the photons, and means for accelerating the electrons against an output phosphor.

2. A tube according to Claim 1 wherein the said cesium iodide is activated.

The question to be decided is whether amended claims 1 and 2 overcome the objections made in the Final Action with respect to Section 25 of the Patent Rules, and Section 36(2) and Section 2(d) of the Patent Act.

It is noted that the refusal under Section 25 of the Patent Rules was directed to the phrase "crystalline sheet". Since the applicant has now limited the claimed scintillator in the amended claims 1 and

2 to "vacuum evaporated", the Board is prepared to accept "substantially crystalline" as descriptive of the photoluminescent layer, and since claim 1 now defines that the "sheet" is disposed on a substrate the Board would also accept the word "sheet" as definitive of the evaporated layer.

With respect to the ground of rejection under Section 36(2) of the Patent Act, the inclusion in amended claim 1 of the limitations that the "sheet" of photoluminescent material is vacuum evaporated and disposed on a substrate satisfies the objection to claims 1 and 2 as indefinite and incomplete.

In line with this the amendments to claims 1 and 2 limiting the scintillator to vacuum evaporated sheets disposed on a substrate has removed the objection that the claims were so broad as to include inoperative combinations (Section 2 of the Patent Act).

We turn now to the newly submitted claims 7 to 18, these claims are clearly subject to the same objections which were set out in the Final Action. In each of claims 7 to 18 the applicant has failed to define the scintillator as a vacuum evaporated layer disposed on a supporting substrate, and the photoluminescent layer is defined in each claim so broadly as to read on unitary self-supporting slabs of bulk halide material, or single crystals deformed by molding into a dish-shape structure - embodiments which are not supported and have been disclaimed as species of the invention.

Furthermore, claims 7 to 14 each define as an image intensifier tube scintillator "a single crystalline sheet" of photoluminescent material. Each claim fails to define that the sheet is vacuum evaporated and disposed on a supporting substrate. They are consequently objectionable for the same reasons as claims 1 and 2, which were finally rejected under Section 46 of the Patent Rules

and which objections the applicant amended to avoid. These claims it is held are unsupported, avoidably indefinite, incomplete and broader in scope than the invention disclosed.

In addition, claims 7 to 14 are objectionable under Section 36(2) of the Patent Act and Section 25 of the Patent Rules in that the limitation "a single crystalline sheet" (which limitation is not specifically described in the disclosure) adds a further indefinite limitation "single" to the limitation already finally rejected. It is not clear if "a single crystalline sheet" refers to a monocrystalline or single crystal sheet which the applicant disclaims in the response of April 17, 1972, or if the limitation refers to one sheet of polycrystalline material.

As for the other newly submitted claims, 3 to 6 and 19 to 34, each define a vacuum evaporated scintillator disposed on a substrate or a method of making such a scintillator. These claims are therefore not open to the same objections as were set out in the Final Action.

The Board is therefore satisfied that the grounds of rejection have been overcome with respect to amended claims 1 and 2, that claims 3 to 6 and 19 to 34 also avoid the grounds of rejection, that claims 7 to 18 are subject to the same grounds of rejection made in connection with the finally rejected claims 1 and 2, and should therefore not be accepted.

It is noted, however, that newly submitted prior art is made of record in the response of September 21, 1972 and this must now be considered by the examiner against the allowability of the amended claims.

The Board recommends that the entry of claims 7 to 18 be refused, that claims 1 to 6 and 19 to 34 be entered if re-presented as claims

I to 22 and that these claims then be re-examined in view of the newly submitted prior art. The Board also recommends that the Applicant's request, to amend new claim 1 to include "lithium iodide and potassium iodide," be granted.

J.P. Hughes,
Assistant Chairman,
Patent Appeal Board.

I concur with the findings of the Patent Appeal Board and refuse to enter claims 7 to 18. Claims 1 to 6 and 19 to 34 will be accepted including the amendment to claim 1 and the application is returned to the examiner for resumption of prosecution in accordance with this decision. The applicant has six months within which to appeal this decision in accordance with Section 44 of the Patent Rules.

Decision accordingly,

A.M. Laidlaw,
Commissioner of Patents.

Dated and signed this
3rd day of October, 1973
in Hull, Quebec.

Agent for Applicant

Gowling, MacTavish, Osborne & Henderson.
Ottawa.