

THIS OPINION WAS NOT WRITTEN FOR PUBLICATION

The opinion in support of the decision being entered today
(1) was not written for publication in a law journal and
(2) is not binding precedent of the Board.

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte MASUMITSU INO

Appeal No. 97-2422
Application 07/939,720¹

HEARD: MAY 3, 1999

Before THOMAS, KRASS and RUGGIERO, Administrative Patent Judges.
THOMAS, Administrative Patent Judge.

DECISION ON APPEAL

Appellant has appealed to the Board from the examiner's
final rejection of claims 1, 2, 7, 11, 20 through 33 and
36 through 43.

¹ Application for patent filed September 2, 1992.

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Representative claim 1 is reproduced below:

1. A liquid crystal display device which comprises:

a first substrate;

a plurality of display elements being arranged in a matrix on the first substrate to define a display area of the liquid crystal display device, each of the display elements comprising a picture element electrode and a switching transistor associated with the picture element electrode;

a driving circuit being formed on the first substrate for driving the display elements of the display area;

a passivation layer substantially entirely covering the display area and the driving circuit;

a second substrate substantially entirely opposed to the first substrate to form a space therebetween; and

a liquid crystal layer filling the space between the first and second substrates, both said passivation layer and said liquid crystal layer being disposed above the driving circuit to provide additional means for protecting the driving circuit.

The following references are relied on by the examiner:

Sawatsubashi et al. (Sawatsubashi)	5,148,301	Sep. 15, 1992 (filed Feb. 21, 1991)
Misawa et al. (Misawa)	5,250,931	Oct. 5, 1993 (filed May 15, 1989)
Noguchi	5,289,016	Feb. 22, 1994 (filed Apr. 24, 1991)

Claims 1, 2, 7, 11, 20 through 33 and 36 through 43 stand rejected under 35 U.S.C. § 103. As evidence of obviousness, the

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examiner relies upon Misawa in view of Sawatsubashi as to claims 1, 2, 7, 11 and 20, with the addition of Noguchi as to claims 21 through 33 and 36 through 43.

Rather than repeat the positions of the appellant and the examiner, reference is made to the briefs and the answer for the respective details thereof.

OPINION

For all the reasons expressed by the examiner in the answer, and for the additional reasons presented here, we will sustain both prior art rejections encompassing all claims on appeal under 35 U.S.C. § 103.

Appellant's assessment of the prior art at the top of page 2 of the specification indicates that silicon nitride is an insulating film that has been used as a protective layer on top of drive circuits for prior art liquid crystal displays to protect them from moisture and movable ions. A protective insulating film of silicon dioxide has been used over the liquid crystal cells per se as well. Appellant's assessment of the prior art in the paragraph bridging pages 2 and 3 of the specification as filed also indicates that it was known in the art to combine drive circuits and liquid crystal cell circuits on

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the same substrate or otherwise build the drive circuits in a liquid crystal cell unit. It is further noted that the top of page 4 of appellant's specification indicates that the prior art considers that silicon nitride is a passivation film from which hydrogenation is effected since silicon nitride contains a large amount of hydrogen and serves as a favorable hydrogen source. Pages 2 and 4 also indicate that polyamide resins have been used as protective films including orienting films and films that have been directly formed on silicon nitride protective films.

Thus, appellant's own assessment of the prior art indicates that both silicon dioxide and silicon nitride layers have been used in the prior art for both insulating and protective or passivation purposes. This is also evident in Kirk-Othmer, Encyclopedia of Chemical Technology, 3rd Edition, Vol. 20, page 644 (1982), a copy of which is provided as an attachment to this opinion. We cite this reference merely to confirm the state of the prior art and is in accordance with In re Boone, 439 F.2d 724, 727, 169 USPQ 231, 234 (CCPA 1971), since this encyclopedia is considered a standard reference work.

To round out appellant's discussion with respect to their own Figure 1 embodiment the paragraph bridging pages 8 and 9, indicates that a silicon oxide compound such as PSG in this

embodiment is used both as an insulating film, as well as a passivation film for protective purposes. As to the second embodiment in Figure 23, the discussion at page 16 of the specification as filed indicates that a form of silicon oxide called PSG and silicon nitride are both used as protective or passivation films.

Therefore, in view of the appellant's own assessment of the prior art as well as the teachings of Misawa and the state of the art generally, the examiner's view is well taken as best expressed at page 9 of the answer that in Misawa's Figure 3B the layer 95 over the display transistors and in Figure 3A the layer 84 over the drive circuit transistors inherently function as the claimed passivation layers with respect to at a minimum the independent claims 1, 27 and 36 on appeal. Figure 3A relates to the drive circuit structures of the LCD display and Figure 3B relates to the display elements per se. The discussion as to these figures at columns 6 and 7 indicates that silicon dioxide and silicon nitride comprise insulating layers 78, 79, 82 and 84, as specifically noted at column 6, lines 45 and 46. The overall discussion in these two columns and the showings in Figures 3A and 3B indicate that layers 78 and 79 of Figure 3A are the same layer deposited as layer 90 in Figure 3B. Similarly, in Figure

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3A insulation layer 82 is the same layer as 92 in Figure 3B. Again, in Figure 3A the discussion indicates that insulation layer 84 is the same layer as insulation 95 in Figure 3B. Figure 3A and the discussion beginning at column 7, line 37 indicates that an additional separate passivation film 85, apparently of polyamides as noted at line 46, is finally left deposited on the driver circuits only and not on the display elements per se in Figure 3B. (To clarify a comment at page 5 of the brief, it is noted that the discussion at column 7, lines 46 and 47 should probably read that the insulation films 84 and 95 (rather than 85) are not dissolved in the processing of the passivation film to be consistent with the rest of the discussion at columns 6 and 7, as well as the showings in Figures 3A and 3B.)

In any event, the state of the art indicates that there is no particular distinction between passivation and insulation layers, that they are considered by name to be equivalent and used interchangeably in the art and the same materials are used for the same purposes. As such, there is, within the teachings of this portion of Misawa and in accordance with the examiner's reasoning at page 9 of the answer, a passivation layer in the form of silicon dioxide substantially entirely covering the

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display area and the driving area circuits as claimed. The teachings of Misawa and the examiner's reasoning emphasize that the same materials are deposited at the same time as the same layer over the driver and display circuit per se to simplify manufacturing processes.

The language of independent claim 1 of a "second substrate substantially entirely opposed to the first substrate to form a space therebetween" does not recite, as apparently asserted by appellants in the brief and reply brief, a co-extensive size of the first and second substrates. The quoted language merely recites that the second substrate is substantially entirely opposed with respect to the first substrate, meaning that the second substrate may be smaller than the first substrate below it. Likewise, and conversely, there is no positive statement of this language in the claim and any other independent claim on appeal such as claims 27 and 36, that the first substrate in turn must be substantially entirely opposed to the second substrate.

Figures 1, 4D and 8 of Misawa clearly indicate that driving circuits 12 and 21 in Figure 1 are formed on the same substrate as the active matrix circuit 22 in this figure. The first paragraph of column 4 of Misawa also implies that the top and bottom substrates are the same size. Notwithstanding these

considerations, in view of our earlier discussion with respect to the size relationships actually recited in the second substrate clause of claim 1 on appeal, the embodiment shown in Figure 16A and 16B (noted at page 2 of the reply brief) clearly fall within this interpretation as well. The top substrate 331 in Figure 16A is of smaller size than the lower substrate 330 in this figure. The discussion beginning at column 15, line 8 again indicates that the active matrix display elements and the drivers per se are on the same substrate as is apparently shown in the two figures. Between the two showings in this figure only the wires 338 exit the lower substrate 330 to be attached to the mounting substrate 335. It is thus apparent that there are no external circuits and that all circuits are contained within the window of common aperture 340, thus indicating that the liquid crystal material 333 would therefore fill the space and cover all of the circuits including the driver circuits and the liquid crystal drive circuits to the extent recited at the end of claim 1 on appeal.

Even though Misawa may be interpreted as only suggesting but not explicitly showing the noted features with respect to the two portions of Figure 16, they are clearly shown in the first embodiment, Figures 3 and 4 of Sawatsubashi, the second

embodiment in Figure 8 and the third embodiment in Figure 11. These figures show that a liquid crystal layer completely fills the space between the lower substrate and the upper substrate which are substantially the same size, and that this liquid crystal material completely covers any and all layers on the pixel region 103 and the associated transistors 104, as well as to cover entirely or in part the various drive circuits 112 and 113. This interpretation necessarily would require that any and all passivation layers would also be covered by such liquid crystal material.

Although Sawatsubashi does not specifically teach passivation layers, they would have been necessarily inherent and obvious to the artisan in the art even without the specific teachings thereof in Misawa. This is buttressed by the consideration that in Sawatsubashi's Figure 2 element 4 is an alignment film which appears to be analogously shown as film 106 in Figures 4, and 11 of this reference. This film obviously covers all circuit elements on the lower substrate including all or a part of the respective driver circuits 112 and 113 and the pixel element circuits as well. This would have clearly suggested to the artisan that any passivation or protective or insulating layers below these alignment films would have

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obviously been to the extent of substantially entirely covering the display area and the driving circuit area to the extent recited in representative independent claim 1 on appeal. This reference also clearly teaches the claimed orientation layer in dependent claim 7 since appellant's arguments in the brief, our understanding of the reference, as well as the arguments presented by appellant's representative at oral hearing, indicate that the alignment layers in Sawatsubashi are the same as the claimed orientation layer.

Therefore, this analysis directly addresses appellant's arguments with respect to the combination of teachings of Misawa and Sawatsubashi as to the initially stated rejection of the examiner. Thus, appellant's arguments that the examiner has exercised prohibitive hindsight are misplaced since the evidence of the collective teachings of both references clearly indicates that, at least to the extent recited in independent claim 1 and dependent claim 7, the obviousness of the subject matter recited therein was clearly demonstrated by the prior art relied upon by the examiner. Moreover, the examiner's position that the passivation layer of independent claim 1 may be considered to be a silicon oxide-based material as taught in the applied prior art

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is confirmed by appellant's recitation in dependent claim 21 which indicates that the passivation layer is such a material.

As to the consideration of the second rejection, including independent claims 27 and 36, appellant's position with respect to these is also misplaced. The analysis made with respect to independent claim 1 and the combination of teachings of Misawa and Sawatsubashi apply equally as well here. Our analysis with respect to the first passivation layer has already been made with respect to the passivation layer of independent claim 1 and the collective teachings of Misawa and Sawatsubashi at a minimum in addition to the teachings of Noguchi, additionally relied upon by the examiner. The claimed second or hydrogen-containing passivation layer of independent claims 27 and 36 is clearly met by the teachings in Noguchi.

Before discussing the features of this reference, it is important to recognize that this second or hydrogen-containing passivation layer is recited as being only "selectively disposed on the first passivation layer." This recitation is broad enough to include the limited teaching of silicon nitride over the drive circuits only of appellant's admitted prior art as indicated at the top of specification page 2 with respect to the showing in prior art Figure 21. Thus, the language of the claim may be

interpreted as to selectively dispose only the second passivation layer on the driver circuits. On the other hand, the prior art Figure 1 of Noguchi clearly indicates that such a material is shown to be apparently only on the picture element circuits as well. There is, we note, no teaching explicitly in Noguchi of driver circuits associated with his invention, but they must be presumed to be a necessary part of the prior art of this reference. Figure 3 of Noguchi clearly indicates that two passivation layers, the first of BSG and the second of silicon nitride, are utilized over the transistor portions of the display elements per se. It goes without saying that the art recognizes, as well as appellant's own assessment of the prior art recognizes, that silicon nitride is a hydrogen-containing passivation layer.

To the extent recited in independent claims 1, 27 and dependent claim 37, we recognize that there is no specific teaching in any of the three references relied upon by the examiner that the liquid crystal material itself may provide an additional means for protecting the driving circuit. It appears to us that this would have been self-evident to the artisan within 35 U.S.C. § 103 based upon the showings and teachings in Figure 16A, 16B in Misawa as well as the structures shown in

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Sawatsubashi. This functional limitation would have been clearly inherent in the overall construction technique best represented by Sawatsubashi.

As a final matter, the extensive reasoning of the answer justifies the combinability within 35 U.S.C. § 103 of the teachings of the respective references relied upon. Additionally, the overall structure presented in Figure 16A and 16B of Misawa clearly is analogous in configuration to the overall structure of Sawatsubashi because both utilize and explicitly show respective sealing regions for containing the liquid crystal material in a space provided by the upper and lower substrates of the respective references.

Other than the particular claims identified in this opinion, appellant has presented no arguments with respect to the other dependent claims on appeal. As such, they fall with our consideration of their respective parent claims. Therefore, the decision of the examiner rejecting claims 1, 2, 7, 11, 20 through 33 and 36 through 43 under 35 U.S.C. § 103 is affirmed.

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No time period for taking any subsequent action in connection with this appeal may be extended under 37 CFR § 1.136(a).

AFFIRMED

JAMES D. THOMAS)	
Administrative Patent Judge)	
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ERROL A. KRASS)	BOARD OF PATENT
Administrative Patent Judge)	APPEALS AND
)	INTERFERENCES
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