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PATENT TRIAL AND APPEAL BOARD

Ex parte SAMSUNG DISPLAY CO., LTD.
(Application 11/689,390)

Appeal 2011-011830
from Technology Center 1700
Galen Hauth, Examiner

Before RICHARD TORCZON, DONNA M. PRAISS and CHRISTOPHER L. CRUMBLEY, *Administrative Patent Judges*.

TORCZON, *Administrative Patent Judge*.

DECISION ON APPEAL

The appellant (Samsung) seeks relief from the final rejection of claims 1-5, 8-14 and 19-21.[1] We AFFIRM.

OPINION

BACKGROUND

Samsung's specification "relates to a mold for manufacturing a display

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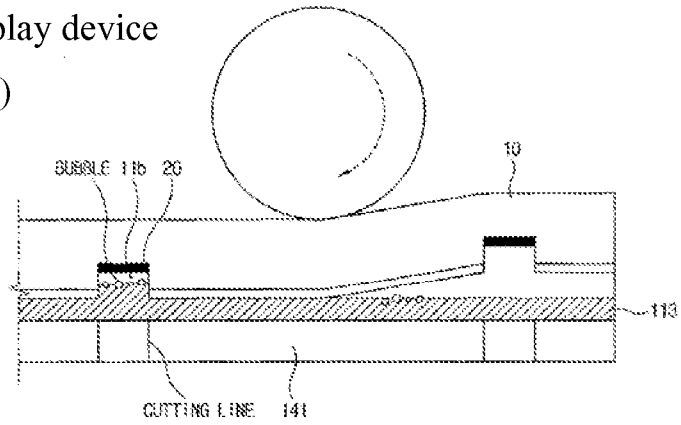
[1] Claim 22 appears in the claims appendix of Samsung's appeal brief, but is not mentioned in the final rejection or in Samsung's request for relief. Accordingly, we do not consider claim 22 to be properly before us.

device and a method of manufacturing a display device using the same."[2] Samsung Figure 5B (right) illustrates a step in an embodiment of a manufacturing method of a liquid crystal display device.[3] A roller (unnumbered circle rotating clockwise) presses a mold (with a mold main body **10** and a groove with a subgroove **11b**) onto an organic layer **113** on a substrate **141** such that bubbles get trapped in the subgroove **11b**.[4]



Claim 1, the only independent claim, defines the invention as:[5]

> A method of manufacturing a display device, comprising:
>
> providing a mother insulating substrate which comprises usage regions arranged in a matrix shape, and a removal region formed between the usage regions;
>
> forming an organic layer on the mother insulating substrate;
>
> arranging a flexible mold formed with a pattern part corresponding to the usage regions and *a plurality of grooves corresponding to at least a part of the removal region and formed in a grid shape*, on the organic layer;
>
> moving a pressure means in a direction parallel to a top surface of the mold to sequentially press the mold to the organic layer;
>
> separating the mold from the organic layer, and
>
> forming a plurality of thin film transistor substrates by cutting the mother insulating substrate along a cutting line,
>
> wherein the mold comprises a mold main body which comprises a light transmissive polymer and a light blocking layer

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[2] Spec. ¶002.
[3] *Id.* ¶0026.
[4] *Id.* ¶¶0052-0067.
[5] Claim language comes for the claims appendix of the brief. Br. 10. Emphasis has been added for the limitation that Samsung particularly contests. *Id.* 6.

which is formed on the mold main body to correspond to the removal region,

wherein the light blocking layer is formed on a lower part of the groove,

wherein bubbles formed between the mold and the organic layer move toward a direction of moving the pressure means, and

wherein the moved bubbles are trapped in the groove, and

wherein the removal region is formed according to the cutting line.

The examiner rejected claims 1-5, 9-12 and 19-21 as having been obvious,[6] relying on the combined disclosures of Maekawa,[7] Choi,[8] Guo[9] and Tan.[10] The examiner rejected the remaining claims as having been obvious, using the base combination plus one additional reference for claim 8[11] and a different additional reference for claims 13-14.[12] Samsung relies on the limitations of claim 1 to urge prejudicial error in the rejection of all of the claims;[13] hence, we have no basis for reversing the other rejections apart from the reasons given for claim 1.[14]

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[6] Final Rej. 2, citing 35 U.S.C. 103.
[7] S. Maekawa, *Method for manufacturing semiconductor device*, US 2005/0266693 A1.
[8] B.J. Choi et al., *Method and system of automatic fluid dispensing for imprint lithography processes*, US 2002/0094496 A1.
[9] L.J. Guo and X. Cheng, *Combined nanoimprinting and photolithography for micro and nano devices fabrication*, WO 2005/029179 A2.
[10] H. Tan, A. Gilbertson & S.Y. Chou, *Roller Nanoimprint Lithography*, 16(6) J. VACUUM SCI. TECH. B 3926 (1998).
[11] Final Rej. 8, citing D.P. Mancini, D.J. Resnick & W.J. Dauksher, *Lithographic template and method of formation and use*, US 2002/0122995 A1.
[12] Final Rej. 9, citing Y. Yamanaka et al., *Reflector, method of fabricating the same, reflective display device comprising reflector, and method of fabricating the same*, US 6,452,653 B1 (2002).
[13] Br. 6-9.
[14] *Hyatt v. Dudas*, 551 F.3d 1307, 1313 (Fed. Cir. 2008).

FACTS AND FINDINGS

[1] Maekawa discloses a method for manufacturing a semiconductor device applying a nanoimprinting method.[15]

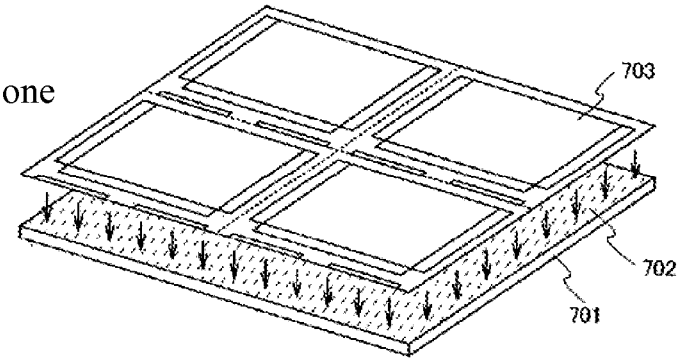
[2] Nanoimprinting is a method for reducing the costs of lithography.[16]

[3] Maekawa's invention may be used to manufacture semiconductor display devices.[17]

[4] Maekawa's invention may be used to manufacture thin-film transistor devices.[18]

[5] Maekawa teaches using a single mold pressed to the resist on a substrate to form multiple devices.[19]

[6] Maekawa Figure 11A (right) depicts one mode of pattern forming on a large substrate using nanoimprinting,[20] in which a mold **703** is pressed onto a substrate **701** with resist **702**.[21]



[7] The examiner reasons that Maekawa's formation of several devices on the same substrate implies subsequent cutting of the substrate in the grid-like, non-device zones to separate the devices.[22]

[8] The examiner found that Maekawa does not teach:[23]

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[15] Maekawa ¶0002.
[16] *Id.* ¶0004.
[17] *Id.* ¶0013.
[18] *Id.* ¶0014.
[19] *Id.* ¶¶0125-26.
[20] *Id.* ¶0025.
[21] *Id.* ¶0126.
[22] Ans. 12.
[23] Final Rej. 3.

a. the use of a flexible mold with a moving pressure source parallel to the top,

b. grooves present in the mold main body corresponding to the non-usage regions,

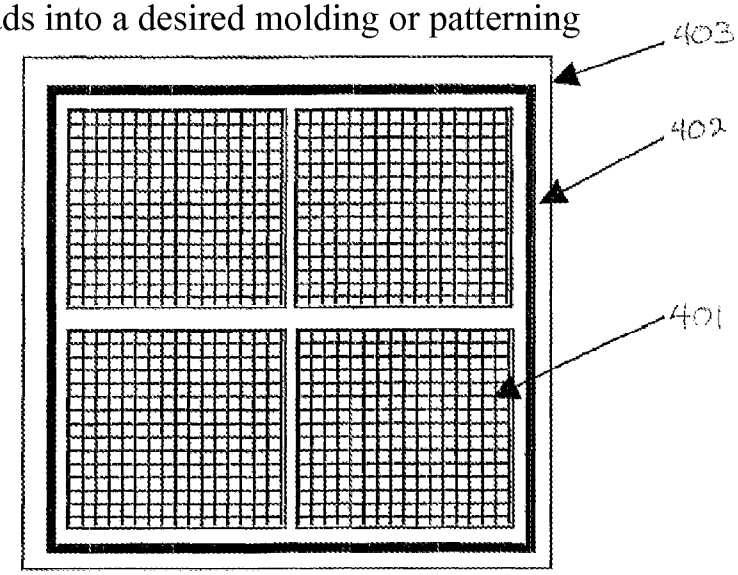
c. a light-blocking layer in the groove.

[9] Choi discloses methods of dispensing fluids applicable to imprint lithography processes.[24]

[10] Bubbles and distortions caused by imprinting pressure were known problems.[25]

[11] Choi teaches the use of an entrainment channel or kerf in the template for capturing excess fluid before it spreads into a desired molding or patterning area.[26]

[12] Choi Figure 4 (right) is a bottom view of a patterned template,[27] showing a patterning region **401**, an entrainment channel **402** and a template edge **403** for holding the template.[28]



[13] The examiner reasons that a person having ordinary skill in the art would move Choi's entrainment channel

[24] Choi ¶0003.
[25] *Id.* ¶0008.
[26] *Id.* ¶¶0090 & 0094.
[27] *Id.* ¶0026.
[28] *Id.* ¶0090.

to the cutting zones implicit in Maekawa because it would be reasonably expected to improve the imprinting process by better controlling the unwanted spread of resist across the substrate.[29]

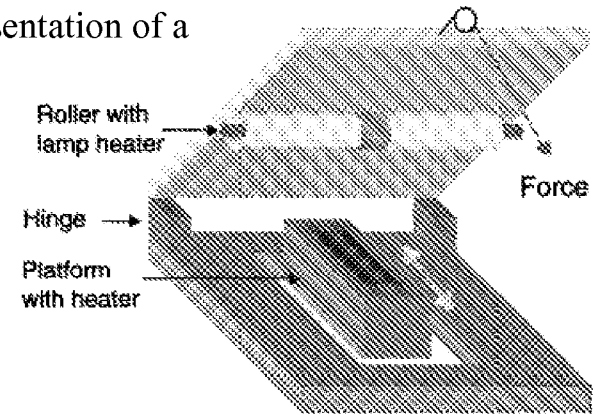
[14] The examiner relies on Guo for disclosures that Samsung does not dispute in this appeal.[30]

[15] Tan discusses roller nanoimprint lithography as an improvement over conventional nanoimprint lithography.[31]

[16] Tan teaches that the mold may be on the roller itself or the roller may press a flat mold onto the substrate, in which case the mold must be flexible enough to deform under the roller.[32]

[17] The roller locally heats the resist on the substrate so the resist flows.[33]

[18] Tan Figure 1 (right) is a schematic representation of a roller nanoimprint system with a roller, a movable platform, a hinge and heaters.[34]



[19] Tan reports that the roller method results in "few air bubbles" and speculates that "the roller pushes the air out."[35]

ANALYSIS

Samsung contends that the cited references fail to disclose a groove formed in a grid shape disposed in a portion corresponding to the removal section formed along a cutting line. Samsung notes that the examiner conceded as a difference

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[29] Final Rej. 3.
[30] *Id.* 3-4 (discussing Guo) and Br. 8 (discussing only Maekawa and Choi).
[31] Tan 3926, abstract.
[32] *Id.* 3926, right col.
[33] *Id.*
[34] *Id.* 3927, left col.
[35] *Id.* 3928, left col.

that Maekawa does not teach grooves present in the mold main body corresponding to the non-usage regions. Samsung urges that the examiner erred in his understanding of Choi's groove, which Samsung states (1) is formed along the periphery of the template rather than in the claimed "grid shape" along a "cutting line" and (2) is a pattern forming part, not a part removed by cutting a mother insulating substrate along a cutting line.[36]

Samsung misapprehends the examiner's findings. The examiner does not rely on Choi to teach grid-like grooves aligned with cutting lines. Rather, the examiner found that Maekawa at least suggests grid-like cutting zones around the patterned devices, while Choi teaches the desirability of entrainment channels outside the patterned zones. The examiner further found that a person having ordinary skill in the art reasonably expected that moving the entrainment channels to the grid-like, non-device regions would improve the ability of the channels to entrain, presumably because each channel would be closer to the problem and have to entrain flow over a smaller area. Once the channel was moved, it would automatically be in the cutting zone.

The examiner's position is reasonable and is consistent with the references on which he relies. Samsung has not demonstrated prejudicial error in the final rejection.

HOLDING

Final rejection of claims 1-5, 8-14 and 19-21 is—

AFFIRMED

bar

For the appellant: MARK A. PELLEGRINI,[37] Innovation Counsel LLP, of Cupertino, California.

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[36] Br. 7-8.

[37] 37 C.F.R. § 1.34 (Acting in a representative capacity).