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SAMSUNG ELECTRONICS CO., LTD., et al.

UNITED STATES DISTRICT COURT

NORTHERN DISTRICT OF CALIFORNIA

ADVANCED MICRO DEVICES, INC., et al.,

Plaintiffs and Counterdefendants,

v.

SAMSUNG ELECTRONICS CO., LTD., et al.,

Defendants and Counterclaimants.

Case No. 3:08-CV-0986-SI

DEFENDANTS AND COUNTERCLAIMANTS' NOTICE OF MOTION, MOTION FOR SUMMARY JUDGMENT OF INVALIDITY OF U.S. PATENT NO. 5,545,592 AND POINTS AND AUTHORITIES IN SUPPORT THEREOF

DATE: May 8, 2009
TIME: 9:00 a.m.
COURTROOM: 10, 19th Floor
JUDGE: The Honorable Susan Illston

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NOTICE OF MOTION AND MOTION FOR SUMMARY JUDGMENT

TO ALL PARTIES AND THEIR COUNSEL OF RECORD:

PLEASE TAKE NOTICE that on May 8, 2009 at 9 a.m., or as soon thereafter as the matter may be heard before the Honorable Judge Illston, United States Court House, San Francisco, California, Defendants and Counterclaimants SAMSUNG ELECTRONICS CO., LTD., SAMSUNG SEMICONDUCTOR, INC., SAMSUNG AUSTIN SEMICONDUCTOR, LLC, SAMSUNG ELECTRONICS AMERICA, INC., SAMSUNG TELECOMMUNICATIONS AMERICA, LLC, SAMSUNG TECHWIN CO., LTD., and SAMSUNG OPTO-ELECTRONICS AMERICA, INC., (collectively, "Samsung") will move and hereby do move for an order granting summary judgment under Rule 56 of the Federal Rules of Civil Procedure that claims 1 and 4 of U.S. Patent No. 5,545,592 are invalid. This motion is made on the grounds that claims 1 and 4 of U.S. Patent No. 5,545,592 are anticipated under 35 U.S.C. § 102 and/or obvious under 35 U.S.C. § 103.

This motion is based on this Notice of Motion and Motion; the accompanying Memorandum of Points and Authorities in Support Thereof; the accompanying declarations of Michael Thomas and Christine Saunders Haskett; the pleadings and papers on file herein; and any other matter that may be presented at the hearing.

MEMORANDUM OF POINTS AND AUTHORITIES

I. INTRODUCTION

Among the seven patents that AMD has asserted against Samsung in this litigation is U.S. Patent No. 5,545,592 ("the '592 patent"), which claims methods for forming metal contacts in semiconductor devices. The area of technology to which this patent relates is an intensely crowded field; Samsung's Preliminary Invalidity Contentions in this case cite no less than 54 separate references in this area, and that comprises but a small subset of the art that is publicly available.

Samsung has brought this summary judgment motion at this relatively early stage of the case because there is one prior art reference in particular that so clearly renders the '592 patent invalid that it would be an inefficient use of the Court's—and the parties'—resources to continue to litigate over the '592 patent. The prior art reference in question, U.S. Patent No. 5,975,912 to Hillman et al. ("the Hillman patent" or "Hillman"),[1] was filed before the inventions claimed in the '592 patent and discloses, in one straightforward and unambiguous paragraph, each and every limitation of the asserted claims of the '592 patent. There simply can be no genuine dispute that the Hillman patent anticipates the asserted claims of the '592 patent under 35 U.S.C. § 102.

Further, because the parties have not requested that any terms of the '592 patent be construed during the Markman phase of this case, there is no reason to delay the resolution of this motion. The Court should proceed to find claims 1 and 4 of the '592 patent invalid for anticipation by the Hillman patent.

While the process claimed in the '592 patent and that disclosed in the Hillman patent are identical, it is possible that AMD may try to create claim construction or other arguments to try to avoid anticipation. As described below, any such attempt would be futile, indeed frivolous. However, out of an abundance of caution, Samsung also moves for judgment that the '592 patent is invalid for obviousness over the Hillman patent. Any differences that AMD might concoct between

[1] References in this brief to "the '592 patent" are to Exhibit 1 to the Declaration of Christine Saunders Haskett in Support of Samsung's Motion for Summary Judgment of Invalidity of U.S. Patent 5,545,592 ("Haskett Decl." or "Haskett Declaration"). References to "the Hillman patent" or "Hillman" are to Exhibit 2 to the Haskett Declaration.

the '592 and Hillman patents would have been obvious and trivial to a person of ordinary skill in the art.

II. FACTUAL BACKGROUND

A. The Technology of the '592 Patent

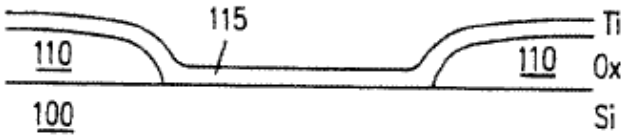
The '592 patent claims methods for forming contacts in semiconductor devices, and AMD alleges conception of the patent on October 14, 1994. *See* Haskett Decl., Ex. 3 (Iacoponi Dep. at 47:10-13, 62:25-63:10); *id*. at Ex. 4 (AMD's Response to Samsung's First Set of Interrogatories at 7 (No. 2)). In particular, the patent discloses a process for creating a metal contact on a silicon surface in an integrated circuit. The process can be broken down into two portions: a first set of steps that the patent admits are in the prior art, followed by a purportedly new set of steps covered by the claims.

1. Prior Art Steps

First, the '592 patent explains, a layer of an oxide ("Ox") is grown on the surface of the silicon ("Si"). '592 patent at 1:20-23; *id*. at Fig. 1 (reproduced at right); Thomas Decl. at ¶ 6.

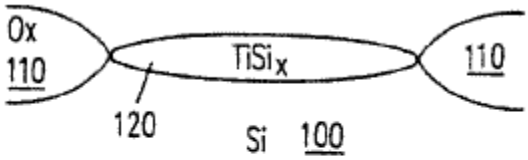
PRIOR ART
FIG. 1

A titanium silicide layer is formed by opening a hole in the oxide layer and then depositing a layer of titanium ("Ti"). '592 patent at 1:24-28; *id*. at Fig. 2 (reproduced at right); Thomas Decl. at ¶ 7.



PRIOR ART
FIG. 2

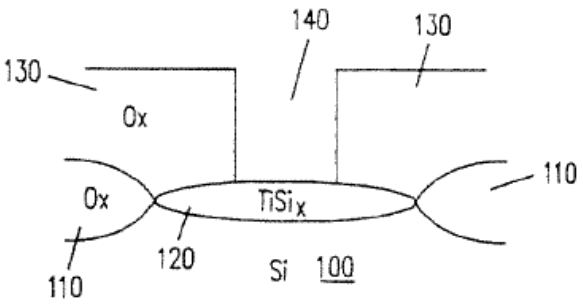
After exposure to high heat, the portion of titanium in contact with the silicon surface reacts with the silicon to form titanium silicide ("$TiSi_x$," or simply "silicide"). The portion of titanium covering the oxide layer remains



PRIOR ART
FIG. 3

unreacted and is removed. '592 patent at 1:29-36; *id*. at Fig. 3 (reproduced above); Thomas Decl. at ¶ 8.

Next, a dielectric (insulating material), such as silicon dioxide, is deposited over the layers, and a contact hole is etched through it. '592 patent at 1:37-46; *id*. at Fig. 4 (reproduced at right); Thomas Decl. at ¶ 9.



PRIOR ART
FIG. 4

2. Purportedly Inventive Steps

It is at this stage, after the formation of the silicide and the creation of the contact hole, that the purportedly inventive process begins. First, the silicide is exposed to nitrogen (N) ionized in a plasma, which is generated using a nitrogen source gas such as N_2 (nitrogen gas) or NH_3 (ammonia) in conjunction with an electrical power source. '592 patent at 3:31-40; *id*. at Fig. 8 (reproduced at right); Thomas Decl. at ¶ 10.

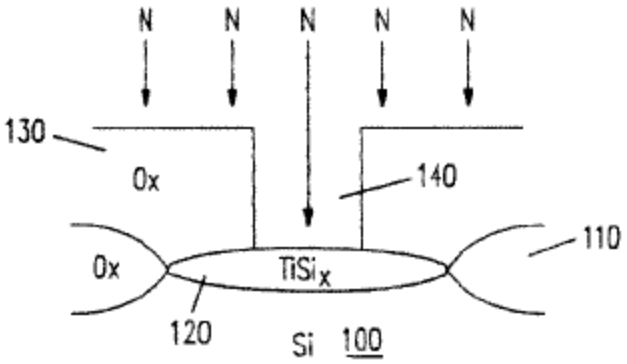


FIG. 8

In the presence of the nitrogen, the exposed top surface of the titanium silicide is converted into titanium nitride. '592 patent at 3:41-43; *id*. at Fig. 9 (reproduced at right); Thomas Decl. at ¶ 11. This titanium nitride layer, labeled 200 in Fig. 9 of the patent, provides a protective barrier for the underlying titanium silicide layer and removes some undesirable materials from the surface of the titanium silicide layer. '592 patent at 3:54-67; Thomas Decl. at ¶ 11.

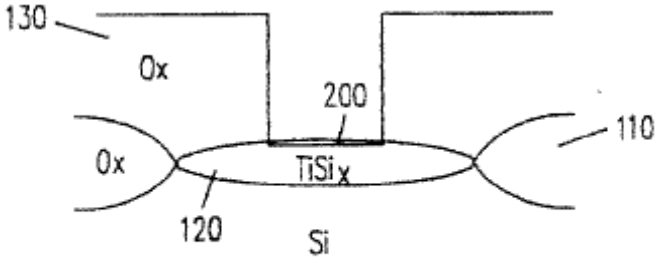


FIG. 9

Next, a conventional deposition process is used to deposit a layer of titanium nitride, which combines with the previously created titanium nitride layer (labeled 200) to form a combined titanium nitride layer (labeled 220 in Figure 10 of the patent). '592 patent at 4:1-10; *id*. at Fig. 10 (reproduced at right); Thomas Decl. at ¶ 12.

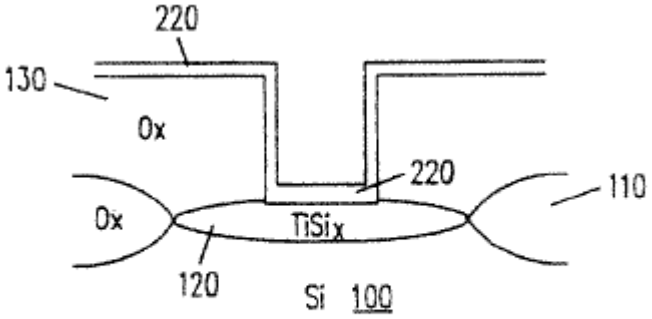


FIG. 10

Finally, a layer of another metal, *e.g.*, tungsten, is deposited to form a metal plug, thus creating a metal contact with an electrical connection to the underlying silicon layer. '592 patent at 4:11-12, 28; *id*. at Fig. 11 (reproduced at right); Thomas Decl. at ¶ 13.

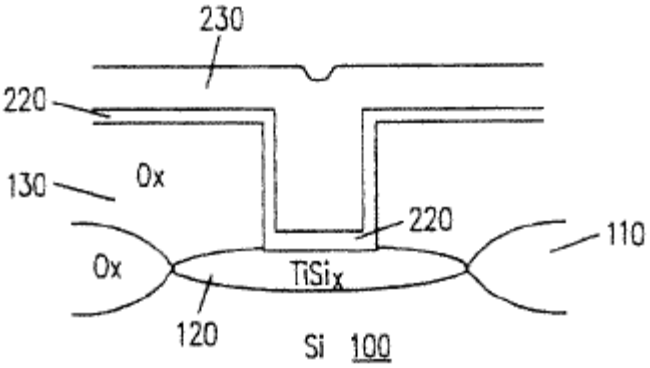


FIG. 11

3. The Asserted Claims: Claims 1 and 4

AMD accuses Samsung of infringing independent claim 1 of the '592 patent and claim 4, which depends from claim 1. These claims are directed primarily at the purportedly inventive techniques discussed above regarding Figures 8-10 of the patent.

Claim 1 recites:

> 1. A method for forming a contact to a semiconductor body, said method comprising the steps of:
> [a.] forming a metal silicide layer on said body; [see Fig. 3, above]
> [b.] exposing said metal silicide layer to nitrogen ionized in a plasma, thereby converting a portion of said metal silicide layer to a first metal nitride layer; [see Figs. 8 and 9, above]
> [c.] depositing a layer of a second metal nitride over said metal silicide layer, such that said second metal nitride layer overlays and engages said first metal nitride layer; [see Fig. 10, above] and
> [d.] depositing a layer of a second metal over said second metal nitride layer. [see Fig. 11, above]

Claim 4 recites:

> 4. The method of claim 1, wherein said metal silicide is titanium silicide, and wherein the second metal nitride is titanium nitride.

B. The Prior Art Hillman Patent

U.S. Patent No. 5,975,912 to Hillman et al., entitled "Low Temperature Plasma-Enhanced Formation of Integrated Circuits" was filed on June 3, 1994, over four months before the conception of the claims of the '592 patent. In one straightforward paragraph, the Hillman patent discloses precisely the same techniques claimed in claims 1 and 4 of the '592 patent:

> An integrated contact metallization process can be used by first ***depositing titanium*** onto a silicon surface by PECVD. This will ***form a layer of titanium silicide***. After the titanium deposition an ***ammonia plasma anneal*** is performed to ***provide an upper layer of nitrided silicide titanium.*** Finally, a ***titanium nitride layer can be deposited*** by PECVD, again in the same reaction chamber. Finally, following the deposition of the titanium nitride, aluminum or ***tungsten metal can be sputter deposited***.

Hillman at 15:29-37 (emphases added).

III. LEGAL STANDARDS FOR SUMMARY JUDGMENT

Summary judgment is appropriate when no genuine issue of material fact exists and the moving party is entitled to judgment as a matter of law. *Celotex Corp. v. Catrett*, 477 U. S. 317, 322-23 (1986); *Anderson v. Liberty Lobby, Inc.*, 477 U.S. 242, 247-48 (1986). "Summary judgment is as appropriate in a patent case as in any other . . . . [C]ourt[s] should utilize the salutary procedure of Fed. R. Civ. P. 56 to avoid unnecessary expense to the parties and wasteful utilization of the jury process and judicial resources." *Barmag Barmen Maschinefabrik AG v. Murata Mach., Ltd.*, 731 F.2d 831, 835 (Fed. Cir. 1984). To defeat a summary judgment motion, the opposing party must do "more than simply show that there is some metaphysical doubt as to the material facts." *Matsushita Elec. Indus. Co. v. Zenith Radio Corp.*, 475 U. S . 574, 586 (1986). In this regard, unsupported conclusions on the ultimate issue of invalidity are "insufficient to raise a genuine issue of material fact." *Dynacore Holdings Corp. v. U.S. Philips Corp.*, 363 F. 3d 1263, 1278 (Fed. Cir. 2004). Instead, the opposing party must set forth "specific facts showing that there is a genuine issue for trial." Fed. R. Civ. P. 56(e); *Matsushita Elec.*, 475 U.S. at 587.

A patent claim is invalid as anticipated if any embodiment covered by the claim was "described in . . . a patent granted on an application for patent by another filed in the United States"

before the date of invention by the patent applicant. 35 U.S.C. § 102(e). To anticipate a claim, a prior art reference must disclose every feature of the claimed invention, either explicitly or inherently. *See Glaxo Inc. v. Novopharm Ltd.*, 52 F.3d 1043, 1047 (Fed. Cir. 1995). "[A] prior art reference may anticipate without disclosing a feature of the claimed invention if that missing characteristic is necessarily present, or inherent, in the single anticipating reference." *Schering Corp. v. Geneva Pharmaceuticals, Inc.*, 339 F.3d 1373, 1380 (Fed. Cir. 2003). For summary judgment to be proper, there must be no genuine dispute whether the limitations of the claimed invention are disclosed, either explicitly or inherently, by an allegedly anticipating prior art reference. *See IPXL Holdings, L.L.C. v. Amazon.com, Inc.*, 430 F.3d 1377, 1380-81 (Fed. Cir. 2005).

A patent is invalid under 35 U.S.C. § 103 when "the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains." Obviousness under Section 103 frequently involves the combination of more than one reference. "However, a court need not rely on separate references to reach a conclusion that the subject matter of asserted claims would have been obvious based on the plain disclosure of a single reference." *Tokyo Keiso Co. v. SMC Corp.*, Nos. 2008-1045, 2008-1112, 2009 WL 59769 at *6 (Fed. Cir. Jan. 9, 2009); *see also B.F. Goodrich Co. v. Aircraft Braking Sys. Corp.*, 72. F.3d 1577 (Fed. Cir. 1996) (affirming judgment of obviousness in view of a single prior art reference).

IV. ARGUMENT

A. Hillman Is Prior Art to the '592 Patent.

There can be no genuine dispute that Hillman is prior art to the '592 patent under at least 35 U.S.C. § 102(e)(2), under which a patent is prior art if it is "a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent." The patent application that led to Hillman was filed on June 3, 1994, and the patent was issued on November 2, 1999. Haskett Decl., Ex. 2. AMD contends that the '592 patent was conceived on

October 14, 1994. Haskett Decl., Ex. 4 (AMD Response to Samsung's First Set of Interrogatories at 7 (No. 2)); *see id.* at Ex. 3 (Iacoponi Dep. at 62:25-63:10). Even accepting AMD's alleged conception date for purposes of summary judgment, the application leading to Hillman predates the invention of the '592 patent by over four months.

B. Claim 1 of the '592 Patent Is Anticipated by Hillman.

No dispute of material fact exists that Hillman discloses each limitation of claim 1, rendering claim 1 anticipated and therefore invalid.

1. Preamble: "A method for forming a contact to a semiconductor body, said method comprising the steps of"

The words in a preamble limit a claim only if they "give meaning to the claim and properly define the invention," but not if they "merely state a purpose or intended use of the invention." *In re Paulsen*, 30 F. 3d 1475, 1479 (Fed. Cir. 1994). Here, the preamble merely states a purpose or intended use and therefore does not limit the claim. Even if the preamble is considered a limitation, however, Hillman discloses "[a] method for forming a contact to a semiconductor body," as recited in the preamble of claim 1:

> In the formation of integrated circuits (IC's), ***thin films containing metal elements are often deposited*** upon the surface of a substrate, such as a semiconductor wafer. Thin films are deposited ***to provide conducting and ohmic contacts*** in the circuits and between the various devices of an IC. For example, a desired thin film might be ***applied to the exposed surface of a contact or via hole on a semiconductor wafer***, with the film passing through the insulative layers on the wafer to provide plugs of conductive material for the purpose of making interconnections across the insulating layers.

Hillman at 1:11-21 (emphases added); Thomas Decl. at ¶ 19.

2. Step [a]: "forming a metal silicide layer on said body"

Hillman teaches that "[a]n integrated contact metalization process can be used by first depositing titanium onto a silicon surface . . . . This will form a layer of titanium silicide." Hillman at 15:29-31. Titanium silicide is a type of metal silicide and is the same metal silicide described in an embodiment of the '592 patent. Thomas Decl. at ¶ 21. Hillman thus discloses "forming a metal silicide layer on [the semiconductor] body," as recited in claim 1 of the '592 patent; Thomas Decl. at ¶ 21.

3. Step [b]: "exposing said metal silicide layer to nitrogen ionized in a plasma, thereby converting a portion of said metal silicide layer to a first metal nitride layer"

Hillman discloses this limitation, stating: "After the titanium deposition an ammonia plasma anneal is performed to provide an upper layer of nitrided silicide titanium." Hillman at 15:31-33; *see also id*. at 3:47-58.

Hillman's "ammonia plasma anneal" is one way to "expos[e] said metal silicide layer to nitrogen ionized in a plasma" as recited in claim 1 of the '592 patent. The '592 patent explicitly discloses that the metal silicide is converted to titanium nitride by using active free nitrogen ('592 patent at 3:41-42), and "active free nitrogen may be produced by generating a plasma above a silicon body 100 using a nitrogen source gas, such as N_2 or NH_3." '592 patent at 3:34-36. NH_3 is the chemical formula for ammonia, a source of active free nitrogen described in the Hillman patent. Thomas Decl. at ¶ 22; *see also id*. at ¶¶ 15-16 (quoting '592 patent applicant's statement that the claim term "exposing … to nitrogen ionized in a plasma" is exemplified by exposure to a plasma generated using ammonia (NH_3)).

Further, when Hillman's ammonia plasma anneal provides an upper layer of nitrided silicide titanium (which corresponds to the first metal nitride layer of claim 1 of the '592 patent), it does so by converting a portion of the titanium silicide into titanium nitride. Thomas Decl. at ¶ 22. Step [b] of claim 1 thus also is disclosed by Hillman.

4. Step [c]: "depositing a layer of a second metal nitride over said metal silicide layer, such that said second metal nitride layer overlays and engages said first metal nitride layer"

Hillman discloses this limitation. After exposure to nitrogen ionized in a plasma (*see* step [b] above), Hillman states that "a titanium nitride layer can be deposited." Hillman at 15:33-35. This titanium nitride layer corresponds to the "second metal nitride layer" of claim 1 of the '592 patent, and—having been deposited directly on the first titanium nitride layer—it "overlays" the first titanium nitride layer. Thomas Decl. at ¶ 23. In order to maintain acceptable physical and electrical continuity of the contact being formed, the second titanium nitride layer comes together with, interlocks with, and is in physical and electrical contact with the first titanium nitride layer. *Id*. The second titanium nitride layer thus "engages" the first titanium nitride layer. Thomas Decl.

at ¶ 23; *see also id.* at ¶¶ 14-18 (citing statements in the '592 patent's prosecution history explaining the meaning of the claim term "engages"). Hillman thus discloses each limitation of step [c] of claim 1.

5. Step [d]: "depositing a layer of a second metal over said second metal nitride layer"

Immediately after explaining the formation of the second metal nitride layer (*see* step [c] above), Hillman states, "[f]inally, following the deposition of the titanium nitride, aluminum or tungsten metal can be sputter deposited." Hillman at 15:35-37. The Hillman patent thus discloses step [d] of claim 1. *See* Thomas Decl. at ¶ 24.

Accordingly, there can be no dispute of material fact that the prior art Hillman reference teaches each of the limitations of claim 1 of the '592 patent. Claim 1 therefore is invalid for anticipation by Hillman.

C. Claim 4 of the '592 Patent Is Anticipated by Hillman.

Claim 4 recites: "The method of claim 1, wherein said metal silicide is titanium silicide, and wherein the second metal nitride is titanium nitride." As shown above in connection with claim 1, Hillman discloses titanium silicide as the claimed "metal silicide" and titanium nitride as the claimed "second metal nitride." *See* sections IV.B.2 and IV.B.4 above (discussing steps [a] and [c] of claim 1); *see also* Hillman at 15:29-31, 33-35, 48-49. Because these limitations are disclosed in Hillman, and because Hillman also discloses all the limitations of claim 1, Hillman also discloses all the limitations of claim 4. Accordingly, claim 4 is invalid for anticipation.

D. At a Minimum, Claims 1 and 4 of the '592 Patent Are Rendered Obvious by Hillman.

Sections IV.B and IV.C above set forth the clear limitation-by-limitation anticipation by Hillman of claims 1 and 4 of the '592 patent. To the extent AMD attempts to create any doubt that Hillman precisely discloses each limitation of the claims, Samsung also moves for summary judgment that claims 1 and 4 are invalid under 35 U.S.C. § 103 in view of Hillman. Although section 103 obviousness frequently involves the combination of more than one reference, "a court need not rely on separate references to reach a conclusion that the subject matter of asserted claims

would have been obvious based on the plain disclosure of a single reference." *Tokyo Keiso Co.*, 2009 WL 59769 at *6; *see also B.F. Goodrich Co.*, 72. F.3d 1577. In the instant case, the disclosure of Hillman is identical to the asserted claims, and AMD can raise no question of material fact that claims 1 and 4 of the '592 patent are invalid—whether as anticipated under Section 102 or rendered obvious under Section 103—in view of Hillman.

V. CONCLUSION

For the reasons set forth above, Samsung respectfully requests that this Court grant its motion for summary judgment of invalidity of claims 1 and 4 of the '592 patent.

DATED: March 19, 2009

COVINGTON & BURLING LLP

/s/Robert T. Haslam
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