

The opinion in support of the decision being entered today was not written for publication and is not binding precedent of the Board.

Paper No. 18

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte SEIJI KUMAGAI, TOSHIHIKO YAOI and YOSHITO IKEDA

Appeal No. 1999-2839
Application 08/824,716

ON BRIEF

Before HAIRSTON, FLEMING, and GROSS, ***Administrative Patent Judges.***

FLEMING, ***Administrative Patent Judge.***

DECISION ON APPEAL

This is a decision on appeal under 35 U.S.C. § 134 from the final rejection of claims 1, 2 and 4-7, all the pending claims. Claim 3 is cancelled.

The instant invention relates to a magnetic tunneling junction device that displays a magnetic tunneling effect and has a three layer structure consisting of a magnetic metal layer/ insulating layer/ magnetic metal layer. Appellants' specification, page 1, lines 1-8. Specifically, the invention provides a magnetic tunneling junction device in which a first magnetic metal layer and a second magnetic metal layer are connected together by a ferromagnetic tunnel junction via an insulating layer. Specification, page 2. The ferromagnetic tunnel junction has a junction area of not larger than $1 \times 10^{-9} \text{m}^2$. The invention requires that the ferromagnetic tunnel junction area be positively controlled. Specification, page 3, lines 9-10. The junction area of the ferromagnetic tunnel junction is formed by a first insulating layer for the ferromagnetic tunnel junction and a second insulating layer for limiting the junction area for the ferromagnetic tunnel junction. Specification, page 3, lines 12-15. Limiting the junction area of the ferromagnetic tunnel junction to an area not larger than $1 \times 10^{-9} \text{m}^2$ provides a structure having excellent insulating properties for

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displaying the magnetic tunneling effect with stability.

Specification, page 3.

Appellants' independent claim 1, reproduced below, is representative of the invention:

1. A magnetic tunneling junction device comprising:

a first magnetic metal layer;

a second magnetic metal layer;

wherein said second magnetic metal layer is formed above the first magnetic metal layer; and

first and second insulation layers formed between the first and second magnetic metal layers wherein the second insulating layer surrounds the first insulating layer and a surface area of the first insulating layer in contact with the second magnetic metal layer is less than $1 \times 10^{-9} \text{m}^2$.

In rejecting Appellants' claims, the Examiner relies on the following reference:

Gallagher et al. (Gallagher)	5,650,958	Jul.
22, 1997		

Claims 1, 2 and 4-7 stand rejected under 35 U.S.C. § 102(e) as being anticipated by Gallagher. Rather than repeat the arguments of Appellants and Examiner, we refer the reader to the

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Appellants' Brief¹ and Examiner's Answer² for the respective details thereof.

OPINION

With full consideration being given the subject matter on appeal, the Examiner's rejection and the arguments of Appellants and Examiner, for the reasons stated *infra*, we will reverse the Examiner's rejection of claims 1, 2 and 4-7 under 35 U.S.C. § 102 as being anticipated by Gallagher.

In Argument, Appellants assert that the claims on appeal specifically require that two insulating layers exist between the first and second magnetic conductive layers. Brief at page 5. Referencing Gallagher's Fig. 4D, reproduced below, Appellants argue that Gallagher only discloses and fairly suggests one insulating layer between the magnetic metal layers 10 and 30 and that is layer 20. Brief at page 5.

¹ Appellants filed a Main Brief On Appeal ("Brief") on June 14, 1999. Appellants subsequently filed a Reply Brief on September 8, 1999.

² The Examiner, in response to Appellants' Brief, mailed an Examiner's Answer on July 2, 1999.

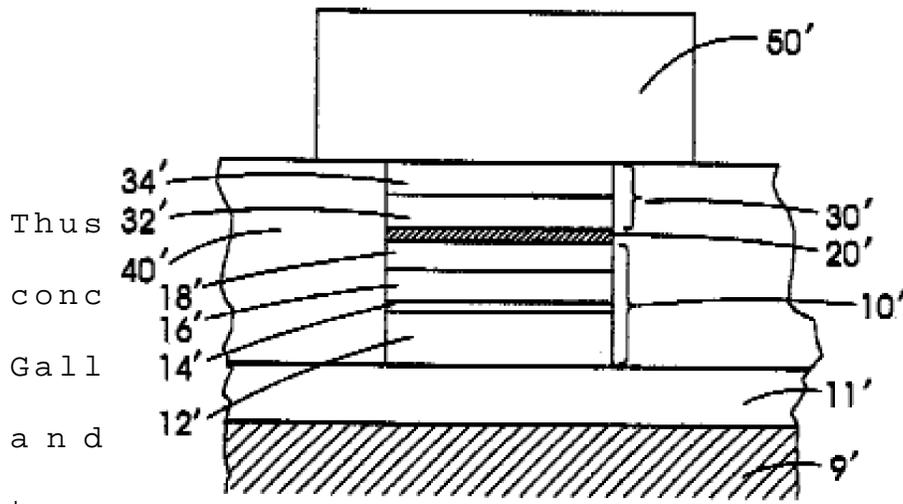


FIG. 4D

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of the insulating layer between the magnetic metal layers 10 and

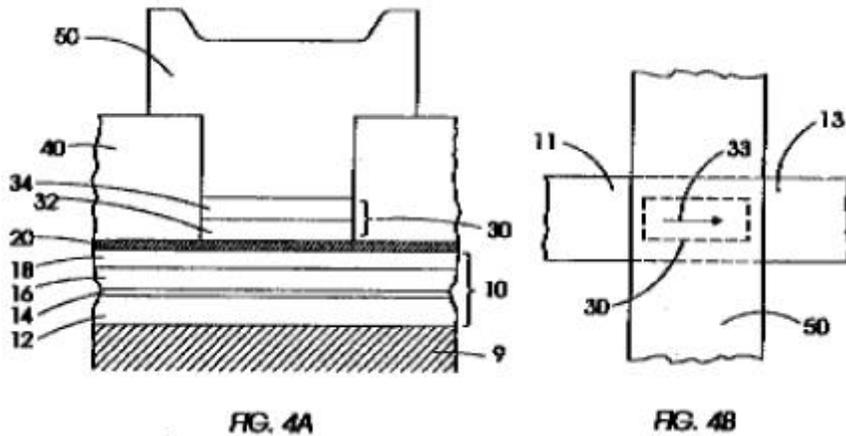
30 by use of a second insulating layer between the magnetic layers of the junction.

Moreover, Appellants state that the claims require that the surface area of the contact area of the second metal magnetic layer and the first insulating layer be no greater than $1 \times 10^{-9} \text{m}^2$.

Brief at page 5. However, Appellants conclude that Gallagher contemplates contact areas that are much larger than that required by the claims and therefore Gallagher does not fairly disclose or suggest a structure with the claimed small contact area of $1 \times 10^{-9} \text{m}^2$. Brief at page 5.

In response, the Examiner states that Gallagher has exactly what Appellants claim i.e., a tunnel junction device having two magnetic layers with an intervening tunnel insulator and the functional part of the Appellants' claimed device has only one [insulating] layer between two magnetic layers. Examiner's Answer at page 4. The Examiner summarizes that the distinction claimed by Appellants is that "there is a path between the two magnetic layers that can be seen to go through both [insulating] layers." Examiner states that a review of Gallagher's Figures 4A and 4B, shown below, shows that a path exists between the lower magnetic layer 10 and the upper magnetic layer 30 that

passes through both [insulating] layers 30 [20] and 40.
Examiner's Answer at page 4.



Furthermore, with respect to the claimed contact area, Examiner contends that Gallagher clearly states that the area of the upper electrode is 2 microns by 8 microns which is almost two orders of magnitude less than the claimed upper limit. Examiner's Answer at page 4.

"A rejection for anticipation under section 102 requires that each and every limitation of the claimed invention be disclosed in a single prior art reference." *In re Paulsen*, 30 F.3d 1475, 1478-79, 31 USPQ2d 1671, 1673 (Fed. Cir. 1994). In

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addition, the reference must be enabling and describe the applicant's claimed invention sufficiently to have placed it in possession of a person of ordinary skill in the field of the invention. Id. The first step of an anticipation analysis is claim construction. **Helifix Ltd. v. Blok-Lok Ltd.**, 208 F.3d 1339, 1346, 54 USPQ2d 1299, 1303 (Fed. Cir. 2000). It is already well-settled that claim construction includes a review of the claim language and the specification. **See Vitronics Corp. v. Conceptronic, Inc.**, 90 F.3d 1576, 1582-83, 39 USPQ2d 1573, 1576-77 (Fed. Cir. 1996). Ordinary principles of claim construction require that "claim language be given its ordinary and accustomed meaning except where a different meaning is clearly set forth in the specification or where the accustomed meaning would deprive the claim of clarity." **Northern Telecom Ltd. V. Samsung Electronics Co.**, 215 F.3d 1381, 1387, 55 USPQ2d 1065, 1069. In general, the plain language of the claim controls. **See Jackson v. Casio Phonemate, Inc.**, 105 F.2d 858, 875, 56 USPQ2d 1081, 1094. The second step in an anticipation analysis involves a comparison of the construed claim[s] to the prior art. Id.

In construing the claims, we find that the plain language of Appellants' claim 1 requires first and second magnetic layers wherein the second magnetic layer is formed above the first magnetic layer. Referencing Gallagher's Figure 4D, we find that

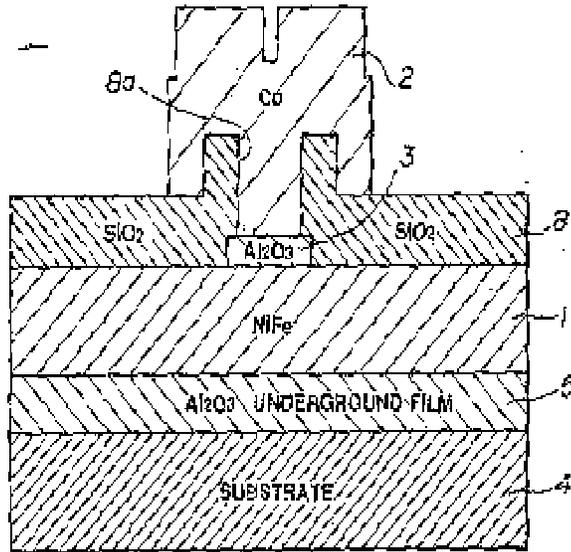


FIG.2

30 wherein the second magnetic layer 30 is formed above the first magnetic layer 10. Appellants' claims further require first 3 and second 8

Gallagher teaches two ferrimagnetic layer stacks 10 and

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insulating layers formed *between* the first 1 and second 2 magnetic metal layers wherein the second insulating layer 8 surrounds the first insulating layer 3, illustrated above by Appellants' Figure 2.

In comparison, we find that Gallagher's Figure 4D discloses an insulating tunnel barrier layer 20' and a surrounding insulating layer 40'. However, we do not find that Gallagher's

two insulating layers 20' and 40' are formed between Gallagher's first and second magnetic metal layers, layers 10 and 30, respectively, as claimed by Appellants. Furthermore, having closely examined Gallagher's Figure 4A and 4B, shown **supra**, we are unable to discern any path that passes from the lower magnetic layer 10 through the insulating layers 20 and 40 to the upper magnetic layer 30.

Addressing now the claim requirement that the first insulating layer in contact with the second magnetic layer be less than $1 \times 10^{-9} \text{m}^2$, we note that Gallagher teaches a contact area of 2 Fm by 8 Fm. Gallagher at column 6, lines 59-60 references the top junction electrode 30 stating, "This electrode was 8 Fm long in the easy axis direction and 2 Fm wide in the hard axis direction." We calculate this area to be 16Fm^2 , at least two orders of magnitude greater than $1 \times 10^{-9} \text{m}^2$. Again, at column 5, lines 1-4, Gallagher discloses "The MTJ top electrode stack 30 is an 8 nm Co/20 nm Pt stack (layers 32 and 34, respectively) having a cross-sectional area of a few Fm^2 or less." These two Gallagher passages clearly indicate that

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Gallagher teaches a contact area that is greater than Appellants' claimed $1 \times 10^{-9} \text{m}^2$.

In summary, Gallagher does not teach Appellants' claimed limitations which recite:

first and second insulating layers formed between the first and second magnetic metal layers wherein the second insulating layer surrounds the first insulating layer and a surface area of the first insulating layer in contact with the second magnetic metal layer is less than $1 \times 10^{-9} \text{m}^2$.

Therefore, Gallagher cannot anticipate Appellants' claims. Accordingly, we reverse the Examiner's rejection of claims 1, 2 and 4-7 under 35 U.S.C. § 102 as being anticipated by Gallagher.

REVERSED.

	KENNETH W. HAIRSTON)	
	Administrative Patent Judge)	
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PATENT)	
	MICHAEL R. FLEMING)	APPEALS AND
	Administrative Patent Judge)	
INTERFERENCES)	

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