IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE

MAGSIL CORP., et al.	:	CIVIL ACTION
	:	
v.	:	
	:	
SEAGATE TECHNOLOGY, et al.	:	NO. 08-940

MEMORANDUM

Bartle, C.J. November 16, 2010

Plaintiffs MagSil Corporation and Massachusetts Institute of Technology have sued Hitachi Global Storage Technologies Inc., Hitachi America Ltd., Hitachi Data Systems Corporation, and Shenzhen ExcelStor Technology, Ltd. (collectively "defendants") for infringement of U.S. Patent No. 5,629,922 (the "'922 patent"), entitled "Electron Tunneling Device Using Ferromagnetic Thin Films."

During a claim construction hearing on February 4, 2010, the parties presented their positions on the meaning of certain terms used in claims 1, 23, and 29 of the '922 patent. On March 1, 2010, the court issued a Memorandum defining these terms, including a phrase containing the word "reverses." Defendants now move for a clarification of the definition of "reverses."

I.

The '922 patent describes a device, called a junction, in which electric current is passed through at least two

electrodes separated by thin layers of insulating material. Each of the electrodes has a magnetization direction, and the electrical resistance exhibited by the current flowing between the electrodes depends on the relative alignments of the electrodes' magnetization directions. The junction's resistance is minimized when the electrodes' magnetization directions are parallel and maximized when the magnetization directions are antiparallel,[1] that is, offset by 180 degrees. A magnetic field can be applied to the junction to rotate the magnetization direction of one or more of the electrodes, thus changing the junction's total resistance. The patent contemplates utilizing modulations in the junction's electrical resistance to create data storage systems such as those used in computer hard drives.

The text of independent claims 1 and 23, in which the word "reverses" appears, is as follows:

> 1. A device forming a junction having a resistance comprising:
> a first electrode having a first magnetization direction,
> a second electrode having a second magnetization direction, and
> an electrical insulator between the first and second electrodes, wherein applying a small magnitude of electromagnetic energy to the junction **reverses** at least one of the magnetization directions and causes a change in the resistance by at least 10% at room temperature.

'922 patent at 8:43-54 (emphasis added).

---

1. In physics, "antiparallel" means "parallel but oppositely directed" and is a term often used to describe vectors. WEBSTER'S THIRD NEW INTERNATIONAL DICTIONARY 95 (1986).

> 23. A memory device for storing binary data comprising:
> a movable read-write sensor head comprising two trilayer devices, each having a junction with a resistance, separated by a gap, wherein each device comprises:
> a first film layer having a first magnetization direction,
> a second film layer having a second magnetization direction, and
> an electrical insulator layer between the first and the second film layers, wherein applying a small magnitude of electromagnetic energy to the junction **reverses** at least one of the magnetization directions and causes a change in the resistance by at least 10% at room temperature.

Id. at 10:25-37 (emphasis added).

During the Markman hearing, the parties agreed "reverses" did not have a specialized meaning to those skilled in the relevant art. See Markman v. Westview Instruments, Inc., 517 U.S. 370 (1996). Defendants insisted only a 180-degree change in an electrode's magnetization direction constituted a reversal within the meaning of the claim language. Plaintiffs countered that the word meant simply "moving ... towards a contrary direction or tendency." Plaintiffs admitted that "reverses" does not mean "any" change in direction, but they declined to state exactly how many degrees an electrode's magnetization direction must rotate to reverse. Both parties agreed, however, that a one-degree shift in magnetization direction is not a reversal.

Following the hearing, the court defined the phrase "reverses at least one of the magnetization directions" to mean "a turning or change of the magnetization direction of at least one of the electrodes or film layers, towards an opposing

alignment, to such a degree as necessary to achieve at least a 10% change in resistance." The court's claims construction Memorandum explained that a reversal is not limited to a 180-degree shift in magnetization direction because such a shift merely maximizes the resistance the junction can generate and the claim language does not require the junction to operate only at maximum resistance. The court recognized a rotation in magnetization direction of less than 180 degrees may be able to generate a 10% resistance change and still constitute a reversal.

II.

Following defendants' motion for clarification, the court heard further oral argument on the meaning of "reverses" as it is used in claims 1 and 23, the two independent claims still at issue. Although "reverses" is a common, non-technical word, the parties have advanced two conceptually distinct meanings of "reverses." Both meanings are consistent with common parlance and the court's construction requiring reversal to be "a turning or change ... towards an opposing alignment."

Plaintiffs argue what we will call the "pendulum" theory of reversing. Plaintiffs maintain that an object "reverses" once it begins to move from its farthest reach to the left toward its farthest reach to the right, and vice versa. For example, the pendulum on a clock reverses by repeatedly traveling a certain arced distance to the left, returning to center, then traveling an equal arced distance to the right. Under this theory, the object may "reverse" by traversing a total arc of

only 10, 20, or 30 degrees. By logical extension, a reciprocating movement 1 degree east and west of due north, covering an arc of only 2 degrees, would be a reversal. Plaintiffs expressly disclaim that so small a motion is a reversal, but taken to its logical conclusion, the "pendulum" theory would include a tiny degree change as a "reversal."

Defendants propose what we will call the "measured-angle" theory of reversing. Defendants contend that the patent uses "reverses" to describe the relative positions of a rotating object and a fixed object. Following closely from the patent language, defendants' theory begins with both objects in parallel orientations. One object rotates, and the angle created by the orientations of the rotated object and the fixed object determines whether a reversal has occurred. One way to visualize defendants' theory is to imagine a clock on which the hour hand is fixed in place at the 12 o'clock position while the minute hand is also pointed at the 12 but moves freely. Initially, defendants insisted that "reversal" required a full 180-degree angle, that is, the minute hand must point to the 6 on the clock. Now, defendants simply contend that a reversal must create an angle of at least 90 degrees, that is, the minute hand must point to at least the 3 on the clock. Defendants maintain that the 90-degree threshold is necessary to ensure the rotating object's resulting orientation is at least as close to antiparallel as it is to parallel, which, to continue the example, means the clock's minute hand must be at least as close to the 6 as to the 12.

III.

These conflicting conceptions have persuaded the court that its definition of "reverses" requires further clarification. When parties dispute the meaning of familiar words or phrases in patent claims, the court must discern the inventor's intended meaning. O2 Micro Int'l, Ltd. v. Beyond Innovation Tech. Co., Ltd., 521 F.3d 1351, 1358-63 (Fed. Cir. 2008). In O2 Micro, the Court of Appeals for the Federal Circuit found the district court erred in not resolving the parties' dispute about whether the phrase "only if" was subject to exceptions. The Court of Appeals held that a district court cannot rely on a term's common meaning if the "term has more than one 'ordinary' meaning or when reliance on a term's 'ordinary' meaning does not resolve the parties' dispute." Id. at 1361. Similarly, the Court of Appeals found a district court improperly allowed a jury to interpret the word "reciprocating" in a case in which the parties disagreed about whether the word required a repetitive motion only in a horizontal plane or whether "reciprocating" permitted travel back and forth along a curved path. Va. Panel Corp. v. MAC Panel Corp., 133 F.3d 860, 863, 865-66 (Fed. Cir. 1997).

The court cannot delegate to the jury the duty of choosing between the parties' proposed meanings. Id. Because the court's current construction of "reverses" has not resolved the parties' dispute, we once again attempt to clarify the meaning of the word as used in the '922 patent. In revisiting the meaning of "reverses," the court applies the claim-

construction principles set forth in its March 1, 2010 Memorandum.

We begin with the language of the patent itself. In the Background section of the patent's specification, the inventors state that the current flowing through the junction "depends on the relative magnetization ... direction" of the electrode layers and that junction resistance "is higher when the magnetization of one [electrode] is antiparallel to that of the other [electrode] and lower when they are parallel to one other." '922 patent at 1:26-31. The inventors acknowledge that the prior art "proposed an explanation for the change in junction resistance with change in magnetization direction." Id. at 1:33-35. The Background also explains that practitioners in the relevant field generally understand that changes in junction resistance are measured using a formula that compares resistance when the electrodes are parallel with resistance when the electrodes are antiparallel. Id. at 1:35-47.

In the Summary of Invention section, the inventors explain that the term "coercive force" refers to the amount of magnetic energy necessary to "reverse" a ferromagnetic electrode's magnetization direction. Id. at 2:28-30. The terms "parallel" and "antiparallel" are not used.

In the Preferred Embodiment, the inventors discuss Figure 3A, a graph included in the patent. The inventors explain, "In Fig. 3A, it is shown that as the magnetic field decreases from a high value, [junction resistance] increases

slowly. Upon reversing the field, [junction resistance] begins to increase sharply, resulting in a resistive peak (see the right peak on the bottom of FIG. 3A)." Id. at 5:23-26. This is the relevant portion of Figure 3A:

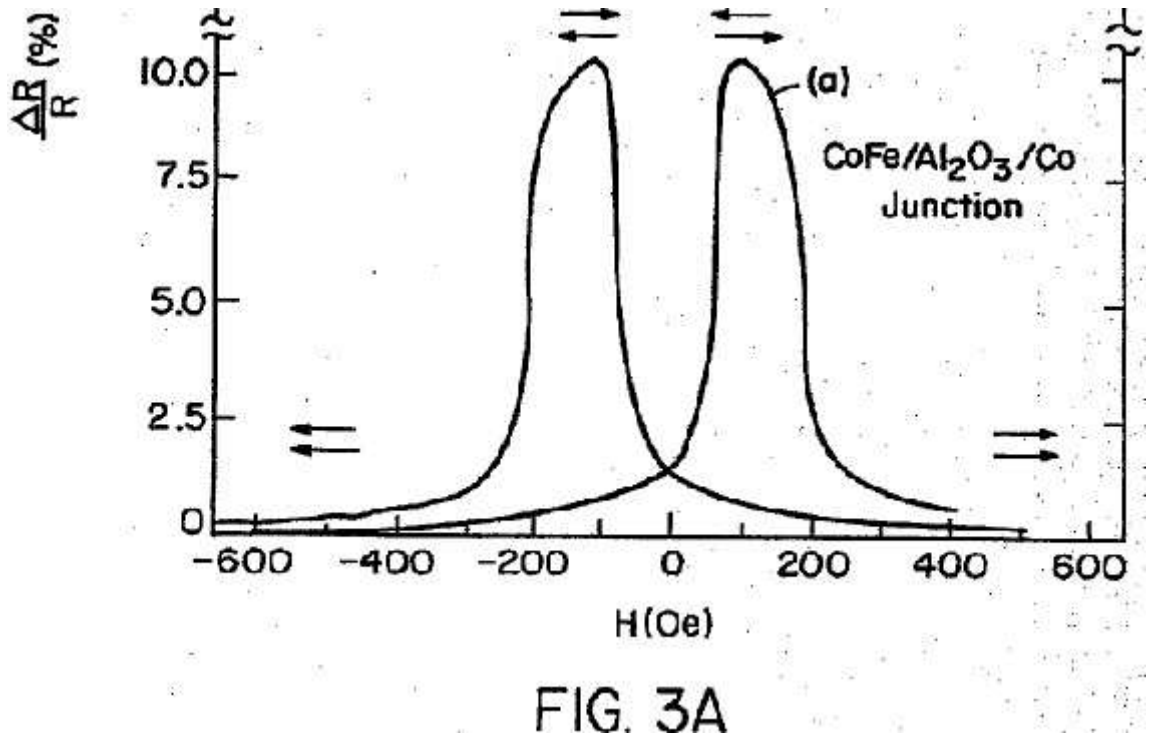

FIG. 3A

Later in the Preferred Embodiment, the inventors say:

> The field dependence of tunnel resistance in ... junctions as shown in FIG. 3A can be explained qualitatively based on earlier models. At high fields (beyond the [coercive field magnitudes] of the [electrodes]), the magnetization of the two [electrodes] are fully saturated and aligned in the same field direction. The tunneling probability and, hence, the current is high. As [the applied magnetic field] decreases toward zero and changes sign, the magnetization of the [electrode] with lower [coercive field magnitude] ... **reverses** its direction whereas

> for the film which has the higher value of [coercive filed magnitude]..., the magnetization direction ... remains the same. In this field range, the magnetization orientation of the two [electrodes] are antiparallel to each other. At this point, the tunneling probability is lowered. The resistance increases rapidly, and accordingly, the tunnel current drops. Upon raising the field further in the reverse direction, [magnetization direction] in the second film also **reverses**, becoming parallel to the first film. This leads once again to higher tunneling probability and current.

Id. at 6:25-42 (emphases supplied).

Thus, the inventors used the word "reverse" in each section of the patent. Only in the preferred embodiment and background sections, however, do the inventors specifically reference parallel and antiparallel alignments. Again, the terms "parallel" and "antiparallel" are not employed in the Summary of Invention or in the claims at issue.

The Court of Appeals has indicated that the specification is "the single best guide to the meaning of a disputed term." Phillips v. AWH Corp., 415 F.3d 1303, 1315 (Fed. Cir. 2005) (quoting Vitronics Corp. v. Conceptronic, Inc., 90 F.3d 1576, 1582 (Fed. Cir. 1996)). That is the case here. The inventors' use of "reverses" (and variations of the word) throughout the '922 patent makes clear that the word was used to describe the electrodes' relative magnetization directions and was chosen to communicate a significant rotation including but

not limited to the 180-degree rotation from parallel to antiparallel. The court's construction must reflect this usage.

In the '922 patent, the preferred embodiment and background sections connect the word "reverses" to parallel and antiparallel alignments, but significantly, the Summary of Invention and, most importantly, the claims do not mention parallel or antiparallel alignments or a 180-degree change in position. We read the background of invention and preferred embodiment as simply providing one possible embodiment when they use the terms "parallel" and "antiparallel." Accordingly, we reiterate that "reverses" does not require the electrodes' magnetization directions to achieve a completely parallel or antiparallel alignment. To do so would impermissibly import into the claims numerical limits discussed in the preferred embodiment. See Acumed, LLC v. Stryker Corp., 483 F.3d 800, 804-806 (Fed. Cir. 2007); Nystron v. TREX Co., Inc., 424 F.3d 1136, 1146-48 (Fed. Cir. 2005); Phillips, 415 F.3d at 1309, 1324-25; Unitherm Food Systems, Inc. v. Swift-Eckrich, Inc., 375 F.3d 1341, 1351-52 (Fed. Cir. 2004), rev'd on other grounds, 546 U.S. 394 (2006).

The court is persuaded that defendants' proposed construction with a slight modification is correct. We conclude that the term "reverses" encompasses a change in direction of the

magnetization direction which is greater than 90 degrees. Only when an electrode's magnetization direction rotates more than 90 degrees does the magnetization direction become closer to antiparallel than to parallel in relation to its original orientation. Thus, defining "reverses" to include only rotations of greater than 90 degrees captures the widest range of relative magnetization directions that the claim language can be read to embrace. Allowing "reverses" to describe rotations of 90 degrees or less would render the word synonymous with other less specific words such as "change," "rotate," or "deviate." These words were available to the inventors, but those were not the words the inventors chose.

Plaintiffs raise two primary objections to this construction. First, plaintiffs assert the "pendulum" theory of reversal is consistent with a common meaning of "reverses" and the court's prior construction. Plaintiffs suggest a jury could find that an electrode's magnetization direction rotating 15 degrees to either side of a central axis is a reversal. The jury, however, cannot determine which sense of "reverses" the inventors intended to convey. That is the province of this court. Markman v. Westview Instruments, Inc., 517 U.S. 370, 384 (1996); O2 Micro Int'l, Ltd. v. Beyond Innovation Tech. Co., Ltd., 521 F.3d 1351, 1358-63 (Fed. Cir. 2008). Further,

plaintiffs' "pendulum" theory is inconsistent with the '922 patent. No patent text suggests the inventors intended "reverses" to describe movements equidistant from a central axis or a minimal change in degree. Moreover, the "pendulum" theory does not reflect the inventors' association between "reverses" and magnetization directions achieving parallel and antiparallel alignments.

Second, plaintiffs contend this construction of "reverses" imports a numerical limitation into the claims not stated in the patent. Plaintiffs suggest this is even less permissible than limiting a claim term to a numerical range stated in the specification. This argument misses the mark. Construing "reverses" to mean a rotation of greater than 90 degrees is not based on numerical examples found in the specification. Although the court's construction uses numbers, these numbers arise from an application of a meaning to a particular device and is merely another way of saying that the change in direction must be closer to the antiparallel alignment than to the parallel alignment. Because the vector at issue rotates in a circular fashion, defining "reverses" in terms of degrees seems to be the clearest means to communicate to the jury how "reverses" was used in the '922 Patent.

Finally, the parties agree that the court should eliminate the phrase "to such a degree as necessary to achieve at least a 10% change in resistance" as part of the construction of "reverses" as used in claims 1 and 23. We will accept the parties' agreement and delete it from the court's construction.

Accordingly, the court will grant defendants' motion for clarification and construe "reverses at least one of the magnetization directions" to mean "at least one of the magnetization directions rotates more than 90 degrees toward an opposing alignment."