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opinion in support of the decision being entered today (1) was not written for publication in a law journal and (2) is not binding precedent of the Board.

Paper No. 17

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

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Ex parte YASUO SASAKI,
MUNEKATSU FUKUYAMA, and
KAZUO KURIHARA

_____

Appeal No. 96-0517
Application 08/264,473[1]

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HEARD OCTOBER 14, 1998

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Before HAIRSTON, KRASS, and MARTIN, Administrative Patent Judges.

MARTIN, Administrative Patent Judge.

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[1] Application for patent filed January 26, 1994, as a division of Application Serial No. 08/146,708, filed November 1, 1993. Appellants claim the benefit under 35 U.S.C. § 119 of the following applications:

P04-293307	Japan	October 30, 1992
P05-058675	Japan	March 18, 1993
P05-097150	Japan	March 31, 1993

DECISION ON APPEAL

This is an appeal under 35 U.S.C. § 134 from the examiner's rejection of claims 14-18, all of pending application claims, under 35 U.S.C. § 103.[2] We reverse.

The invention, a playback circuit for a magnetic head of the magneto-resistive (MR) type, is said[3] to be an improvement over the prior art playback circuit shown in appellants' Figure 22, which is described in appellants' specification at 2:24 to 3:20. This playback circuit includes a first-stage amplifier transistor 22 having its collector connected to one input of a differential-input gm amplifier 24, which functions as a voltage-to-current converting amplifier. The other input of gm amplifier 24 is connected to a source 25 of reference potential. The output of gm amplifier 24 is connected to one side of a capacitor 26, the other side of which is connected to ground. The output of gm amplifier 24 is also connected in a feedback path to the base of transistor 22. In order to conserve power, the power for the playback circuit is turned

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[2] The final rejection of claims 15 and 16 under § 112 was withdrawn in the Answer at 3.

[3] Brief at 2-3.

off during each recording operation (represented by signal level 0 in Figure 23(A)), and the power for the recording circuit (not shown) is turned off during each playback operation (level 1 in Figure 23(A)) -- see Spec. at 3:21 to 4:10. If the rise or decay time of first stage amplifier 22 differs from that of gm amplifier 24, current spikes Ic1 and Ic2 flow through capacitor 26, as shown in Figure 23(D) (Spec. at 4:11 to 5:17). This has the effect of delaying the point in time when the voltage across capacitor 26 is stable enough to permit commencement of the next type of operation (Spec. at 5:17-20).

Appellants' specification notes that while it is possible to shorten the charging/discharging time by increasing the gm value of amplifier 24, that would also have the undesirable effect of increasing the cut-off frequency of the low pass filter (defined by the gm value of the gm amplifier and the capacitance value of capacitor 26[4]), thereby disabling effective dc feedback (Spec. at 5:21-25). Appellants disclose a number of other techniques for dealing with the capacitor

[4] Spec. at 3:9-13.

charging/discharging problem without disabling effective dc feedback, only one of which techniques is before us in this appeal.[5]

Referring to appellants' Figure 14, the charging/discharging time for capacitor 26 is reduced in accordance with the claimed invention by replacing the voltage-to-current amplifier 24 with a voltage-to-current converting amplifier 70 that has an exponential input/output characteristic, shown in the form of a voltage-to-current conversion stage 71 connected in series with an exponential current amplification stage 72 (Spec. at 22:23 to 23:10). Curves a-c in Figure 15 represent the exponential relationship between input voltage Vi and output current Io for three different types of amplifiers, while curves in Figure 16 represent the relationship between input voltage Vi and the transconductance gm for those amplifiers (Spec. at 23:11-22).

Claim 14, the sole independent claim, reads on Figure 14 as follows:

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[5] Application Serial No. 08/447,901, involved in Appeal No. 97-3918, claims another of these techniques.

> 14. A playback circuit for a magnetic head comprising
>
> an initial-stage amplifying means [base-grounded transistor amplifier 22] for amplifying an output signal from a magneto-resistive head,
>
> voltage-to-current converting amplifying means [70] supplied with an output signal of said initial-stage amplifying means, said voltage-to-current converting amplifying means having input/output characteristics represented by an exponential function,
>
> a capacitor [26] connected to an output terminal of said voltage-to-current converting amplifying means, and
>
> feedback means for feeding back an output of said voltage-to-current converting amplifying means to an input side of said initial-stage amplifying means.

This claim reads in similar fashion on the alternative embodiment shown in Figure 19, which replaces the base-grounded transistor 22 of Figure 14 with an emitter-grounded transistor 22 (Spec. at 26:16-18). The circuits of Figures 14 and 19 reduce the capacitor charging/discharging as follows:

> [F]or the starting of the amplifier operation by turning on of the power source as mentioned above, or the head switching, the input voltage Vi is increased and the transconductance gm of the voltage-current converting amplifier (gm amplifier) 70 is increased to enable the quick charging/discharging of the capacitor 26, whereas, for usual playback or the steady-state operation, the input voltage Vi is decreased to lower the transconductance gm. Besides, since changes in transconductance gm are small in the vicinity of Vi = 0 under steady state condition, only small changes in the frequency response are incurred even if more or less

offsets are produced in the operating point for some reason or other. [Spec. at 25:14-23.]

As evidence of the obviousness of the subject matter of claims 14-17, the examiner cites the admitted prior art shown in appellants' Figure 22 in view of

Feldt	5,200,655	April 6, 1993 (filed June 3, 1991)

With respect to claim 18, the examiner additionally cites

Asazawa	5,150,076	Sept. 22, 1992 (filed June 24, 1991)

The prior art playback circuit shown in appellants' Figure 22 satisfies all of the limitations of claim 14 except that the voltage-to-current converting means (i.e., gm amplifier 24) is not disclosed as having an exponential input/output function. For this feature, the examiner cites Feldt, which discloses temperature-independent exponential amplifiers which may be used, for example, to convert linear-scaled signals to decibel-scaled signals in communication systems (col. 1, lines 6-21). The examiner specifically relies on Feldt's Figure 3, which shows a voltage-to-current converter 108 connected to an exponential amplifier circuit

160 via a temperature compensation amplifier circuit 118. In the final Office action, the examiner stated (at 5) that

> it would have been obvious to one having ordinary skill in the art to have applied Feldt's teachings to applicant[s'] admitted prior art. The motivation for this modification would have been to convert linear scaled signals into decibel scaled signals by means of exponential amplification. Gain control circuitry typically utilizes signals which are scaled in terms of decibels. Therefore, exponential conversion would permit more accurate gain control.

In their brief (at 6), appellants argued that nothing in Feldt suggests using an exponential characteristic to reduce the time delay in switching between recording and reproducing modes in the reproducing circuit for an MR head and asserted that the only connection between Feldt and the present invention is hindsight based on their disclosure. The examiner responded in the Answer (at 4-5) by offering a different rationale in support of the rejection.[6] The new rationale is that Feldt teaches how to avoid the problem associated with increasing the gm value in the Figure 22 circuit to shorten the charging/discharging time, i.e., the

[6] Accordingly, we will treat the initial rationale, which in any event is unpersuasive for the reasons given by appellants, as withdrawn.

increase in the cut-off frequency of the low pass filter and consequent disabling of effective dc feedback (Spec. at 5:21-25). The examiner, characterizing this as an "admitted problem" (Answer at 4:21), argues that Feldt "provides for rapid switching of the voltage to a transistor, indicating that the same circuit would charge and discharge a capacitor quickly" (Answer at 5:7-9). More particularly, the examiner contends the exponential amplifier 160 in Feldt's Figure 5 "allow[s] for fast charging and discharging of [its output] node 270" (Answer at 5:18-19). Even assuming for the sake of argument that the examiner is correct to characterize the unwanted increase in cut-off frequency associated with increasing the gm value in the prior art circuit as an "admitted problem," the examiner's position is untenable because Feldt's node 270 is not disclosed as being connected to a capacitor, let alone for the purpose of allowing it to be quickly charged and/or discharged. As a result, the examiner's new rationale also appears to be a hindsight combination based on appellants' disclosure. The rejection of claim 14 for obviousness over the admitted prior art in view of Feldt is therefore reversed, as is the rejection of

dependent claims 15-17, which stand rejected over the same prior art.

Asazawa does not cure the above deficiency. Therefore, the rejection of claim 18 for obviousness over the admitted prior art in view of Feldt and Asazawa is also reversed.

REVERSED

KENNETH W. HAIRSTON Administrative Patent Judge	)
ERROL A. KRASS Administrative Patent Judge	) BOARD OF PATENT) APPEALS AND) INTERFERENCES
JOHN C. MARTIN Administrative Patent Judge	)

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