Paper No. 36

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte BRUNO CARRARA,
MICHEL PECOT,
and PHILIPPE TOURTIER

Appeal No. 2000-0519
Application 08/800,627[1]

HEARD: March 15, 2001

Before BARRETT, FLEMING, and LALL, Administrative Patent Judges.

BARRETT, Administrative Patent Judge.

DECISION ON APPEAL

[1] Application for patent filed February 14, 1997, entitled "Discreet Radar Detection Method And System Of Implementation Thereof," which is a continuation of Application 08/432,068, filed May 1, 1995, now abandoned, which claims the foreign priority benefit under 35 U.S.C. § 119 of French Application 94 05318, filed May 2, 1994.

This is a decision on appeal under 35 U.S.C. § 134 from a final rejection of claims 1, 4-9, and 11-15. Claims 2, 3, and 10 have been canceled.

We reverse.

BACKGROUND

It was known to use analog television signals as illuminators of opportunity in bistatic[2] radar systems. The disclosed invention relates to a discreet radar detection method and system which uses a digital television signal. The transmitted signal is of the orthogonal frequency division multiplexed (OFDM) type where the waveform is defined by the weighted sum of M orthogonal carriers (specification, p. 4). Unlike the case for digital transmission, where the weighting coefficients carry the information to be transmitted on period T_m, the coefficients in Appellants' invention are chosen to be fixed on N successive periods T_m, so as to confer good radar behavior on the resultant signal (specification, p. 4). The received

[2] "Bistatic radar" is defined as "[a] radar using antennas at different locations for transmission and reception." The New IEEE Standard Dictionary of Electrical and Electronics Terms (IEEE, Inc. 5th ed. 1993).

signal is matched-filter processed during an integration time of N periods and is subjected to Doppler and distance processing.

Claim 1 is reproduced below.

> 1. A method of discrete [sic, discreet] radar detection comprising the steps of:
>
> at transmission, producing an encoded waveform, from a multicarrier signal, repeated on at least N periods, N being greater than or equal to 1, wherein said multicarrier signal is an orthogonal frequency divisional multiplexed (OFDM) signal with orthogonal carriers; and
>
> at reception, carrying out a matched filtering operation, a Doppler processing, and a distance processing of received signals.

The Examiner relies on the following prior art:

Hulyalkar et al. (Hulyalkar) 5,291,289 March 1, 1994

Griffiths et al. (Griffiths), Television-based bistatic radar, IEE Proceedings, Vol. 133-F, No. 7, December 1986, pp. 649-57.

Hershey et al. (Hershey), An Adjunct Tracking System for Low Altitude Sector Aircraft, IEEE Trans. on Broadcasting, Vol. 40, No. 1, March 1994, pp.44-49.

After the first Appeal Brief (Paper No. 23) was filed, the Examiner reopened prosecution (Paper No. 24) and entered a new ground of rejection under § 103 over "the articles to

Hershey et al when taken in view of Griffiths et al and the patent to Hulyalkar et al ('289)" (Paper No. 24, p. 3). Appellants filed a Supplemental Appeal Brief (Paper No. 25) (pages referred to as "SEA__"), as they were entitled to do because the claims had been twice rejected. The Examiner entered an Examiner's Answer (Paper No. 26) (pages referred to as "EA__") rejecting the claims under § 103 over "the articles to Hershey et al or Griffiths et al when taken in view of the patent to Hulyalkar et al ('289)" (EA4). Appellants filed a Reply Brief (Paper No. 28) (pages referred to as "RBr__"). Examiners are not permitted to file a supplemental examiner's answer unless the application is remanded by the Board for such purpose. 37 CFR § 1.193(b)(1) (1999).

As noted by Appellants in their Reply Brief, the Examiner's statement of the rejection in the Examiner's Answer is confusing because it is different from the rejection in the Action of March 15, 1999, Paper No. 24 (RBr1-2). We agree with Appellants' conclusion that the rejection of Paper No. 24 appears to be the more accurate

one (RBr2) and treat the rejection as being over Hershey, Griffiths, and Hulyalkar.

Claims 1, 4-9, and 11-15 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Hershey when taken in view of Griffiths and Hulyalkar.

OPINION

Hershey acknowledges that Griffiths explored the issue of using television broadcast signals as a fortuitous illuminators of opportunity for a bistatic radar system (p. 45, referring to reference [4]). Griffiths discloses that signal processing in a television-based bistatic radar may be assisted by modifying the television signal to introduce a pulsed signal which can achieve something more akin to a normal radar waveform (p. 654, first full para.), which teaching is recognized by Appellants (specification, p. 1, lines 31-33). Griffiths discloses Doppler and range signal processing (pp. 655-657).

Hershey describes an experiment by the Institute of Telecommunication Sciences (ITS) wherein "the ITS experimenters first insinuated a 127 bit pseudonoise (PN) sequence, and its copy, for a total of 254 bits, into a

Vertical Blanking Interval (VBI) line of a commercial TV broadcast, both VHF and UHF" (footnote omitted) (p. 45). The signal was synchronously demodulated and the in-phase and quadrature components recovered (p. 46). The components were crosscorrelated against the PN sequence and a function of the results was plotted (p. 46). "Multipath signals are indicated by peaks in the crosscorrelations" (p. 46) along a time axis (figures 3 and 4). Hershey discloses a bistatic radar based on this example, i.e., Hershey "consider[s] some of the key parameters of a TV-base bistatic radar using a PN sequence in a single VBI line" (p. 47). The system includes matched filters (p. 47; figure 7) and carries out distance processing (the position of the target in three dimensional space) using time difference of arrival (p. 46). Although Doppler processing is not expressly discussed in Hershey, one of ordinary skill in the art would have been motivated to perform Doppler processing in Hershey in view of the teachings in Griffiths.

Thus, both Hershey and Griffiths expressly teach using a modified television signal with a repeating sequence (the PN sequence and its copy on a VBI line in Hershey and the

pulsed signal in Griffiths) to improve the radar detection signal. However, both Hershey and Griffiths disclose a conventional analog amplitude modulated television signal. The Examiner finds that Hulyalkar teaches that multicarrier modulation using multicarrier signals of the OFDM type is a well known technique of transmitting television signals that produces an encoded signal which has the advantages of greater immunity to noise and interference (EA5; see Hulyalkar, col. 2, lines 42-63). The Examiner concludes that it would have been obvious to transmit the signals of Hershey or Griffiths using an encoded multicarrier television signal as taught by Hulyalkar for the reasons noted in Hulyalkar (i.e., greater immunity to noise and interference) (EA5).

The problem with the Examiner's reasoning, which is not clearly addressed in the briefs, but which was brought out at the oral hearing, is that merely transmitting the signals of Hershey or Griffiths using OFDM as taught by Hulyalkar does not produce an encoded waveform from a multicarrier signal which acts as a radar signal. The repeated signals in the analog waveform of Hershey or Griffiths would be

converted into serial data and then into parallel data for transmission by OFDM. The repeated signals in the waveforms just become data spread out over the carriers in some unknown way and no longer be a repeated pattern. What is necessary is adjusting the weighting coefficients c_k of the M orthogonal carriers so they are fixed on N successive periods as disclosed in the specification, page 4, line 22 to page 5, line 2. That is, the carriers act as radar pulses. Claim 1 requires "an encoded waveform, from a multicarrier signal, repeated on at least N periods, N being greater than or equal to 1, wherein said multicarrier signal is an orthogonal frequency divisional multiplexed (OFDM) signal with orthogonal carriers," which requires the multicarrier signal to be encoded (impliedly by selection of the coefficients) and repeated; claim 9 contains a similar limitation. There is no reasoning why it would have been obvious to encode the OFDM signal of Hulyalkar by keeping the coefficients invariant for at least two successive periods in view of Hershey and Griffiths. The issue is not simply whether it would have been obvious to use a known alternative type of television transmission scheme such as

OFDM for the analog television transmission scheme in

Hershey and Griffith.

For these reasons, we conclude that the Examiner has failed to establish a prima facie case of obviousness with respect to claims 1, 4-9, and 11-15. The rejection of claims 1, 4-9, and 11-15 is reversed.

REVERSED

LEE E. BARRETT Administrative Patent Judge	)	
MICHAEL R. FLEMING Administrative Patent Judge	)	BOARD OF PATENT APPEALS AND INTERFERENCES
PARSHOTAM S. LALL Administrative Patent Judge	)	

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