

**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opinion in support of the decision being entered today (1) was not written for publication in a law journal and (2) is not binding precedent of the Board.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. 15

UNITED STATES PATENT AND TRADEMARK OFFICE

---

BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES

---

Ex parte CLIFTON QUAN

---

Appeal No. 96-2408  
Application No. 08/246,538<sup>1</sup>

---

ON BRIEF

---

Before THOMAS, HAIRSTON and KRASS, Administrative Patent Judges.

KRASS, Administrative Patent Judge.

**DECISION ON APPEAL**

---

<sup>1</sup> Application for patent filed May 20, 1994. According to appellant, this application is a continuation of Application No. 07/589,965 filed September 28, 1990, now abandoned.

Appeal No. 96-2408  
Application No. 08/246,538

This is a decision on appeal from the final rejection of claims 13 through 17 and 19 through 21, constituting all the claims remaining in the application.

The invention is directed to an antipodal flared notch radiator with separate transmit and receive ports.

Representative independent claim 21 is reproduced as follows:

21. An integrated antipodal flared notch radiating element for radiating energy into, or receiving energy from, free space, said radiating element having separate, integral transmit and receive connections which are isolated from each other, said integral antipodal flared notch radiating element comprising:

a planar dielectric board having first and second opposed surfaces, the first surface having a first conductive pattern formed thereon, the second surface having a second conductive pattern formed thereon;

wherein said first and second conductive patterns cooperate to define an antipodal slotline adjacent a flared end thereof and a broadside coupled strip transmission line region which transitions into said antipodal slotline, said broadside coupled strip transmission line region formed by first and second conductive strips overlying each other on opposite sides of the dielectric board;

said first conductive pattern further defining first and second microstripline conductors adjacent a receive/transmit port end of said radiating element, said first microstripline conductor comprising a transmit signal connection integrated with said radiating element, said second microstripline conductor comprising a receive signal connection integrated with said radiating element;

said second conductive pattern further defining a ground plane region adjacent said transmit/receive port end of said element and underlying said microstripline conductors, said ground plane region transitioning to said second conductive strip comprising said broadside coupled strip transmission line region; and

a circulator device integrated with said broadside coupled strip transmission line region such that the circulator device is mounted on said dielectric board and includes a terminal connected to one of said conductive strips comprising said broadside coupled strip transmission line region, said circulator device connecting said broadside coupled strip transmission line region to said first microstripline conductor without a balun, and connecting said broadside coupled strip transmission line region to said second microstripline conductor without a balun, said circulator device electrically isolating said first microstripline conductor from said second microstripline conductor at microwave frequencies, said circulator device including a first terminal connected to said first microstripline conductor, a second terminal connected to said first conductive strip comprising said broadside coupled strip transmission line region, and a third terminal connected to said second microstripline conductor.<sup>2</sup>

The examiner relies on the following references:

|                 |           |          |
|-----------------|-----------|----------|
| Nester<br>1985  | 4,500,887 | Feb. 19, |
| Fassett<br>1985 | 4,509,055 | Apr. 2,  |
| Sharma<br>1988  | 4,782,346 | Nov. 1,  |

---

<sup>2</sup> This claim is as presented in the amendment after final (Amendment D) filed August 7, 1995 (Paper No. 11) which was indicated by the examiner in the answer as being entered.



Appeal No. 96-2408  
Application No. 08/246,538

...force said antipodal slotline of said radiating element to operate as a coplanar slotline-type of structure by concentrating fields

is indefinite because the meaning of "slotline-type of structure" is unclear since it has no specifically defined structure in the antenna art. Further, it is the examiner's position that "...by concentrating fields" is indefinite and adds to the confusion of a "slotline-type of structure" because "any slot radiator has a concentration of the electric field, but not necessarily the magnetic field" [answer-page 4].

We will not sustain the rejection of claims 17, 19 and 20 under 35 U.S.C. 112, second paragraph, because we find no confusion caused by the identified claim language. It appears clear, from reference to page 6 of the instant specification, that while the conductor strips of the upper and lower patterns 66 and 64 are not coplanar, the arrangement recited in claim 17 and shown in Figure 4 allows the antipodal slotline of the radiating element to appear as a coplanar slotline structure by operating as such, i.e., as "a coplanar slotline-type of structure." The concentration of the electric fields is what allows such an operation. The claim,

Appeal No. 96-2408  
Application No. 08/246,538

as amended, calls for "concentrating fields." This may be a broader term than the examiner would like, but it is clearly supported at page 6, line 23 of the specification and we find nothing indefinite about the term.

We turn, now, to the rejection of the claims under 35 U.S.C. 103.

We note, initially, that in a decision of March 21, 1994, this Board sustained a rejection under 35 U.S.C. 103 of similar claims over the same three primary references employed herein. However, while similar, the instant claims are amended versions of the previous claims and the instant claims are narrower than those previously before us.

The examiner rejects claims 15, 16 and 21 under 35 U.S.C. 103 over Gazit, Fassett and Lamberty for reasons similar to ours in sustaining the rejection in our earlier decision. However, the claims have been amended. While we had earlier dismissed [see page 6 of the earlier decision] appellant's argument, regarding incorporation of a circulator into a single flared notch radiating element to provide integral transmit and receive connections or ports and that this went against conventional wisdom, as not being commensurate in

Appeal No. 96-2408  
Application No. 08/246,538

scope with the claim language, it is clear that the instant claims now recite an "integrated antipodal flared notch radiating element" and that that element comprises, inter alia, microstripline conductors connecting to transmit and receive ports "integrated" with the radiating element and a circulator device "integrated" with the broadside coupled strip transmission line region.

That is, in our view, the instant claims now make it clear that it is a single flared notch radiating element having all of the claimed elements integrated thereon with which we deal. We agree with appellant that not one of the applied references appears to suggest the incorporation of a circulator device into the radiating element itself in order to provide for separate and isolated transmit and receive ports within the radiating element itself. It appears that, as indicated by appellant at page 13 of the brief, the references all teach that the circulator is connected to a transmit/receive module and not integrated into the radiating element as claimed.

We disagree with the examiner when it is stated in the answer, at page 9, that it is "not an issue of incorporating a

circulator in a single...flared notch radiator." Indeed, that is the issue because this is what is now required by the instant claims<sup>3</sup> and, in our view, the examiner has not made a satisfactory showing of why such a single flared notch radiator would have integrated thereon those elements recited in the instant claims so that the radiating element itself would have separate and isolated transmit and receive ports.

With regard to instant independent claim 17, this claim additionally requires first and second dielectric sheets to sandwich the flared end of the radiating element in order to force the slotline to "operate as a coplanar slotline-type of structure by concentrating fields." While Figure 18 of Sharma, employed by the examiner to teach this claimed feature, may show a "sandwiching" provided by dielectric sheets, these dielectric plates do not force an antipodal slotline structure to operate as a coplanar slotline-type structure, as required by instant claim 17. We find no

---

<sup>3</sup> While the claims do not specifically recite the term "single," it is clear from the claims that we deal with "An integrated antipodal flared notch radiating element" and "the integrated antipodal flared notch radiating element" [emphasis ours], indicating that, indeed, it is a "single" radiating element which is required.

Appeal No. 96-2408  
Application No. 08/246,538

teaching in Nester to remedy this deficiency in Sharma, a deficiency shared by the other applied references.

The examiner's decision rejecting claims 17, 19 and 20 under 35 U.S.C. 112, second paragraph, and claims 13 through 17 and 19 through 21 under 35 U.S.C. 103 is reversed.

**REVERSED**

|                             |   |                 |
|-----------------------------|---|-----------------|
| JAMES D. THOMAS             | ) |                 |
| Administrative Patent Judge | ) |                 |
|                             | ) |                 |
|                             | ) |                 |
|                             | ) |                 |
|                             | ) | BOARD OF PATENT |
| KENNETH W. HAIRSTON         | ) | APPEALS         |
| Administrative Patent Judge | ) | AND             |
|                             | ) | INTERFERENCES   |
|                             | ) |                 |
|                             | ) |                 |
|                             | ) |                 |
| ERROL A. KRASS              | ) |                 |
| Administrative Patent Judge | ) |                 |

bae

Appeal No. 96-2408  
Application No. 08/246,538

S. E. Walters  
Hughes Aircraft Company  
Building C1  
Mail Station A126, P.O. Box 80028  
Los Angeles, CA 90080-0028