LAW OFFICES

HOFGREN, WEGNER, ALLEN, STELLMAN & McCORD

20 NORTH WACKER DRIVE

CHICAGO 60606

TELEPHONE
FINANCIAL 6-1630
AREA CODE 312

AXEL A. HOFGREN
ERNEST A. WEGNER
JOHN REX ALLEN
WILLIAM J. STELLMAN
JOHN B. McCORD
BRADFORD WILES
JAMES C. WOOD
STANLEY C. DALTON
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W. E. RECKTENWALD
J. R. STAPLETON
WILLIAM R. McNAIR
JOHN P. MILNAMOW
DILLIS V. ALLEN
W. A. VAN SANTEN, JR.
JOHN R. HOFFMAN
A. R. OSTRAUSKAS

December 16, 1966

Mr. James J. Costello
Legal Counsel
University of Illinois
258 Administration Building
Urbana, Illinois

RE: UIF v. ET v. JFD

Dear Mr. Costello:

* I enclose a copy of a subpoena with regard to some additional documentary material we wish to examine.

Very truly yours,

Richard S. Phillips

RSP:ag

* Enclosure

cc: Mr. Harold S. Lawler
Mr. Basil P. Mann
Mr. Myron C. Cass
Mr. Robert H. Rines
Mr. I. S. Blonder

CIVIL SUBPOENA TO PRODUCE DOCUMENT OR OBJECT — D. C. Form No. 48 (Rev. 2-67)

United States District Court

FOR THE

THE UNIVERSITY OF ILLINOIS FOUNDATION,
Plaintiff and Counterclaim Defendant,
- v -
BLONDER-TONGUE LABORATORIES, INC.,
Defendant and Counterclaimant,
- v -
JFD ELECTRONICS CORPORATION,
Counterclaim Defendant.

CIVIL ACTION FILE NO. .....

No. 66 C 567

TO: Harold B. Lawler, Business Manager
Department of Electrical Engineering
Electrical Engineering Building
University of Illinois
Urbana, Illinois

YOU ARE HEREBY COMMANDED to ~~appear in the United States District Court for the~~ produce for inspection and ~~District of~~ copying at the offices of Merriam, ~~at~~ Marshall, Shapiro & Klose, ~~in the city of~~ 30 West Adams Street, in the ~~on the~~ ~~day of~~ ~~at~~ ~~o'clock~~ ~~to~~ ~~testify on behalf of~~ city of Chicago, Illinois, the following:

~~In the above entitled action and bring with you~~

(1) All reports, drafts of reports, correspondence with the sponsoring agency, memoranda of University personnel regarding reports under contract No. AF33(616)-6079 Project No. 9-(13-6278) Task 40572, during the period March 1, 1959 - June 1, 1959.
(2) All cover letters accompanying copies of reports.
(3) All records regarding the printing of reports under said contract during said period.
(4) All accounting records relating to reports under said contract during said period, including, but not limited to, records of the printing expense and the mailing expense of said reports.

December 16, 1966.

Hofgren, Wegner, Allen,
Stellman & McCord
Attorney for

Blonder-Tongue Laboratories, Inc.
Address
20 North Wacker Drive
Chicago, Illinois 60606

Robert A. Wagner Jr
Clerk.

By A. Leonard E. Kuby
Deputy Clerk.

RETURN ON SERVICE

Received this subpoena at on
and on at
served it on the within named
by delivering a copy to h and tendering to h the fee for one day's attendance and the mileage allowed by law.[1]

Dated:
....., 19.....

By.....

Service Fees
Travel .....$
Services .....
Total .....$

Subscribed and sworn to before me, a this
day of , 19 .

.....

[1] Fees and mileage need not be tendered to the witness upon service of a subpoena issued in behalf of the United States or an officer or agency thereof. 28 USC 1825.

NOTE.—Affidavit required only if service is made by a person other than a United States Marshal or his deputy.

BLONDER-TONGUE

File

Laboratories Inc. / 9 Alling St., Newark 2, N. J. / Area code 201 / MArket 2-8151

December 16, 1966

Mr. Robert H. Rines
Rines & Rines
10 Post Office Square
Boston, Massachusetts

Dear Bob:

Ed Finkel called today and offered to settle for a royalty of 10% on our antennas paid direct to J.F.D.

Without your advice, I took the liberty of saying "No".

See you soon.

Sincerely,

Blonder-Tongue Laboratories, Inc.

Ike

Isaac S. Blonder
Chairman of the Board

dal

ISB:dal

LAW OFFICES

HOFGREN, WEGNER, ALLEN, STELLMAN & McCORD

20 NORTH WACKER DRIVE
CHICAGO 60606

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JOHN P. MILNAMOW
DILLIS V. ALLEN
W. A. VAN SANTEN, JR.
JOHN R. HOFFMAN

January 3, 1967 Enc.

Mr. Basil P. Mann
Merriam, Marshall, Shapiro & Klose
30 West Monroe Street
Chicago, Illinois 60603

RE: UIF v. BT v. JFD

Dear Pete:

In accordance with your request, I revised the stipulation to express the agreement among the parties with respect to the addition of patents by Blonder-Tongue. * I enclose the executed original and two copies of the stipulation. If the stipulation is satisfactory with you, I assume you will send it on to Mike for his signature. I would appreciate receiving a copy signed on behalf of all the parties when it is filed.

Very truly yours,

Richard S. Phillips

RSP:iag

* Enclosures

cc: Mr. Robert H. Rines (with enclosure)

c/Belmont 1/6/67

LAW OFFICES

HOFGREN, WEGNER, ALLEN, STELLMAN & McCORD

20 NORTH WACKER DRIVE

CHICAGO 60606

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WILLIAM R. McNAIR
JOHN P. MILNAMOW
DILLIS V. ALLEN
W. A. VAN SANTEN, JR.
JOHN R. HOFFMAN
A. R. OSTRAUSKAS

January 4, 1967 Enr

VIA AIR MAIL

Mr. Robert H. Rines
Rines and Rines
No. Ten Post Office Square
Boston, Massachusetts 02109

RE: UIF v. BT v. JFD

Dear Bob:

Our docket clerk talked with Judge Hoffman's minute clerk regarding the probable position of your case on the calendar. The case will be on the February calendar, but will probably not be called for trial until before the latter part of the month, or more likely sometime in March.

We were advised that Judge Hoffman does not presently consider the new rules regarding pretrial to apply to cases which were already on file.

Do you think the application on the combined UHF-VHF antenna will be allowed and issue in time to be added to the suit before it is on the trial calendar? Judge Hoffman might not agree to its addition to the suit unless we can do it rather soon. Let me know as soon as you have any commitment from the Patent Office. Then when we first go in on trial call I can give the court some specific information.

Will you be able to take the deposition of Jerry Balash within the next few weeks? If this is going to take extra time, let me know about that also.

Very truly yours,

Richard S. Phillips

RSP:iag

c/ Belmont 1/6/67

LAW OFFICES
SHAPIRO AND SHAPIRO
PATENT, TRADEMARK AND COPYRIGHT CAUSES
SUITE 640 WASHINGTON BUILDING
FIFTEENTH STREET & NEW YORK AVE., N. W.
WASHINGTON 5, D. C.

STERLING 3-0498

ARTHUR SHAPIRO (1900-1961)
NELSON H. SHAPIRO
MILTON M. FIELD

IRVIN A. LAVINE
COUNSEL

January 3, 1967

Robert H. Rines, Esq.
Rines and Rines
No. Ten Post Office Square
Boston, Massachusetts 02109

Re: Blonder-Tongue Litigation
Log Periodic Antenna
(Our Ref. #5093)

Dear Bob:

Supplementing our letter of December 19, 1966, we received notification from the Library of Congress that report No. 2 had been located. Upon visiting the Library, we found that the correct report had still not been located, and we made a further search to find the report.

We were finally successful in locating the correct report, but unfortunately the only date of record was constituted by a date stamp on the report in September of 1959. No covering letter or other substantiating evidence could be found.

We enclose herewith our supplemental statement.

Very truly yours,

SHAPIRO AND SHAPIRO

Nelson

Nelson H. Shapiro

NHS/lm
encl.

LAW OFFICES

HOFGREN, WEGNER, ALLEN, STELLMAN & McCORD

20 NORTH WACKER DRIVE

CHICAGO 60606

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DILLIS V. ALLEN
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JOHN R. HOFFMAN
A. R. OSTRAUSKAS

January 13, 1967 Enl.

Mr. Robert H. Rines
Rines and Rines
No. Ten Post Office Square
Boston, Massachusetts 02109

Dear Bob:

* I enclose the following papers which were served by Mann this afternoon:

Notice of Motion
Motion for Leave to File Amended Complaint
Stipulation
Amended Complaint.

I intend to be on hand Monday morning when the motion is presented in the event Judge Hoffman has questions regarding timing of further actions in the case.

Will you prepare the answer to the amended complaint?

Very truly yours,

Richard S. Phillips

RSP:iag

* Enclosures

IN THE UNITED STATES DISTRICT COURT
FOR THE NORTHERN DISTRICT OF ILLINOIS
EASTERN DIVISION

THE UNIVERSITY OF ILLINOIS FOUNDATION, Plaintiff and Counterclaim Defendant, - v - BLONDER-TONGUE LABORATORIES, INC., Defendant and Counterclaimant, - v - JFD ELECTRONICS CORPORATION, Counterclaim Defendant.	Civil Action No. 66 C 567

S T I P U L A T I O N

It is hereby stipulated and agreed by and between counsel for the respective parties, the Honorable Court consenting, that:

1. Plaintiff may file an Amended Complaint for the purpose of charging defendant, Blonder-Tongue Laboratories, Inc., with infringement of an additional United States Letters Patent No. Re.25,740, granted March 9, 1965, to plaintiff as assignee of Paul E. Mayes and Robert L. Carrel.

2. Defendant, Blonder-Tongue Laboratories, Inc., may file an Amended Counterclaim to include said added patent in its Counterclaim previously filed herein.

3. Defendant, Blonder-Tongue Laboratories, Inc., upon issuance to it of other United States Letters Patent relating to the antennas of JFD charged in the Counterclaim to infringe Blonder 3,259,904, may file an Amended Counterclaim for the purpose of charging plaintiff and counterclaim defendant with infringement of such patent. Plaintiff and counterclaim defendant may file responsive pleadings to such Amended Counterclaim.

HOFGREN, WEGNER, ALLEN, STELLMAN & McCORD

By Richard S. Phillips
Attorneys for Defendant
Blonder-Tongue Laboratories, Inc.

January 3, 1967.

MERRIAM, MARSHALL, SHAPIRO & KLOSE

By Basil P. Mann
Attorneys for Plaintiff
University of Illinois Foundation

January 4, 1967.

SILVERMAN AND CASS

By Myron C. Cass
Attorneys for Counterclaim Defendant
JFD Electronics Corporation

January 5, 1967.

CIVIL SUBPOENA TO PRODUCE DOCUMENT OR OBJECT — D. C. Form No. 48 (Rev. 2-67)

United States District Court

FOR THE

THE UNIVERSITY OF ILLINOIS FOUNDATION,
Plaintiff and Counterclaim Defendant,
- v -
BLONDER-TONGUE LABORATORIES, INC.,
Defendant and Counterclaimant,
- v -
J[illegible] ELECTRONICS CORPORATION,
Counterclaim Defendant.

CIVIL ACTION FILE NO. .....

No. 66 C 567

TO: Harold B. Lawler, Business Manager
Department of Electrical Engineering
Electrical Engineering Building
University of Illinois
Urbana, Illinois

YOU ARE HEREBY COMMANDED to ~~appear in the United States District Court for the~~ District of ~~in the city of~~ produce for inspection and copying at the offices of Merriam, Marshall, Shapiro & Klose, 30 West Monroe Street, in the ~~at the day of at o'clock M. to testify on behalf of~~ City of Chicago, Illinois, the following:

~~In the above entitled action and bring with you~~

(1) All reports, drafts of reports, correspondence with the sponsoring agency, memoranda of University personnel regarding reports under contract No. AF33(616)-6079, during the period March 1, 1959 - June 1, 1959.
(2) All cover letters accompanying copies of reports.
(3) All records regarding the printing and mailing of reports under said contract during said period.
(4) All accounting records relating to reports under said contract during said period, including, but not limited to, records of the printing expense and the mailing expense of said reports.

January 12, 1967.

Hofgren, Wegner, Allen, Stellman & McCord
Attorney for

Blonder-Tongue Laboratories, Inc.
Address
20 North Wacker Drive
Chicago, Illinois 60606

Calvert A. Wagner 2,
Clerk.
By [illegible] C. Kelley,
Deputy Clerk.

RETURN ON SERVICE

RECEIVED
JAN 10 1967
RINES AND RINES
NO. TEN POST OFFICE SQUARE, BOSTON

Received this subpoena at ..... on .....
and on ..... at .....
served it on the within named .....
by delivering a copy to h and tendering to h the fee for one day's attendance and the mileage allowed by law.[1]

Dated:
....., 19.....

.....,
By.....

Service Fees
Travel .....$
Services .....
Total .....$

Subscribed and sworn to before me, a ..... this
day of , 19 .

.....

[1] Fees and mileage need not be tendered to the witness upon service of a subpoena issued in behalf of the United States or an officer or agency thereof. 28 USC 1825.

NOTE.—Affidavit required only if service is made by a person other than a United States Marshal or his deputy.

LAW OFFICES

HOFGREN, WEGNER, ALLEN, STELLMAN & McCORD

20 NORTH WACKER DRIVE

CHICAGO 60606

TELEPHONE
FINANCIAL 6-1630
AREA CODE 312

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ERNEST A. WEGNER
JOHN REX ALLEN
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W. E. RECKTENWALD
J. R. STAPLETON

WILLIAM R. McNAIR
JOHN P. MILNAMOW
DILLIS V. ALLEN
W. A. VAN SANTEN, JR.
JOHN R. HOFFMAN

January 31, 1967

Mr. Robert H. Rines
Rines and Rines
No. Ten Post Office Square
Boston, Massachusetts 02109

RE: UIF v. BT v. JFD

Dear Bob:

* I enclose JFD's reply to the amended counterclaim and their crossclaim. I will file a short document restating our answer to the crossclaim.

Pete Mann advises me that the suit against Winegard in Des Moines is scheduled to go to trial February 13.

Very truly yours,

Richard S. Phillips

RSP:iag

* Enclosure

OSTROLENK, FABER, GERB & SOFFEN

ATTORNEYS AT LAW

TEN EAST FORTIETH STREET

NEW YORK, N. Y. 10016

SAMUEL OSTROLENK
SIDNEY G. FABER
BERNARD GERB
MARVIN C. SOFFEN
SAMUEL H. WEINER
JEROME M. BERLINER
LOUIS WEINSTEIN
MARC S. GROSS
STEWART J. FRIED

MICHAEL S. PINKLES
(ILL. & PA. BARS ONLY)

ROBERT C. FABER

PATENT CAUSES

AREA CODE 212
MURRAY HILL 5-8470

CABLE ADDRESS
"OSTROFABER" NEW YORK

February 1, 1967

Julius E. Foster, Esq.
420 Lexington Avenue
New York, New York 10017

Re: JFD 3.223 - UIF v. B-T v. JFD

Dear Julius:

This is to confirm our telephone conversation of even date during which I advised you that New York Telephone Company information lists the address of the Stratford Retreat House as 199 Main Street in White Plains.

During the course of the aforesaid telephone conversation, you confirmed that Abraham Schenfeld will be produced by Blonder-Tongue for oral examination to be conducted in my office immediately following the conclusion of the examinations of Edward Finkel and Jerome Balash now scheduled for Wednesday, February 8, 1967. Em.

Very truly yours,

OSTROLENK, FABER, GERB & SOFFEN

Jerry

Jerome M. Berliner

JMB:cg

cc: Myron C. Cass, Esq.

LAW OFFICES

AXEL A. HOFGREN
ERNEST A. WEGNER
JOHN REX ALLEN
WILLIAM J. STELLMAN
JOHN B. McCORD
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JOHN R. HOFFMAN

HOFGREN, WEGNER, ALLEN, STELLMAN & McCORD

20 NORTH WACKER DRIVE

CHICAGO 60606

TELEPHONE
FINANCIAL 6-1630
AREA CODE 312

February 2, 1967

VIA AIR MAIL

Mr. Robert H. Rines
Rines and Rines
No. Ten Post Office Square
Boston, Massachusetts 02109

RE: UIF v. BT v. JFD

Dear Bob:

* I enclose copies of the Foundation's reply to the amended counterclaim and of the JFD deposition notice and motion and other papers we filed seeking to change the date.

Very truly yours,

Richard S. Phillips

RSP:iag

* Enclosures

February 2, 1967

Richard S. Phillips, Esq.
Hofgren, Wegner, Allen, Stellman & McCord
20 North Wacker Drive
Chicago, Illinois 60606

Re: UIF v. BT v. JFD

Dear Dick:

We have just spoken with Mr. Blonder and have learned that Mr. Harry Gilbert and Mr. Jerry Cohn and I could be available for depositions in New York the week of February 20.

With regard to Dick Halsocki, we are not sure that he will remain with Blonder-Tongue following the appointment of the new sales manager; but we shall keep you apprised.

We understand that on the basis of what we gave you over the telephone relating to my impossible schedule, you are going to move to quash the less than one week notice of depositions filed by JFD.

Very truly yours,

RINES AND RINES

RHR/BD

By _____

IN THE UNITED STATES DISTRICT COURT
FOR THE NORTHERN DISTRICT OF ILLINOIS
EASTERN DIVISION

THE UNIVERSITY OF ILLINOIS FOUNDATION Plaintiff, and Counterclaim Defendant, v. BLONDER-TONGUE LABORATORIES, INC., Defendant, and Counterclaimant, v. JFD ELECTRONICS CORP., Counterclaim Defendant.	Civil Action No. 66C 567

NOTICE OF EXAMINATION

(1) of JFD Electronics Corp.;
(2) of Jerome N. Balash; and
(3) of John Doe (psuedonym for) chief executive officer of Stratford Retreat House, Inc.

TO: Ostrolenk, Faber, Gerb & Soffen - Attorneys for Counterclaim Defendant, JFD ELECTRONICS CORP.

PLEASE TAKE NOTICE, that on Wednesday, February 8, 1967, commencing at 9:30 A. M. at your office at 10 East 40th Street, New York City, N. Y., as arranged by stipulation, the Defendant and Counter-claimant, Blonder-Tongue Laboratories, Inc., by its counsel, will examine the Counter-claim Defendant J. F. D. Electronics Corp., in accordance with the Federal Rules of Civil Procedure, by oral examination before a Notary Public, of

1. Mr. Edward Finkel, Executive Vice-President of JFD Electronics Corp.;

2. Jerome N. Balash, an employee of JFD Electronics Corp.; and

3. John Doe, (a pseudonym for) the executive officer of STRATFORD RETREAT HOUSE, INC., alleged to be the present owner of said JFD Electronics, Inc., and, therefore, a proper party to this action, but not findable in the State of New York, or registered, as required by law, to do business within the State of New York.

PLEASE TAKE FURTHER NOTICE, that the Counter-claim defendant, JFD Electronics Corp. is required to produce at such examination for the use of Mr. Finkel for the purpose of the examination, the following documents:

a) a sample copy of each form and type of distributor agreement and of dealer agreement used by JFD Electronics Corp., from the beginning of 1966 to date;

b) all correspondence, documents, memoranda of intent and final agreement, relating to the transfer of JFD Electronics Corp. to Stratford Retreat House, Inc.,

c) all correspondence with notes of meetings and conferences with, and reports from, Jerome N. Balash, dated or occurring prior to the employment of said Balash by JFD Electronics Corp., relating to or having any bearing on investigations made by said Balash, while employed at, and by, Blonder-Tongue and assigned to such investigations by Blonder-Tongue for the purposes of this action.

PLEASE TAKE FURTHER NOTICE, that the witness Jerome N. Balash, whom you have promised to produce without a subpoena, is required to produce and to have available at and for the purpose of his examination, at

said time, the following things and documents:

a) all notes, notebooks, memoranda, data and reports made by him, while employed by Blonder-Tongue and assigned to make certain investigations for the purpose of this action, at a time prior to his resignation from Blonder-Tongue to join JFD Electronics Corp.;

b) a list of all items of information acquired by him as a result of conducting said investigation and delivered by him to JFD Electronics Corp. in anticipation of or upon his employment by JFD Electronics Corp.;

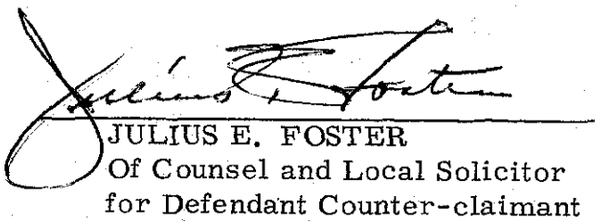
c. copies of all correspondence between said Balash and Counter-claim defendant JFD Electronics Corp. during the period of said investigation and and leading up to the date of employment of Balash by JFD Electronics Corp.

and, PLEASE TAKE FURTHER NOTICE, that, under Rule 17 of the Federal Rules of Civil Procedure, the Stratford Retreat House, Inc. is now a real party in interest, and is a proper Counter-claim co-Defendant herein, and must be considered to be subject to the rules of examination here involved.

Since the Stratford Retreat House, Inc. is not findable in New York for service of process, and it is not authorized to do business in the State of New York,

DEMAND IS HEREBY MADE UPON YOU, as attorneys for the Counter-claim Defendant JFD Electronics Corp., either to assure the presence of said John Doe official of said Stratford Retreat House, Inc., at said examination, or to notify Counter-claimant's counsel and local solicitor of the address and location of said John Doe official, to permit appropriate service of process to be made upon said John Doe for attendance at said examination. Otherwise, application will be made to the Court for appropriate sanctions.

You are invited to attend and cross-examine.



JULIUS E. FOSTER
Of Counsel and Local Solicitor
for Defendant Counter-claimant
420 Lexington Avenue
New York, N.Y. 10017
Tel. 889-4608

Of Counsel:
Robert H. Rines
Rines & Rines
10 Post Office Square
Boston, Mass.

66 Civil Action 567

UNITED STATES DISTRICT COURT
NORTHERN DISTRICT OF ILLINOIS
EASTERN DIVISION

THE UNIVERSITY OF ILLINOIS FOUNDATION,
Plaintiff, and
Counterclaim Defendant,

vs.

BLONDER-TONGUE LABORATORIES, INC.,
Defendant, and
Counterclaimant,

vs.

JFD ELECTRONICS CORP.,
Counterclaim Defendant

NOTICE OF EXAMINATION OF JFD
BY BLONDER-TONGUE

OF COUNSEL: Robert H. Rines
RINES & RINES
10 Post Office Square
Boston, Mass. 02109

Julius E. Foster
Of Counsel & Local Solicitor
420 Lexington Avenue
New York New York 10017
TEL: 889-4608

Copy received
11/30/67 Berliner
for Osterlund et al

LAW OFFICES

HOFGREN, WEGNER, ALLEN, STELLMAN & McCORD

20 NORTH WACKER DRIVE

CHICAGO 60606

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WILLIAM R. McNAIR
JOHN P. MILNAMOW
DILLIS V. ALLEN
W. A. VAN SANTEN, JR.
JOHN R. HOFFMAN

Ltr. ack'd 2/10/67

February 6, 1967

Mr. Robert H. Rines
Rines and Rines
No. Ten Post Office Square
Boston, Massachusetts 02109

RE: UIF v. BT v. JFD

Dear Bob:

* I enclose a notice from Ostrolenk, Faber of a deposition of Robert F. Heslin, to be taken in their office on February 14. Even though you may be on trial in St. Louis, I don't think there is any point in trying to get the date changed.

Very truly yours,

Richard S. Phillips

RSP:iag

* Enclosure

cc: Mr. I. S. Blonder

OSTROLENK, FABER, GERB & SOFFEN
ATTORNEYS AT LAW
TEN EAST FORTIETH STREET
NEW YORK, N. Y. 10016

SAMUEL OSTROLENK
SIDNEY G. FABER
BERNARD GERB
MARVIN C. SOFFEN
SAMUEL H. WEINER
JEROME M. BERLINER
LOUIS WEINSTEIN
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STEWART J. FRIED

MICHAEL S. PINELES
(ILL. & PA. BARS ONLY)
ROBERT C. FABER

AREA CODE 212
MURRAY HILL 5-8470

CABLE ADDRESS
"OSTROFABER" NEW YORK

February 20, 1967

Robert H. Rines, Esq.
Rines & Rines
10 Post Office Square
Boston, Massachusetts

Re: JFD 3,223 - UIF v. B-T v. JFD
(ND Ill. ED 66-C-567)

Dear Mr. Rines:

Enclosed are photostats of Exhibits J-10 through J-50 inclusive and J-52 through J-57 inclusive all marked for identification during the deposition of Robert F. Heslin conducted on February 14, 1967 in connection with the above identified litigation. Exhibit J-51 for identification is the physical antenna shown in the photographs J-20 and J-21.

Exhibit J-53 is indicated in J-52 as being a copy of the official record at ARRL that Heslin's article in the June 1963 issue of QST was received by the publication on 11-27-61 and was accepted on 12-8-61. In order to avoid the necessity of taking testimony in Newington, Connecticut, it is requested that you stipulate to the authenticity of J-53 or accept an affidavit from QST attesting to the authenticity of J-53.

Heslin testified that the antenna J-51 has been in the custody of Van Field located in Bellport, New York (approximately 60 miles east of Kennedy Airport). At the time J-51 was taken from Mr. Field he advised that J-51 was mounted on the roof of the Suffolk County Technical Electronics Facility at 289 Station Road, Bellport, New York, where he is an Engineer-Instructor. He also advised that he is an amateur radio operator (call letters W20QI) and that his transmitter-receiver, connected to antenna J-51, was frequently used to transmit and receive signals on amateur bands. In order to avoid the time and expense of taking testimony to establish the foregoing, it is requested that you stipulate to the foregoing facts, and the period of time during which the J-51 was in use, or accept an affidavit by Mr. Field setting forth these facts.

LAW OFFICES

HOFGREN, WEGNER, ALLEN, STELLMAN & McCORD

20 NORTH WACKER DRIVE

CHICAGO 60606

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FINANCIAL 6-1630
AREA CODE 312

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JOHN P. MILNAMOW
DILLIS V. ALLEN
W. A. VAN SANTEN, JR.
JOHN R. HOFFMAN
A. R. OSTRAUSKAS

January 9, 1967 Em.

Mr. Robert H. Rines
Rines and Rines
No. Ten Post Office Square
Boston, Massachusetts 02109

RE: UIF v. BT v. JFD

Dear Bob:

As we discussed when you were here, we have gotten copies of some of the papers from the Finney suit. The * following are enclosed:

1. Amended Complaint (filed September 20, 1965)

2. Plaintiff's Response to Defendant JFD Electronics Corporation's First Set of Interrogatories to Plaintiff The Finney Company Under Rule 33 (filed October 8, 1965)

3. Answers by Plaintiff The Finney Company to Defendant JFD Electronics Corporation's Second Set of Interrogatories to Plaintiff The Finney Company Under Rule 33 (filed October 8, 1965)

4. Answers by Plaintiff, The Finney Company to Additional Interrogatories Under Rule 33 Filed by Defendant, The University of Illinois Foundation (filed December 3, 1965)

5. Additional Answers by Plaintiff, The Finney Company, to Additional Interrogatories Under Rule 33 Filed by Defendant, The University of Illinois Foundation (filed January 3, 1966)

6. Answers by Plaintiff, The Finney Company,

to Interrogatories Under Rule 33 filed by Defendant, The University of Illinois Foundation (filed February 11, 1966).

Very truly yours,

Dick

Richard S. Phillips

RSP:iag

* Enclosures

LAW OFFICES

AXEL A. HOFGREN
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January 13, 1967

Mr. Robert H. Rines
Rines and Rines
No. Ten Post Office Square
Boston, Massachusetts 02109

Dear Bob:

I received today from the attorneys for JFD a large stack of blueprints of the JFD antennas. These are prints of the drawings which you looked at briefly when you were here for the depositions at Merriam's office. Do you want me to keep these drawings here, send them to you or send them to Ike?

Fox asked whether you had yet found any test data regarding boom spacing. He also inquired whether you might have the negative photographs listed in his letter * of December 21 to me, copy attached. I think I sent you a copy when I got the letter, I am not sure.

Very truly yours,

Dick

Richard S. Phillips

RSP:lag

* Enclosure

LAW OFFICES
Silverman & Cass
PATENTS · TRADEMARKS · COPYRIGHTS
105 W. ADAMS STREET · CHICAGO, ILLINOIS, U.S.A. 60603
TELEPHONE 726-6006
AREA CODE 312
CABLE: SILCAS

I. IRVING SILVERMAN
MYRON C. CASS
SIDNEY N. FOX

JAMES L. KNIGHT
GERALD R. HIBNICK, IND. BAR

December 21, 1966

Our Ref. 6-418

Richard S. Phillips, Esq.
Hofgren, Wegner, Allen,
Stellman & McCord
Suite 2200
20 North Wacker Drive
Chicago, Illinois 60606

Re: UIF v. BT v. JFD - No. 66 C 567

Dear Dick:

Would you be so kind as to check your files and ask Bob Rines to check his files in respect of a group of negative photostats we had prepared of the following documents produced by Blonder-Tongue Laboratories, Inc.:

B 210	Drawing No. C-1758-B	Boom-VHF #37
B 211	Drawing No. C-1757-C	Elements (Tubing) Family Dwg.
B 219	Drawing	Examples of Trademark Representations
B 177	Drawing No. M-1552 E	Clamp, Outdoor UHF Antenna
B 220	Tissue (Large)	Illustrating Adoption of Trademark "Ranger"

You will recall that I received the originals of the above on December 9, 1966 in your office and agreed to obtain photostatic copies thereof. This was accomplished and Myron Cass handed positive copies thereof to Pete Mann on December 13, 1966. We retained the negatives. You will also recall that the originals above were given either to you or to Bob Rines at the recent depositions in Champaign.

Now we find that the complete set of negatives is missing from our files. It is possible that these negatives could have gotten mixed in with the originals when the same were turned over in Champaign. There was a lot of material passed back and forth at the time. Please advise.

On checking our files, we note also that original B-documents B-217, 218 and 228-233 were inadvertently retained. These documents are enclosed herewith.

Our very best wishes for a Happy Holiday Season.

Very truly yours,

SILVERMAN & CASS

Sidney N. Fox

Sidney N. Fox

SNF/gm

Encl.

LAW OFFICES

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HOFGREN, WEGNER, ALLEN, STELLMAN & McCORD

20 NORTH WACKER DRIVE
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AREA CODE 312

January 12, 1967

Mr. James J. Costello
Legal Counsel
University of Illinois
258 Administration Building
Urbana, Illinois

RE: UIF v. ET v. JFD

Dear Mr. Costello:

On December 16, 1966, I sent you a copy of a subpoena in the above suit with regard to certain materials relating to Contract AF33(616)-6079 Project No. 9-(13-6278) Task 40572. We have just learned that our request was too limited and should have called for all the specified materials relating to the Contract AF33(616)-6079. I enclose a copy of a further subpoena which we have directed to Mr. Lawler with regard to these materials.

Very truly yours,

Richard S. Phillips

RSP:ieg

* Enclosure

cc: Mr. Harold B. Lawler
Mr. Basil P. Mann
Mr. Myron C. Cass
Mr. Robert H. Rines
Mr. I. S. Blender

LAW OFFICES

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J. R. STAPLETON

WILLIAM R. McNAIR
JOHN P. MILNAMOW
DILLIS V. ALLEN
W. A. VAN SANTEN, JR.
JOHN R. HOFFMAN

March 2, 1967

Mr. Robert H. Rines
Rines and Rines
No. Ten Post Office Square
Boston, Massachusetts 02109

RE: UIF v. BT v. JFD

Dear Bob:

I wrote you on February 13 regarding waiver of signature of Mr. Blonder's deposition. We discussed it after that and you said you did not know whether he had any changes to suggest. Please let me know as soon as possible whether there are changes or whether we can stipulate to a waiver of signature so that the depositions can be filed.

Very truly yours,

Richard S. Phillips

RSP:iag

LOUIS D. FLETCHER
OF COUNSEL
DONALD J. OVEROCKER
HARVEY W. MORTIMER
MORRIS RELSON
ROBERT R. KEEGAN
GORDON D. COPLEIN
WILLIAM F. DUDINE, JR.

EGON E. BERG
MICHAEL J. SWEEDLER
HARVEY M. BROWNROUT

DARBY & DARBY
ATTORNEYS AT LAW
PATENTS AND TRADEMARKS
CHRYSLER BUILDING
405 LEXINGTON AVENUE
NEW YORK, N. Y. 10017

SAMUEL E. DARBY (1867-1936)
WALTER A. DARBY (1889-1949)
SAMUEL E. DARBY, JR. (1891-1947)
FLOYD H. CREWS (1899-1964)

CABLE: YBRAD, NEW YORK

TELEPHONE (212) OXFORD 7-7660

March 2, 1967

Robert H. Rines, Esq.
Rines & Rines
10 Post Office Square
Boston, Massachusetts 02109

Re: University of Illinois Foundation

Dear Bob:

Your absences appear to have meshed with mine to such an extent that considerable time has passed since our discussion of the above situation, in which you were going to make available to me your depositions, exhibits and discovery, to copy as we may need.

I would appreciate your lending us these materials and assure you that we will return them promptly.

I would also be interested to know whether the materials I supplied to you were useful in connection with your depositions of the Foundation people.

Cordially yours,

Morris

mv

Morris Relson

LAW OFFICES

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20 NORTH WACKER DRIVE
CHICAGO 60606

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FINANCIAL 6-1630
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February 27, 1967

Mr. John F. Pearne
McNenny, Farrington, Pearne & Gordon
920 Midland Building
Cleveland, Ohio 44115

Dear John:

I had misunderstood Jack Allen's message regarding Bob Rines' schedule. He is coming to Chicago Monday morning, March 13, and staying overnight for a meeting on another matter Tuesday morning. We can get together with you Monday afternoon, Monday evening, or Tuesday afternoon, at your convenience.

Rines' telephone number is Area Code 617, HUbbard 2-3289 in case you wish to talk with him ahead of time. Let me know how your plans develop. I will look forward to seeing you again.

Very truly yours,

Richard S. Phillips

RSP:iag

cc: Mr. Robert H. Rines - I have talked with Keith Kulie regarding access to the Winegard record. He has a brief due on March 17 but will not be using the record every day. He will let me know when it is available and we will try to have a copy for you before or by our meeting on the 13th.

Dick

OSTROLENK, FABER, GERB & SOFFEN

ATTORNEYS AT LAW

TEN EAST FORTIETH STREET

NEW YORK, N. Y. 10016

SAMUEL OSTROLENK
SIDNEY G. FABER
BERNARD GERB
MARVIN C. SOFFEN
SAMUEL H. WEINER
JEROME M. BERLINER
LOUIS WEINSTEIN
MARC S. GROSS
STEWART J. FRIED

MICHAEL S. PINELES
(ILL. & PA. BARS ONLY)
ROBERT C. FABER

PATENT CAUSES

AREA CODE 212
MURRAY HILL 5-8470

CABLE ADDRESS
"OSTROFABER" NEW YORK

February 28, 1967 Ent.

Robert H. Rines, Esq.
Rines and Rines
No. Ten Post Office Square
Boston, Massachusetts 02109

Re: JFD 3,223 - UIF v. B-T v. JFD
66-C-567

Dear Bob:

The spirit of cooperation expressed in your letter of February 24, 1967 is very much appreciated.

In this connection, enclosed is the original and two copies of a Stipulation concerning the facts referred to in the second and third paragraphs of my letter dated February 20, 1967.

I have executed all three copies of the enclosed Stipulation on behalf of JFD. If you find the terms of the enclosed Stipulation to be satisfactory, kindly execute same and return the original and one copy to me.

Sincerely,

OSTROLENK, FABER, GERB & SOFFEN

Jerry

Jerome M. Berliner

JMB:cg

Enclosures

IN THE UNITED STATES DISTRICT COURT
FOR THE NORTHERN DISTRICT OF ILLINOIS
EASTERN DIVISION

THE UNIVERSITY OF ILLINOIS FOUNDATION, Plaintiff and Counterclaim Defendant, v. BLONDER-TONGUE LABORATORIES, INC., Defendant and Counterclaimant, v. JFD ELECTRONICS CORPORATION, Counterclaim Defendant.	Civil Action No. 66 C 567

STIPULATION OF FACTS

In order to facilitate pre-trial discovery procedures for the above noted Action, the parties BLONDER-TONGUE LABORATORIES, INC. and JFD ELECTRONICS CORPORATION, through their respective attorneys, stipulate and agree that the following facts are admitted and require no proof at trial of this Action (each of said parties reserving the right to object to the materiality of any stipulated fact and its relevancy to the issues).

1. Exhibit J-53* is an authentic copy of the official record

*Marked for identification on February 14, 1967 at the deposition of Robert F. Heslin taken in connection with this Action.

at the American Radio Relay League, Inc. for the article, Exhibit J-10*, appearing on pages 50 through 52 in the June 1963 issue of the American Radio Relay League, Inc. publication QST, and said Exhibit J-53 may be used at trial of this Action with the same force and effect as the original of said official record.

2. During the period from the late fall of 1961 to the end of 1966, the antenna marked Exhibit J-51* was mounted on the roof of the Suffolk County Board of Cooperative Educational Services (2nd Supervisory District) Technical Electronics Facility at 289 Station Road, Bellport, New York.

3. On frequent occasions throughout the period from the late fall of 1961 to the end of 1966, the transmitter-receiver of amateur radio operator Van Field (call letters W20QI) was used with said Exhibit J-51 to transmit and receive signals on amateur bands.

Rines & Rines
Of Counsel For
Blonder-Tongue Laboratories, Inc.

Date: March , 1967

By_____

Date: February 28, 1967

Ostrolenk, Faber, Gerb & Soffen
Of Counsel For
JFD Electronics Corporation

By Jerome M. Berliner

*Marked for identification on February 14, 1967 at the deposition of Robert F. Heslin taken in connection with this Action.

IN THE UNITED STATES DISTRICT COURT
FOR THE NORTHERN DISTRICT OF ILLINOIS
EASTERN DIVISION

THE UNIVERSITY OF ILLINOIS FOUNDATION, Plaintiff and Counterclaim Defendant, v. BLONDER-TONGUE LABORATORIES, INC., Defendant and Counterclaimant, v. JFD ELECTRONICS CORPORATION, Counterclaim Defendant.	Civil Action No. 66 C 567

STIPULATION OF FACTS

In order to facilitate pre-trial discovery procedures for the above noted Action, the parties BLONDER-TONGUE LABORATORIES, INC. and JFD ELECTRONICS CORPORATION, through their respective attorneys, stipulate and agree that the following facts are admitted and require no proof at trial of this Action (each of said parties reserving the right to object to the materiality of any stipulated fact and its relevancy to the issues).

1. Exhibit J-53* is an authentic copy of the official record

*Marked for identification on February 14, 1967 at the deposition of Robert F. Heslin taken in connection with this Action.

at the American Radio Relay League, Inc. for the article, Exhibit J-10*, appearing on pages 50 through 52 in the June 1963 issue of the American Radio Relay League, Inc. publication QST, and said Exhibit J-53 may be used at trial of this Action with the same force and effect as the original of said official record.

2. During the period from the late fall of 1961 to the end of 1966, the antenna marked Exhibit J-51* was mounted on the roof of the Suffolk County Board of Cooperative Educational Services (2nd Supervisory District) Technical Electronics Facility at 289 Station Road, Bellport, New York.

3. On frequent occasions throughout the period from the late fall of 1961 to the end of 1966, the transmitter-receiver of amateur radio operator Van Field (call letters W2OQI) was used with said Exhibit J-51 to transmit and receive signals on amateur bands.

Rines & Rines
Of Counsel For
Blonder-Tongue Laboratories, Inc.

Date: March , 1967

By_____

Date: February 28, 1967

Ostrolenk, Faber, Gerb & Soffen
Of Counsel For
JFD Electronics Corporation

By Jerome M. Berliner

*Marked for identification on February 14, 1967 at the deposition of Robert F. Heslin taken in connection with this Action.

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J. R. STAPLETON

WILLIAM R. McNAIR
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JOHN R. HOFFMAN

March 2, 1967

Mr. Robert H. Rines
Rines and Rines
No. Ten Post Office Square
Boston, Massachusetts 02109

RE: UIF v. BT v. JFD

Dear Bob:

* I enclose copies of the Foundation's answers to the interrogatories. Apparently they have changed their position and are answering the interrogatories based on the information from testimony in the Winegard suit. Apparently the report was not reviewed by the contractor before printing and only the master copy of the final text was prepared. It is my understanding the answer to 10(b)(1) does not agree with the testimony in the lawsuit. I think the custodian of the collection testified that if a member of the general public asked to see something in the collection, they would be permitted to see it.

Very truly yours,

Dick

Richard S. Phillips

RSP:iag

* Enclosure

LAW OFFICES

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A. R. OSTRAUSKAS

January 26, 1967 Encl.

VIA AIR MAIL

Mr. Robert H. Rines
Rines and Rines
No. Ten Post Office Square
Boston, Massachusetts 02109

RE: UIF v. BT v. JFD

Dear Bob:

I had a call from Sid Fox advising that there was an incorrect date on a publication in the notice under §282, Page 3, the QST issue identified as June 1959 should be June 1963.

Very truly yours,

Richard S. Phillips

RSP:iag

cc: Mr. I. S. Blonder

LAW OFFICES

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HOFGREN, WEGNER, ALLEN, STELLMAN & McCORD

20 NORTH WACKER DRIVE
CHICAGO 60606

TELEPHONE
FINANCIAL 6-1630
AREA CODE 312

January 25, 1967

VIA AIR MAIL

Mr. Robert H. Rines
Rines and Rines
No. Ten Post Office Square
Boston, Massachusetts 02109

RE: UIF v. BT v. JFD

Dear Bob:

In connection with your proposed motion for summary judgment, Jack and I both feel very strongly that it should be presented before the case goes on the trial call on February 20. Judge Hoffman is likely to deny it without consideration of its merits if presented after that time. Accordingly, I thought it might be helpful to you to have our tentative schedules for February. I am leaving the afternoon of February 7 and will be in Washington the 8th and 9th. Jack is leaving the evening of the 15th and will be gone the 16th. Other than these dates, we should be available at any time.

Very truly yours,

Dick

Richard S. Phillips

RSP:iag

January 26, 1967

Richard S. Phillips, Esquire
Hofgren, Wegner, Allen, Stellman & McCord
20 North Wacker Drive
Chicago 60606, Illinois

Re: University of Illinois Foundation v.
Blonder-Tongue v. JFD

Dear Dick:

Thank you for the copy of the amended answer and the notice of prior art of the counterclaim defendant.

We have noticed Balash for testimony in New York on February 8 and hope to proceed on summary judgment promptly thereafter.

What is the status of the documents subpoenaed from the University?

Very truly yours,

RINES AND RINES

By _____

RHR/BD
cc: Isaac Blonder

LAW OFFICES

HOFGREN, WEGNER, ALLEN, STELLMAN & McCORD

20 NORTH WACKER DRIVE

CHICAGO 60606

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JOHN R. HOFFMAN
A. R. OSTRAUSKAS

January 24, 1967

Mr. Robert H. Rines
Rines and Rines
No. Ten Post Office Square
Boston, Massachusetts 02109

RE: UIF v. BT v. JFD

Dear Bob:

* I enclose a copy of a notice from JFD regarding prior patents, publications and uses, under 35 U.S.C. 282.

If you wish to have discovery with regard to any of this, I suggest that you proceed promptly. Judge Hoffman will not be likely to postpone the trial date if more time should be necessary and you are not diligent now. I am not even sure he would grant a postponement if you are diligent, but certainly there is a better chance, if you should run into problems.

Have you arranged the Balash deposition?

Very truly yours,

Richard S. Phillips

RSP:iag

* Enclosure

LAW OFFICES

AXEL A. HOFGREN
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HOFGREN, WEGNER, ALLEN, STELLMAN & McCORD

20 NORTH WACKER DRIVE
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FINANCIAL 6-1630
AREA CODE 312

January 23, 1967 Enr.

Mr. Robert H. Rines
Rines and Rines
No. Ten Post Office Square
Boston, Massachusetts 02109

RE: UIF v. BT v. JFD

Dear Bob:

In accordance with your secretary's phone call, * we have completed and filed the amended answer. A copy is enclosed. I don't have copies of all your prior art patents and as a result did not attempt to list the prior art with respect to the reissue patent. As soon as you have this information available, we should give a formal notice. I added paragraph 24 questioning the basis for the reissue.

Very truly yours,

Dick

Richard S. Phillips

RSP:iag

* Enclosure

cc: Mr. I. S. Blonder - with enclosure

c/ Belmont 1/20/67

LAW OFFICES

AXEL A. HOFGREN
ERNEST A. WEGNER
JOHN REX ALLEN
WILLIAM J. STELLMAN
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HOFGREN, WEGNER, ALLEN, STELLMAN & McCORD

20 NORTH WACKER DRIVE
CHICAGO 60606

TELEPHONE
FINANCIAL 6-1630
AREA CODE 312

January 18, 1967

Bob to be in
non-com.
Until amended
answer in
plan

Mr. Robert H. Rines
Rines and Rines
No. Ten Post Office Square
Boston, Massachusetts 02109

RE: UIF v. BT v. JFD

Dear Bob:

Encl. Cond.

* I enclose a copy of the judge's minute order entering the amended complaint. He gives only five days for filing an amended answer. If you can't prepare the paper and send it to me, call me so that we can discuss the affirmative defenses which you wish to put in with regard to the added patent.

Very truly yours,

Dick

Richard S. Phillips

RSP:iag

* Enclosure

O/Belmont 1/20/67

3

UNITED STATES DISTRICT COURT, NORTHERN DISTRICT OF ILLINOIS
Eastern DIVISION

Name of Presiding Judge, Honorable Julius J. Hoffman

16

Cause No. 66 C 567

Date January ~~13~~, 1967

Title of Cause: University of Illinois Foundation v. Blonder-Tongue Laboratories, Inc., v. JFD Electronics Corporation

Brief Statement of Motion: Stipulated Motion for Leave to File Amended Complaint

Notice Motion Stipulation

Amended Complaint

The rules of this court require counsel to furnish the names of all parties entitled to notice of the entry of an order and the names and addresses of their attorneys. Please do this immediately below (separate lists may be appended).

Names and Addresses of moving counsel:
Merriam, Marshall, Shapiro & Klose
30 West Monroe Street
Chicago, Illinois

Representing:
Plaintiff and Counterclaim Defendant

RECEIVED
JAN 20 1967
RINES AND RINES
NO. TEN POST OFFICE SQUARE, BOSTON

Names and Addresses of other counsel entitled to notice and names of parties they represent.

HOFGREN, BRADY, WEGNER, ALLEN, STELLMAN & McCORD
20 North Wacker Drive
Chicago, Illinois 60606

Defendant and Counterclaimant

RECEIVED
JAN 19 1967
HOFGREN, WEGNER, ALLEN, STELLMAN & McCORD

SILVERMAN & CASS
105 West Adams Street
Chicago, Illinois 60603

Counterclaim Defendant

Reserve space below for notations by minute clerk

On Stipulation - Ltf to Plff to file an Amended Complaint. Order on Deft to file answer pleading to the Amended Complaint within 5 days. Ltf to Deft to file an amended counterclaim within 5 days. Counterclaim Deft to answer the Amended Counterclaim within 5 days. Cause to stand set to take place on the calendar.

Judge Julius Hoffman

Hand this memorandum to the Clerk

LAW OFFICES

HOFGREN, WEGNER, ALLEN, STELLMAN & McCORD

20 NORTH WACKER DRIVE

CHICAGO 60606

TELEPHONE
FINANCIAL 6-1630
AREA CODE 312

AXEL A. HOFGREN
ERNEST A. WEGNER
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WILLIAM J. STELLMAN
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JOHN P. MILNAMOW
DILLIS V. ALLEN
W. A. VAN SANTEN, JR.
JOHN R. HOFFMAN
A. R. OSTRAUSKAS

January 17, 1967

Mr. Robert H. Rines
Rines and Rines
No. Ten Post Office Square
Boston, Massachusetts 02109

RE: UIF v. BT v. JFD

Dear Bob:

* I enclose a copy of a minute order from the court adding your case to the trial call on February 20, 1967. It is our belief from previous discussions with the judge's clerk that this indicates the case will not be reached for trial until sometime in April. We will check this again with the clerk during the next few days and let you know for sure. In any event, we will advise the court on February 20, or sooner if the clerk deems it advisable, of your unavailability during the month of March.

Very truly yours,

Richard S. Phillips

RSP:iag

* Enclosure

JRA
RSP 10
JKR

UNITED STATES DISTRICT COURT, NORTHERN DISTRICT OF ILLINOIS
EASTERN DIVISION

Name of Presiding Judge, Honorable JULIUS J. HOFFMAN.

Cause No. 66 C 567 Date JAN 13 1967

Title of Cause University of Illinois Foundation v. Blonder-Tongue Laboratories, Inc., et al.

Brief Statement of Motion

The rules of this court require counsel to furnish the names of all parties entitled to notice of the entry of an order and the names and addresses of their attorneys. Please do this immediately below (separate lists may be appended).

Names and Addresses of moving counsel

Representing

Names and Addresses of other counsel entitled to notice and names of parties they represent.

RECEIVED
JAN 19 1967
RINES AND RINES
NO. TEN POST OFFICE SQUARE, BOSTON

RECEIVED
JAN 17 1967
HOFGREN, WEGNER, ALLEN, STELLMAN & McCORD

Reserve space below for notations by minute clerk

ON COURT'S MOTION, CAUSE WILL BE ADDED TO THE TRIAL CALL ON FEB 20 1967

COUNSEL REQUIRED TO BE READY FOR TRIAL

Judge J. Hoffman

Hand this memorandum to the Clerk.
Counsel will not rise to address the Court until motion has been called.

LAW OFFICES

AXEL A. HOFGREN
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HOFGREN, WEGNER, ALLEN, STELLMAN & McCORD

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March 16, 1967

Mr. John T. Pearne
McNenny, Farrington, Pearne & Gordon
920 Midland Building
Cleveland, Ohio 44115

Dear John:

* I enclose copies of exhibits 27 through 33, 36, 37, 41, and 45 through 48 from the Mayes depositions taken on behalf of Blonder-Tongue. Exhibits 38 through 40 are blueprints which we are having copied and will send you later.

Very truly yours,

Richard S. Phillips

RSP:lag

* Enclosures

cc: Mr. Robert H. Rines

AXEL A. HOFGREN
ERNEST A. WEGNER
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AREA CODE 312

March 16, 1967

Mr. John F. Pearne
McNenny, Farrington, Pearne & Gordon
920 Midland Building
Cleveland, Ohio 44115

Dear John:

Bob Rines asked that I send you copies of the * transcripts of the depositions taken of Paul Mayes. They are enclosed. I am reviewing our exhibits from these depositions and will send you copies of those which I don't think you have. If there is anything further with regard to the depositions which would be of interest to you, let me know.

Bob asked that I check with you regarding your opinion as to the most pertinent prior art against the Isbell and Mayes et al patents. We have to prepare a list of exhibits by March 25. I would appreciate having your suggestions before then.

Bob is also considering the possibility of using DuHamel, Isbell or Carrel as witnesses at the trial. Have you contacted any of them? If so, have you learned anything which you believe to be of interest?

Very truly yours,

Richard S. Phillips

RSP:iag

* Enclosures

cc: Mr. Robert H. Rines

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WILLIAM R. McNAIR
JOHN P. MILNAMOW
DILLIS V. ALLEN
W. A. VAN SANTEN, JR.
JOHN R. HOFFMAN

March 1, 1967 Enc.

Mr. Robert H. Rines
Rines and Rines
No. Ten Post Office Square
Boston, Massachusetts

RE: UIF v. BT v. JFD

Dear Bob:

* I enclose a copy of a pre-trial order regarding exhibits and witnesses to which Jack Allen agreed with Pete Mann.

Very truly yours,

Richard S. Phillips

RSP:iag

* Enclosure

IN THE UNITED STATES DISTRICT COURT
FOR THE NORTHERN DISTRICT OF ILLINOIS
EASTERN DIVISION

UNIVERSITY OF ILLINOIS FOUNDATION, Plaintiff and Counterclaim Defendant, v. BLONDER-TONGUE LABORATORIES, INC., Defendant and Counterclaimant, v. JFD ELECTRONICS CORPORATION, Counterclaim Defendant.	CIVIL ACTION NO. 66 C 567

PRETRIAL ORDER

Pursuant to stipulation of the parties, it is ordered that the subsequent course of this action prior to trial will be controlled by the following:

1. Each party shall mark its own exhibits and shall furnish a list of such exhibits to the other parties not later than March 25, 1967 with respect to exhibits relating to issues as to which each party has the burden of proof (i.e., the Foundation as to its Amended Complaint; Blonder-Tongue as to its Counterclaim; and JFD as to its Cross-Claim). A list of

LAW OFFICES

AXEL A. HOFGREN
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HOFGREN, WEGNER, ALLEN, STELLMAN & McCORD

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February 21, 1967

Mr. Robert H. Rines
Rines and Rines
No. Ten Post Office Square
Boston, Mass. 02109

Re: University of Illinois v.
Blonder-Tongue et al

Dear Mr. Rines:

At the trial call yesterday Judge Hoffman set case after case during the month of April. When he finally got to the above case he set it for trial on April 24. I explained to him that that was the only time in April that you were not available and he thereupon reset it for May 1st. Inasmuch as he will be gone during the entire month of March, it seems most unlikely that it will be reached on May 1st but you never can tell. In several instances in connection with the cases that were set earlier, the lawyer advised the Judge that there was a likelihood of settlement.

At the hearing Mr. Merriam also suggested that it would be in order to enter a pretrial order with regard to the schedule of exhibits, witnesses, trial brief, etc. and wanted the matter set for hearing on such an order on Thursday of this week. I told the court that I might not be able to get in touch with you in time and suggested that the matter be put over until next month. It will be heard by Judge Decker who will be hearing emergency motions at that time.

After the hearing I talked with Pete Mann about the proposed order as Merriam's comments about it were a little indefinite. Here is what they propose.

1. By April 1 both sides will exchange written schedules of all exhibits which will be offered in evidence at the trial and the names and addresses of all prospective witnesses.

2. By April 15 the parties will file whatever objections they have to the exhibits on the other side's schedule.

3. The parties will exchange pretrial briefs on April 20.

The above is more or less in line with the pretrial order of December 20, 1966 issued for the court by Judge Campbell and of which I believe you have a copy. However, there will be no pretrial conference. Will you agree to the above pretrial order?

I tried to get you on the phone to give you the above information but was unable to reach you yesterday or this morning so thought I had better get this letter off right away.

Yours very truly,

HOFGREN, WEGNER, ALLEN, STELLMAN & McCORD

John Rex Allen

JRA:DB

LAW OFFICES

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JOHN R. HOFFMAN
A. R. OSTRAUSKAS

February 21, 1967 Ltr.

Mr. Robert H. Rines
Rines and Rines
No. Ten Post Office Square
Boston, Massachusetts 02109

RE: UIF v. BT v. JFD

Dear Bob:

I am writing as I have been unable to reach you by phone. I had a long conversation with John Pearne, counsel for Finney, who developed most of the information used by the defense in the trial against Winegard last week in Des Moines. The trial was conducted by Keith Kulie of George Frost's old firm, and I hope to be able to borrow the trial transcript and send you a copy.

With regard to the distribution of Quarterly Report No. 2, John is convinced that no copies were mailed early enough to establish a statutory bar. Copies were delivered, however, to the editor of the publications office at the University of Illinois, on April 29. This office functions like a library although it is not officially so designated. Its purpose is to obtain the widest possible dissemination of information resulting from University research. It is open not only to faculty and students but to interested outsiders. In addition to maintaining a collection of materials available for studying and copying, it lends materials and in many cases, including the case of Quarterly Report No. 2, had a supply of extra copies which are given away so long as they last. The woman who serves as editor was a witness at the trial in Des Moines and John felt clearly established the availability of Quarterly Report No. 2 as early as April 29. According to him, the only rebuttal testimony was that the publications office is not classified on the University records as a library.

Pearne is quite interested in the possibility of comparing notes with you regarding the lawsuit. As I mentioned, he obtained an admission from Prof. Mayes that the

initial suggestion that they V the dipoles came from a Mr. Turner at Wright-Patterson Air Base; and that it was tried after studying the textbooks. The results which were achieved showed an improvement ~~and~~ in gain when operating at the third or higher harmonics as predicted by the texts. They had some evidence of JFD tie-in sales but decided not to use it, to avoid involving their customers.

John would be happy to talk with you on the telephone or, better yet, to meet with you either in Cleveland or in Chicago. Possibly this could be arranged when you are out here the latter part of March.

Pete Mann called me regarding the interrogatories. The Foundation does not have and will not go to the University to get the detailed information which we requested. They have in the past and intend in the future to require that this type of discovery be by deposition of the University personnel. When would you like me to arrange such a deposition?

Very truly yours,

Richard S. Phillips

RSP:iag

February 24, 1967

Jerome M. Berliner, Esq.
Ostrolenk, Faber, Gerb & Soffen
Ten East Fortieth Street
New York, New York 10016

Re: UIF v. B-T v. JFD -66-C-567

Dear Jerry:

We are prepared to assist you in avoiding the necessity of taking testimony in the specific matters and statements contained in the second and third paragraphs of your letter of February 20, 1967, and are willing to stipulate to the authenticity of Ex. J-53 and to the statements that you say Mr. Field would testify to, contained in the third paragraph of your letter. It should be clearly understood, however, that we are not agreeing to any facts or details other than the specific statements above-referred to.

Very truly yours,

RINES AND RINES

By_____

RHR:H

cc: R. Phillips, Esq.

IN THE UNITED STATES DISTRICT COURT
FOR THE NORTHERN DISTRICT OF ILLINOIS
EASTERN DIVISION

THE UNIVERSITY OF ILLINOIS FOUNDATION,

Plaintiff and
Counterclaim Defendant,

- v -

BLONDER-TONGUE LABORATORIES, INC.,

Defendant and
Counterclaimant,

- v -

JFD ELECTRONICS CORPORATION,

Counterclaim Defendant.

Civil Action
No. 66 C 567

REPLY OF BLONDER-TONGUE LABORATORIES INC. TO
CROSS-CLAIM OF JFD ELECTRONICS CORPORATION

Defendant, Blonder-Tongue Laboratories Inc., by its attorneys, answers the cross-claim of JFD Electronics Corporation as follows:

Blonder-Tongue Laboratories Inc. realleges all of the paragraphs of its reply to the cross-claim as herein filed.

HOFGREN, WEGNER, ALLEN, STELLMAN & McCORD

By_____
Attorneys for Defendant and
Counterclaimant

February _____, 1967.

CERTIFICATE OF SERVICE

I hereby certify that a copy of the foregoing Reply of Blonder-Tongue Laboratories Inc. to Cross-Claim of JFD Electronics Corporation was mailed by first class mail this _____ day of February, 1967, to each of the following:

SILVERMAN & CASS
Attorneys for Counterclaim Defendant
105 West Adams Street
Chicago, Illinois 60603

MERRIAM, MARSHALL, SHAPIRO & KLOSE
Attorneys for Plaintiff and
Counterclaim Defendant
30 West Monroe Street
Chicago, Illinois 60603.

LAW OFFICES

HOFGREN, WEGNER, ALLEN, STELLMAN & McCORD

20 NORTH WACKER DRIVE

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JOHN P. MILNAMOW
DILLIS V. ALLEN
W. A. VAN SANTEN, JR.
JOHN R. HOFFMAN
A. R. OSTRAUSKAS

January 30, 1967 Cont. Litde

VIA AIR MAIL

Mr. Robert H. Rines
Rines and Rines
No. Ten Post Office Square
Boston, Massachusetts 02109

RE: UIF v. BT v. JFD

Dear Bob:

I have been advised by Mike Cass that JFD would like to take the depositions of Harry Gilbert, Dick Halsocki and Jerry Cohn, in Faber's office starting February 6. If there will be any problem in having these three men available at that time, let me know immediately.

Very truly yours,

Richard S. Phillips

Richard S. Phillips

RSP:iag

cc: Mr. I. S. Blonder

McNENNY, FARRINGTON, PEARNE & GORDON
920 MIDLAND BUILDING
CLEVELAND, OHIO 44115

July 25, 1967

Richard S. Phillips, Esq.
Hofgren, Wegner, Allen, Stellman & McCord
20 North Wacker Drive
Chicago, Illinois 60606

Re: The University of Illinois Foundation v. Winegard Company

Dear Dick:

You will be interested in the enclosed copy of Judge Stephenson's order of July 18, 1967, on the motion of plaintiff in the above case for reconsideration and amendment of the decision of June 23, 1967. Considering how the plaintiff presented its motion, merely calling attention to an alleged error in footnote 14, and how defendant merely argued that footnote 14 was correct as written (neither party telling the Judge, even in substance, how he might amend his decision), I think the Judge did a very neat job of amending his decision without detracting from its original force. In fact, I feel that the Judge demonstrated greater ingenuity in coping with the problem than counsel for either of the parties.

Sincerely,

John

JFP:jh
Enclosure

cc: Robert H. Rines, Esq.

IN THE UNITED STATES DISTRICT COURT

FOR THE SOUTHERN DISTRICT OF IOWA

DAVENPORT DIVISION

UNIVERSITY OF ILLINOIS FOUNDATION,

Plaintiff,

vs.

WINEGARD COMPANY,

Defendant.

Civil No. 3-693-D

ORDER

This matter is now before the Court on the plaintiff's motion pursuant to Fed. R. Civ. P. 52(b) to amend the Court's finding of fact. More specifically, the plaintiff moves the Court to reconsider and amend footnote 14 of the opinion which was filed June 23, 1967.

After having considered the briefs of counsel and after having examined PX-68, referred to in plaintiff's motion, it is the view of the Court that the said footnote 14 would more accurately express the meaning intended by the Court, and more precisely conform to the evidence if it were amended as set out below.

IT IS ORDERED that footnote 14 of the memorandum opinion filed herein on June 23, 1967, be and the same is hereby amended, by deleting the last sentence thereof, and substituting in its place the following sentence, to wit:

> However, there is nothing in the file wrapper to indicate that, in ruling on the patentability of the Isbell patent, the patent examiners considered the published

work of DuHamel and Ore, the formula set out therein, or the log periodic theory of antenna design all of which was a part of the prior art at the time of the application. Reference was made thereto in the interference proceedings as indicated in PX-68.

Dated this 18th day of July, 1967.

/s/ Roy L. Stephenson
CHIEF JUDGE

to Bob Rines

VICTOR H. POMPERI

H. H. SCOTT, INC.
111 POWDER MILL RD.
MAYNARD, MASS.

Voids Patent Of Univ. of Ill. Foundation

DES MOINES, Ia. — U. S. District Judge Roy L. Stephenson has declared invalid University of Illinois Foundation's Patent No. 3,210,767 for a frequency-independent, unidirectional antenna.

The ruling was made in the foundation's suit charging that Winegard Co., Burlington, Ia., makes antennas that infringe the patent. The suit was filed in March, 1966.

The judge said the claimed invention was obvious in view of prior art.

The patent involved the so-called "long-periodic" antenna design concept for dipole arrays and was originally issued to D. E. Isbell on Oct. 5, 1965. One of the prior patents cited by the judge was issued to John R. Winegard on Jan. 18, 1955.

IC Test System For Under $5000 New at Redcor

Heinrich Heads Hamco Machine

ROCHESTER, N. Y. — Robert G. Heinrich, formerly vice-president, has been named president and chief executive officer of Hamco Machine & Electronics Corp. He succeeds Bernard Kozel, chairman, as president.

Mr. Heinrich was an owner of Hambleton-Heinrich, Inc., and owner of Heinrich Metal Products, Inc., from 1947 through 1959 before he joined Hamco.

Hamco produces semiconductor processing products marketed by Navan, invention marketing subsidiary of North American Aviation; and thin-sectioning machines marketed by Bronwill Scientific. It recently introduced a machine for production lapping of semiconductor wafers.

Whittaker Plans To Acquire Fanon In Stock Deal

LOS ANGELES. — Whittaker Corp., here, said Friday it plans to acquire Fanon Electronic Industries, Newark, N. J., an agree-

Illinois U Gets 150kv X-Ray Unit

URBANA, Ill.—A new 150 kilovolt X-ray installation with electronic fluoroscopy has been installed here in the department of Geology Oceanography Laboratories in the Natural History Building at the University of Illinois.

Professor Adrian F. Richards, of the university's departments of Geology and Civil Engineering, who is in charge of the facility, noted that "It is one of the finest and most modern installations of any science department in the nation."

The equipment includes an image intensifier for electronic fluoroscopy with electronic zoom to enlarge selected areas; and a versatile specimen handling system which was built in the university's civil engineering shop to position and move specimens in front of the X-ray beam.

Specimens include 50-pound plastic tubes, 5 feet long and 4½ inches in diameter; which contain undisturbed sediments from the sea bottom which are trapped by pushing 10-foot tube sections into the bottom and by sealing the ends to preserve moisture

Chisholm Resigns Teleflex Presidency

NORTH WALES, Pa. — M. C. C. Chishon, Jr., has resigned from the presidency of Teleflex, Inc., upon the advice of his physician, according to company spokesmen.

Richard P. Barnard, vice-president and a director, succeeds Mr. Chisholm as president.

Mr. Chisholm remains active as executive committee chairman. He is the son of Cameron Chisholm, founder of Teleflex.

File

LAW OFFICES

HOFGREN, WEGNER, ALLEN, STELLMAN & McCORD

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W. A. VAN SANTEN, JR.
JOHN R. HOFFMAN

July 18, 1967

Mr. John F. Pearne
McNenny, Farrington, Pearne & Gordon
920 Midland Building
Cleveland, Ohio 44115

Dear John:

In accordance with our telephone conversation, * I enclose our copy of the deposition Bob Rines took of Ed Finkel together with prints of the exhibits. I imagine you have most of them but am sending these on in case there may be something you have missed.

Please return the deposition when you have finished with it.

Very truly yours,

Richard S. Phillips

RSP:iag

* Enclosures

cc: Mr. Robert H. Rines

LAW OFFICES

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WILLIAM R. McNAIR
JOHN P. MILNAMOW
DILLIS V. ALLEN
W. A. VAN SANTEN, JR.
JOHN R. HOFFMAN

July 18, 1967

cy Bcc Tongue 7/21/67

Mr. Robert H. Rines
Rines and Rines
No. Ten Post Office Square
Boston, Massachusetts 02109

RE: UIF v. BT v. JFD

Dear Bob:

John Pearne was unable to reach you and called me to borrow the transcript of Ed Finkel's deposition. He is planning to take a deposition from Finkel in August or September.

I understand there has been a motion filed in the Winegard suit to modify the court's findings. In the decision, the Judge commented in a footnote that the file wrapper did not indicate that the Examiners were aware of the DuHamel and Orr publications regarding log periodic antennas. It is my understanding that this did come out during the interference proceedings but was not specifically a part of the ex parte prosecution. I will check from time to time with Keith Kulie and let you know what action is taken on the motion.

4802.61

* I enclose our June statement. We would appreciate very much having a payment made on this.

Very truly yours,

Dick

Richard S. Phillips

RSP:jag

* Enclosure

RECEIVED
JUL 20 1967
RINES AND RINES
NO. TEN POST OFFICE SQUARE, BOSTON

cc. to Belmont

LAW OFFICES

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STANLEY C. DALTON
RICHARD S. PHILLIPS
LLOYD W. MASON
TED E. KILLINGSWORTH
CHARLES L. ROWE
JAMES R. SWEENEY
W. E. RECKTENWALD
J. R. STAPLETON

WILLIAM R. McNAIR
JOHN P. MILNAMOW
DILLIS V. ALLEN
W. A. VAN SANTEN, JR.
JOHN R. HOFFMAN

June 30, 1967

Mr. Robert H. Rines
Rines and Rines
No. Ten Post Office Square
Boston, Massachusetts 02109

RE: UIF v. BT v. JFD

Dear Bob:

We had anticipated that Judge Hoffman might set a tentative date for next fall. He did not do so. He indicated that it is his present intention to take his civil trial call in chronologic order when summer vacation is over. However, criminal cases must be disposed of first and there is no way of telling now when the civil cases may start. Our court goes back in session on Monday, September 11. We will check the last week in August and see what we can learn about Judge Hoffman's calendar.

In the meantime, I suggest you give consideration to an amendment of the answer and to the possible stipulation of some of the evidence.

Very truly yours,

Richard S. Phillips

RSP:iag

cc: Mr. I. S. Blonder

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the industry would substantially reduce its sales of alloy wire.

(E) For the purpose of neutralizing plaintiffs' efforts to sell their Flange Master and Traloy, and for the purpose of preventing acceptance of plaintiffs' process by the rebuilding industry, defendant attacked plaintiffs, their integrity, their method of doing business and their ability to do business. This attack consisted of an oral presentation to Caterpillar Tractor Company, designed to destroy its goodwill and assistance toward plaintiffs, and the publication and distribution throughout the world of letters and pamphlets containing false and misleading statements about plaintiffs and their business directed to customers and prospective customers of plaintiffs' machine and wire.

(F) Defendant's acts were intentional and effective. By taking advantage of its established position as a technical advisor to the rebuilding industry, and by utilizing its network of field representatives and distributors, as well as by direct mailings to rebuilding shops throughout the world, defendant was able to virtually destroy the market for plaintiffs' Flange Master and Traloy wire."

"The reputation of a tradesman in the sphere in which he earns his living is a valuable asset and is entitled to the protection of the law. In Moore v. Francis, 121 N.Y. 199, it is said: 'Whatever words have a tendency to hurt, or are calculated to prejudice, a man who seeks his livelihood by any trade or business, are actionable.' * * * Newell on Libel and Slander, (4th Ed. 1924), p. 156, in discussing this matter places imputations against a man's business, profession or means of livelihood next to that of his life or liberty, and says that while it would be difficult to reconcile all of the various decisions upon this subject, the general rule is apparent that words are actionable which directly tend to the prejudice of one in his office, profession, trade or business, and an action will lie for any words which prejudice him in such trade or employment, and although the statements may seemingly concern the goods only they may so reflect upon the merchant himself as to amount to a libel per se. Many cases could be cited to support this rule, for it is one of long lineage as is evidenced by Linotype Co. v. British Empire Typesetting Machine Co., 1899, 81 L. T., N.S., 331, 15 Times L.R. 524; Burnet v. Wells, 12 Mod. 420, 88 Eng. Reprint 1423; 36 Corpus Juris 1188, section 88 et seq.; Annotation, 48 L.R.A., N.S., 1214."[5]

The findings of the trial court establishing liability are supported by the evidence.

3. Evidence

(a) Admissibility of the evidence in bulk

A great portion of the exhibit evidence containing depositions and exhibits attached to them were admitted in bulk. Stoody objects to this procedure.

Prior to the admission of the exhibit evidence, the following colloquy took place:

"It is my policy in a court case, I think you know, any instruments that either one of you want to introduce, I'll accept them and admit them into evidence with the reservation that I won't consider them if I come to the conclusion that they are incompetent, irrelevant or immaterial and that they would all go in by agreement of you gentlemen, if that is satisfactory, over the objection of each of you, so that way, you won't have to introduce every piece of paper separately, but that each instrument is offered. Do you have such instruments? * * * Do either of you raise any question about the competency, relevancy or materiality of any of those instruments?" The answer was no.

Then, the court and counsel discussed the many depositions and the documents identified with them. It was suggested by the court that counsel should sit down during recess and chronologically mark all the exhibits, including depositions, and "that all the exhibits that either side offers be admitted subject to objection of the admissions only as to authenticity and that you still have the right and submit it with the objection on any other ground that you might have. And I won't consider them if I come to the conclusion you are right and they are not competent, relevant or material." Counsel for appellant replied, "Insofar as any document that has come to my attention during the course of the numerous depositions, we have no question about authenticity." The court then replied, "All right."

Rule 43(a) F.R.Civ.P. *in the main*, puts admissibility on the basis of relevancy and materiality.

This court has said and reiterated, "* * * Rule 43(a) is 'a rule of admis-

[5] Rosenberg v. J. C. Penney Co., 30 Cal.App.2d 609.

sibility, not a rule of exclusion'" and it "'* * * is designed to favor the reception of all the evidence 'which properly may be introduced in respect to the point in controversy.'" Mutual Life Insurance Company of New York v. Bohlman, 328 F.2d 289, 294.

(b) Expert testimony of marketing specialists

The amount of damage was established by the expert testimony of Gustafson and Albert. The qualifications of the witnesses is set forth at length in the transcript. Each had experience and was recognized as either a market analyst or an economic feasibility expert. The damages were difficult to ascertain because the manufacture of the Flange Master was a new venture. The rebuildung business itself was in its infancy, but a substantial volume of business had been created by the continued experimentation of the repair shops. The trial court had found for Royer on the issue of liability.

"'A witness is an expert witness and is qualified to give expert testimony if the judge finds that to perceive, know or understand the matter concerning which the witness is to testify, requires special knowledge, skill, experience or training and that the witness has the requisite special knowledge, skill, experience or training.' Restatement Model Code of Evidence, § 402 'Whether a witness called to testify to any matter of opinion has such qualifications and knowledge as to make his testimony admissible, is a preliminary question for the judge presiding at the trial, and his decision of it is conclusive, unless clearly shown to be erroneous as a matter of law.' [Citations omitted]. We have recently said that 'the qualification of the witnesses to testify as experts and the weight to be given to their testimony were matters peculiarly for the trial court.' Korth v. Zion's Savings Bank & Trust Company, 148 F.2d 170, 171, 172. Wigmore maintains that the trial court should be left to determine 'absolutely and without review' the qualifications of a particular witness. Wigmore on Evidence, 2d Ed., Vol. 1, § 561." [6]

In reviewing expert economist's testimony, Judge Lewis said, "Whether or not the witness is qualified or whether or not the subject is one proper for expert testimony has repeatedly been held to be a matter largely within the trial court's discretion. [Citations omitted]." Barnes v. Smith, 305 F.2d 226, 232,.

"In testing the competency of the witness to give opinion testimony with respect to the highest price which might be obtained from a sale of the railroad, it would have to appear to the trial court: (1) that he had knowledge of the property to be sold; (2) that he had knowledge of the various attendant circumstances and conditions which would affect the disposal of the property and determine the price; and (3) that he had the ability, by reason of his training and experience, to make a judgment which would be helpful to the court in determining the issue. See Wigmore on Evidence (3rd ed.) sections 711, 717, 1923, 1976.

* * *

The competence of a witness to testify as to his opinion is largely within the discretion of the trial court; 'its ruling thereon will not be disturbed unless clearly erroneous.' [Citations omitted]." Spitzer v. Stichman, 278 F.2d 402, 409.

In view of the trial court's consideration and acceptance of the expert testimony received by the master, we cannot say he was clearly erroneous.

(c) Was there substantial evidence to sustain the court's findings?

The volumes of testimony read by us on the issues of liability and damages leave us convinced that reasonable men might draw different inferences. We rely upon the findings of the lower court rather than substitute our judgment.

"Rule 52(a), Fed.Rules of Civ. Proc. 28 U.S.C.A., provides that in an action tried without a jury, the findings of fact shall not be set aside unless clearly erroneous, and due regard shall be given to the opportunity of the trial court to judge the credibility of witnesses. It is well established that appellate courts are required to accept findings of fact if supported by substantial evidence and not clearly erroneous. [Citations omitted]. Substantial evidence means more than a mere scintilla, and is such relevant evidence as a reasonable mind might accept as adequate to support a conclusion [Citations omitted]. If, from established facts, reasonable men might draw different inferences, appellate courts may not substitute their judgment for that of the trial court. [Citations omitted]." Federal Security Insurance Co. v. Smith, 259 F.2d 294, 295.

[6] Bratt v. Western Air Lines Inc., 155 F.2d 850, 853.

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G. E. v Generica
174 F. 1013

LAW ON EXPERT TEST.

The primary fact case is on. If the judge can understand it, he can decide it. If he can not understand it, he can not decide it. Law of case cited on page 1015 of 174 F. I have not reviewed them.

The second below cases state of law by way of decision.

I know that our local courts decided a case, in the early 1920's, without expert testimony. The facts involved relating to a drawing-board table, and Mr. Woodworth, for the defense, argued, and the two courts agreed, that they could be understood without expert testimony. The case was reported, but I do not remember its name.

In the present case, it may would help possible the testimony to be introduced that would make the case understandable; perhaps on cross-examination. You stated, and it show, that facts as to the same patent have been found in another suit. Perhaps the judge could rule that he could understand those fact findings in the light of the evidence before him.

American, 71 F.S. 712, 721
Typo Founders v Peerless Foundry

Cohn v Cowan
265 F. 900

Union Switch v Perkins
251 F. 634, 663

IN THE UNITED STATES DISTRICT COURT

FOR THE SOUTHERN DISTRICT OF IOWA

DAVENPORT DIVISION

UNIVERSITY OF ILLINOIS FOUNDATION,

Plaintiff,

vs.

WINEGARD COMPANY,

Defendant.

Civil No. 3-695-D

MEMORANDUM OPINION

This action was brought by the plaintiff University of Illinois Foundation, the owner by assignment of U. S. Patent 3,210,767, issued to Dwight E. Isbell on October 5, 1965 (hereinafter referred to as the Isbell Patent and attached hereto as Appendix A), against the defendant Winegard Company wherein the plaintiff seeks a finding that said patent has been and is being infringed by the defendant. In its answer the defendant alleges, inter alia, invalidity of the patent on the grounds that the invention was disclosed more than one year prior to the date of the application for the patent and that, at the time made, the invention was obvious to one skilled in the art. Jurisdiction is established by virtue of 35 U.S.C. § 381 and 28 U.S.C. § 1338.

Inasmuch as the defendant alleges invalidity of the patent as a defense, the Court must determine initially whether or not the Isbell patent is valid. General Mills, Inc. v. Pillsbury Co., _____ F.2d _____ (8th Cir., June 8, 1967); American Infra-Red Radiant Co. v. Lambert Indus., Inc., 360 F.2d 977, 983-84 (8th Cir.,1966). Of course, a patent, from the fact of its issuance is presumed to be valid. 35 U.S.C. § 282;

Radio Corporation of America v. Radio Engineering Laboratories, Inc., 293 U.S. 1, 7-8 (1934); L & A Products, Inc. v. Britt Tech. Corp., 365 F.2d 83, 86 (8th Cir., 1966); American Infra-Red Radiant Co. v. Lambert Indus.,Inc., supra at 988-89. However, this presumption of validity is weakened when, as in this case, there are prior art references or alleged disclosures of the patent before the Court that were not considered by the patent office during the prosecution of the application for the patent. Imperial Stone Cutters, Inc. v. Schwartz, 370 F.2d 425, 429 (8th Cir., 1966); American Infra-Red Radiant Co. v. Lambert Indus.,Inc., supra at 989; Greening Nursery Co. v. J & R Tool & Mfg. Co., 252 F. Supp. 117, 139 (S.D. Iowa 1966), aff'd _____F.2d _____ (8th Cir., May 9, 1967).

There are three separate conditions precedent to patent validity. They are: Novelty, utility, and nonobviousness. 35 U.S.C. §§ 101-03; Graham v. John Deere Co., 383 U.S. 1, 12 (1966); United States v. Adams, 383 U.S. 39, 48 (1966); L & A Products, Inc. v. Britt Tech. Corp., supra at 85. In this case the defendant relies on lack of novelty (Title 35 U.S.C. Section 102) and obviousness (Section 103) as barring patentability. It is the opinion of the Court that the issue of obviousness is dispositive of this case. Therefore, that issue will be first considered.

While the ultimate question of patent validity is one of law, the determination of the question of obviousness lends itself to several basic factual inquiries. Graham v. John Deere Co., supra at 17; L & A Products, Inc. v. Britt Tech. Corp., supra at 86. In addition to setting out the scope of the patent in suit, the scope and content of the prior art must

be defined so that a determination can be made as to whether the differences between the patent in suit and the pertinent prior art would have been obvious to one ordinarily skilled in the art. If such differences as may exist would have been obvious to a person ordinarily skilled in the art, the obviousness test of 35 U.S.C. § 103 has not been met and the patent will be invalid. Graham v. John Deere Co., supra, at 37; General Mills, Inc. v. Pillsbury Co., supra.

The Patent in Suit

The Isbell Patent is entitled "Frequency Independent Unidirectional Antennas" and relates to antennas designed for the transmission and reception of electromagnetic radio frequency signals. These signals are used for the broadcasting of many types of communications including radio and television signals. The Isbell antenna consists of a plurality of elements called "dipoles"[1] which are arranged in relation to each other and

1. Generally, in this context, a simple straight dipole antenna element consists of two elongated metallic conductors (wires, rods or tubes) arranged approximately colinearly in such a manner that there is a small gap or terminal between their inner ends, at which point a transmission line is attached. The familiar "rabbit-ear" indoor television antenna is a simple dipole having its arms at an angle rather than in a straight line. When immersed in an electromagnetic field the dipole element will intercept electromagnetic radio waves and produce a voltage across the terminal. This voltage is carried to the receiver by means of the transmission line. The dipole antenna element, like any other electrical conductor, will intercept radio energy from the atmosphere to a limited extent, regardless of the frequency of the energy being transmitted. There is, however, a special condition, known as "resonance", in which the dipole is strongly receptive, which occurs when the dipole is of a particular length in relationship to the wavelength of the radiated energy. This condition occurs primarily when the overall length of the dipole is one-half of the wavelength of the radio wave. Thus, it is apparent that a dipole can be "tuned" for optimum reception of a particular radiowave frequency by adjusting the overall length of the dipole. The relative ability of one antenna to produce a signal (i.e., a radio frequency voltage) at a given location distant from the transmitting station in comparison with another antenna similarly located is a measure of the antenna's "gain," a technical term used in the industry in reference to an antenna's signal-producing capabilities.

connected to each other in a particular manner. Generally, as stated in the patent specification, "the antennas of the invention are coplanar dipole arrays consisting of a number of dipoles arranged in side-by-side relationship in a plane, the length and the spacing between successive dipoles varying according to a definite mathematical formula, each of the dipoles being fed by a common feeder (transmission line) * * * ."[2] According to the patent specification,

> The lengths of the dipoles and the spacing between dipoles are related by a constant scale factor τ defined by the following equations:
>
> $$\tau = \frac{L(n+1)}{Ln} = \frac{\Delta S(n+1)}{\Delta Sn}$$
>
> where τ is a constant having a value less than 1, Ln is the length of any intermediate dipole in the array, L(n+1) is the length of the adjacent smaller dipole, ΔSn is the spacing between the dipole having the length Ln and the adjacent larger dipole, and ΔS(n+1) is the spacing between the dipole having the length Ln and the adjacent smaller dipole.[3]

The feeder or transmission line consists of two conductors, one of which is connected to the inner end of one-half of each dipole, the other being connected to the inner end of the other half of the dipole, and transposed between connections of successive dipoles in such a manner that each conductor is connected alternately to the left and right halves of successive dipoles. (See Appendix A, Fig. 1.)

Antennas designed in accordance with the patent specifications are claimed to have unidirectional radiation patterns and high quality performace which are, over a wide band of frequencies, essentially independent of the frequency of the electromagnetic radio waves being transmitted or received. An

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2. Isbell Patent, Col. 1, lines 14-19. See App. A.

3. Isbell Patent, Col. 1, lines 50-62. See App. A.

antenna with such characteristics is, of course, desirable when the reception of many different frequencies is required as one such antenna may be used in place of many antennas which are each capable of receiving a limited number of frequencies. Since VHF television signals are broadcast over a range of frequencies of 54 megacyles/second to 216 megacycles/second,[4] an antenna capable of receiving high quality signals with uniform performance characteristics in that range of frequencies would be of commercial utility. This is particularly true in respect to the reception of color television signals where the minimum standards of performance are higher than those required for satisfactory black and white television reception.

There are fifteen claims in the Isbell patent. See Appendix A. All of the claims except numbers 6, 7 and 8 are claimed to be infringed by one or more of twenty-two models of defendant's antennas which are designed for the reception of television signals.[5] Specifically, all twenty-two models

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4. Channels 2-6 broadcast over radiowave frequencies 54-88 megacycles/second, each channel being assigned a band 6 megacycles wide in which to broadcast. Thus, channel 2 broadcasts over the range 54-59 megacycles/second; channel 3, 60-65 megacycles/second; etc. Channels 7-13 broadcast over frequencies 176-216 megacylces/second, with 89-175 megacycles/second being assigned to non-television broadcasting. While some of the antennas accused of infringing are designed for the reception of VHF and UHF (470-890 megacycles/second) signals, it is only the VHF sections of these antennas that are alleged to be infringements of the Isbell patent.

5. The Winegard antennas that are alleged to be infringements of the Isbell patent are the models with the following numbers:

Chromaflex	B-445	R.C.A.	10-B-200
"	B-550	"	10-B-300
"	B-555	"	10-B-400
"	B-660	"	10-B-1010
"	B-770	"	10-B-1020
"	B-105	"	10-B-1030
"	B-335	"	10-B-1040
Chromatel	CT-40	"	10-B-1050
"	CT-80	"	10-B-1120
"	CT-90	"	10-B-1130
"	Ct-100	"	10-B-1140

are alleged to be literal infringements of claims 14 and 15 and also within the inventive concept of claims 1-5 and 9-13. In addition, one of the antennas, the chromatel CT-100, is alleged to be a literal infringement of claims 1, 2, 9, 10, 11, and 12. It should be noted here that while the portions of the antennas which are charged as infringing are designed solely for the reception of VFH television signals, the Isbell antenna is not so limited. It is designed both as a receiving antenna and a transmitting antenna for use in an unlimited range of frequencies. For example, the specification indicates that the antenna has very high performance characteristics over as high a range as 1100 to 1800 mc/sec.[6]

Prior Art

Four prior patents are cited in the patent as having been considered by the patent examiners. One of these patents, five other U. S. patents not referred to by the examiners, an article published on March 31, 1958 and three antennas in use prior to 1959 are among the references relied upon by the defendant as revealing the prior art at the time of the invention. An examination of some of these references will be helpful in defining the state of the prior art on May 3, 1960, the date of the filing of the application for the patent.

The Katzin patent (U.S. Patent No. 2,192,532, the first page of which is attached hereto as Appendix B) cited by the patent office reveals an antenna consisting of an array of dipole elements of different lengths arranged in a side-by-side relationship in a plane. While some of the illustrated embodiments of the Katzin invention show antennas having several elements of one length arranged parallel to several elements of

6. Isbell Patent, Col. 2, lines 47-52. See App. A.

another length, one illustrated embodiment (Figure 3c, Appendix B) shows an array described in claim seven of the patent as being "a plurality of aerial elements, all of differing length, continuously tapering in length from one end of said antenna to the other * * * ."[7] The patent also suggests, in claim 11 thereof, that the spacing between the shorter elements may be less than that between the longer elements.[8] The teaching of the Katzin patent is that if elements, or groups of elements, of differing lengths are combined into one array, each of the elements, or groups of elements, "will respond most efficiently to its corresponding band of frequencies, so that the combination of two or more such groups * * * will give the result of a high response for a wider frequency band."[9]

One of the antennas cited as prior art by the defendant is the Channel Master "K. O." antenna model 1023, produced and marketed by the Channel Master Corporation of Ellenville, N. Y. between September 1954 and December 1958. A schematic diagram of this antenna, Exhibit DX-G-16, is attached hereto as Appendix C. This antenna is an array of folded dipoles,[10] each

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7. U.S. Patent No. 2,192,532, p. 2, Col. 2, lines 54-58.
8. U.S. Patent No. 2,192,532, p. 3, Col. 2, lines 5-14; See also Fig. 3d, App. B.
9. U.S. Patent No. 2,192,532, p. 2, Col. 1, lines 16-21.
10. Folded dipoles are simple dipoles, see n. 1, supra, which have been altered by adding another conductor in such a manner that it is approximately parallel to the simple dipole and attached to the outer ends of each half of the simple dipole. The resulting structure is an elongated loop having a terminal point midway along one of its longer sides. (See App. C) Folded dipoles have somewhat different characteristics than straight or simple dipoles, the primary differences being that folded dipoles have better performance over a greater bandwidth of frequencies and that folded dipoles have a greater resistance to the flow of electric current than do simple dipoles. This resistance to the flow of current is known as "impedence." In order to achieve the maximum transmission of the signal to the receiver, the impedence of the antenna, the transmission line and the receiver should be as nearly equal

of a different length, arranged in a coplanar side-by-side relationship decreasing in length from one end of the array to the other. The spacing between the dipole elements is irregular, the elements not being equally spaced and the spacing not varying progressively from one end of the array to the other. The feeder or transmission line running between the elements consists of two conductors, one of which is connected to one end of the folded dipole at the terminal point, the other connected to the other end of the dipole at the terminal point, and transposed between dipoles such that each conductor is alternately connected to the left and right ends of successive dipoles. Transposed feeder lines are also shown in the Koomans Patent (U.S. Patent No. 1,964,189, the first page of which is attached hereto as Appendix D) and the Winegard Patent (U.S. Patent No. 2,700,105, the first page of which is attached hereto as Appendix E), both of which are cited as prior art by the defendant. The White Patent (U.S. Patent No. 2,105,569, the first page of which is attached hereto as Appendix F) also uses transposed feeder lines in conjunction with dipole elements decreasing in length from one end of the array to the other. However, the White array is "center-fed," that is, connected to the down lead transmission line which leads to the receiver, at the center of the array, rather than at the end of the array. The antennas described in the Katzin, Koomans, and Winegard patents noted above and the "K. O." antenna, as well as the Isbell antenna, are all fed at the end of the antenna having the smaller

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10. (Con'd) as possible. Television transmission line and receivers have an impedence set by FCC regulation at about 300 ohms. A simple dipole has an impedence of about 75 ohms while a folded dipole has an impedence of about 300 ohms.

elements.

The article cited by the defendant Winegard as prior art is "Logarithmically Periodic Antenna Designs" published by R. H. DuHamel and F. R. Ore on March 31, 1958. This article explains the elements of the theory of logarithmically periodic (log periodic) antennas and the development of several such antennas. Generally stated, log periodic antennas are designed according to the theory that an antenna "design cell"[11] having high performance characteristics for reception of a limited band or period of radio frequency signals, if altered in all dimensions by a constant scale factor will have high performance characteristics for reception of a band of signals having wavelengths which vary from the wavelengths of the first band of frequencies by the same constant scale factor. Thus, according to the theory, if an antenna design cell has certain characteristics for reception of particular frequency wavelengths, an antenna geometrically similar but reduced in all dimensions by a scale factor of .5 will have similar characteristics for reception of frequencies of wavelengths half those of the first. The theory continues that if a particular design cell is reduced successively by a constant scale factor which is less than 1, and repeated periodically in one antenna "array", the array will have the characteristics of the design cell over a broader band of frequencies which is limited only by the largest and smallest of the geometrically similar design cells which are

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11. The term "design cell" is used herein to refer to a structural unit of an antenna which is capable of receiving and transmitting electromagnetic radio energy. A simple or folded dipole and an adjacent section of transmission line are examples of such antenna design cells. A particular antenna array may be composed of one or more similar or dissimilar design cells.

repeated in the array. Because the performance of the antennas so designed is theoretically the same over any band of frequencies for which the antenna is designed the antennas are termed Frequency Independent Antennas. The application of this theory to antenna design appears to be limited only by the conditions that the design cell used must have uniform performance over a single period and that the overall array, the periodic repetition of the cell, not cause an "end effect"[12] that would destroy the frequency independence of the array.

The formula set out by DuHamel and Ore as defining the relationship between the repeated, or periodic, design cells is: $\tau = \frac{R_{n+1}}{R_n}$, which defines a constant proportional relationship between like elements of the design. In this case the formula relates to the radii of circular structures. Of course, in the case of geometrically similar designs all dimensions of one design are proportionally equal to all dimensions of the other similar designs. That is, they must all vary proportionally. The theory of the log periodic antenna was adopted by Isbell in his work and the formula, $\tau = \frac{L_{(n+1)}}{L_n} = \frac{\Delta S_{(n+1)}}{\Delta S_n}$ where τ is a constant having a value of less than 1, can be

12. Very generally stated, "end effect" is a term used to describe a bouncing back and forth, from one end of an antenna array to the other, of any energy that is not fully transmitted or absorbed by the elements of the antenna as the energy travels initially along the antenna. This bouncing, or reflection, back and forth may cause shadows or ghosts in the reception of a television picture. Thus, in order to avoid this end effect an antenna should be designed to have sufficient elements to radiate or absorb all of the energy as it passes from one end of the antenna to the other so that there will be no such reflection of the energy back down the antenna.

seen to be a simple adaptation of the DuHamel-Ore formula[13] and its mathematical equivalent.

The Invalidity of the Patent

Keeping in mind the prior art previously discussed, it can be seen that an antenna with the general parameters of the Isbell Patent will result from a combination of the dipole array of Katzin with the transposed feeder line of the Channel Master "K. O. " or the Koomans or Winegard Patents. Such an antenna would consist of a coplanar side-by-side array of straight dipole elements of differing lengths which decrease in length and spacing from one end of the array to the other (as disclosed by claims 7 and 11 of the Katzin patent), fed at the small end of the array by a two conductor transmission line that is transposed between successive elements (as disclosed by the Koomans and Winegard Patents and the Channel Master "K. O." antenna). Further, if

13. While DuHamel and Ore defined circular structures by relating the radii of different parts of one cell to the radii of another, Isbell has defined linear structures by relating the lengths and spacings of one design cell to another. That these are alternative means of expressing the same mathematical relationsip is evident from an examination of Figure 1 of the Isbell patent and the discussion, found in Col. 1, line 63 to Col. 2, line 2 of the patent, relative to the distance from the base line O, in Figure 1, to the dipole having the length Ln. If the distance from the base line O to dipole having the length Ln were the radius of a circle having its axis at line O and its circumference tangent to the same dipole, the distance represented by Xn ("the distance from the base line O to the dipole having the length Ln", see Col. 1, lines 71-72 of Appendix A) would be equal to Rn, where Rn is the radius of the said circle having its axis at O and its circumference tangent to the dipole of length Ln; then, it is easily seen that the formulas $\tau = \frac{R_{n+1}}{R_n}$ (Isbell) and $\tau = \frac{X_{(n+1)}}{X_n}$ (DuHamel & Ore) are different but equal mathematical expressions of the same proportional relationship.

the length and spacing of the dipole elements in such an antenna are adjusted by the log periodic theory of antenna design which dictates that the periodic or repeating cells (here a dipole element and adjoining section of transmission line) shall be geometrically similar and related to each other in size by a constant scale factor, the result is the Isbell antenna disclosure. It is thus apparent that the Isbell antenna is a combination of elements, all known in the prior art and also that these known elements were combined in the Isbell antenna in a manner dictated by a theory also known in the prior art. Therefore, the critical question is whether such a combination would have been obvious to one reasonably skilled in the art of antenna design. United States v. Adams, supra at 50-52; Kell-Dot Indus., Inc. v. Graves, 361 F.2d 25, 30 (8th Cir., 1966); Infra-Red Radiant Co. v. Lambert Indus., Inc., supra at 988. Those skilled in the art at the time of the Isbell application knew (1) the log periodic method of designing frequency independent antennas, (2) that antenna arrays consisting of straight dipoles with progressively varied lengths and spacings exhibit greater broad band characteristics than those consisting of dipoles of equal length and spacing and, (3) that a dipole array type antenna having elements spaced less than 1/2 wavelength apart could be made unidirectional in radiation pattern by transposing the feeder line between elements and feeding the array at the end of the smallest element.

It is the opinion of the Court that it would have been obvious to one ordinarily skilled in the art and wishing to design a frequency independent unidirectional antenna to combine these three old elements, all suggested by the prior art

references previously discussed.[14] The test of obviousness is the proper test to be applied in determining whether a new combination of known elements is patentable. American Infra-Red Radiant Co. v. Lambert Indus., Inc., supra at 988. When one skilled in the art with the prior art references before him could have, without the exercise of inventive faculty, combined old elements known in the art to produce the plaintiff's "invention," the "invention" does not rise to the level of patentability notwithstanding the fact that it may be an improvement over the

14. It should also be noted that the File Wrapper of the Isbell patent indicates that on November 9, 1960, all original 9 claims (final claims 1-8 and another never approved) were initially rejected by examiner G. N. Westby as being met by Katzin (Patent No. 2,192,532, App. C) in view of other patents teaching the crossing of the feeder line and the use of straight tubular conductors. On May 10, 1961, Isbell submitted an amendment to the Patent Office wherein he argued that "there is certainly no teaching or suggestion in the Katzin patent of an arrangement in which both the length of successive dipoles and the spacing between said dipoles vary in a manner such that the ratio of the length of adjacent dipoles is a constant which is also equal to the ratio of the spacings between adjacent dipoles. Unless both of these conditions are met the antenna does not have the remarkably wide band paths, the high gain and the directivity exhibited by the antennas of the invention." (Emphasis in the original). Subsequently, original claims 1-8 were allowed by examiners H. K. Saalbach and Eli Lieberman as were 7 additional claims added as a result of an interference proceeding and further amendments by the applicant. It appears, thus, that the above argument in regard to the constant proportional relationship of the lengths and spacings of the elements and the importance of such relationship convinced the Patent Office that the Isbell disclosure was patentable. However, there is nothing in the file wrapper to indicate that the patent examiners were aware of published work of DuHamel and Ore, their formula, or the log periodic theory of antenna design all of which was a part of the prior art at the time of the application.

prior art. Kell-Dot Indus., Inc. v. Graves, supra at 29. The Court, upon full consideration of the record herein, finds that the disclosure of Isbell's Patent No. 3,210,767 is lacking in the prerequisite non-obviousness and is, therefore, invalid.

Inasmuch as an invalid patent cannot be infringed, Imperial Stone Cutters, Inc. v. Schwartz, supra at 429; Kell-Dot Indus., Inc. v. Graves, supra at 28, the question of infringement is rendered moot and is, therefore, not decided by this Court.

The foregoing shall constitute the findings of fact and conclusions of law pursuant to Fed. R. Civ. P. 52(a).

IT IS ORDERED that judgment will be entered for the defendant with costs, exclusive of attorney's fees, taxed to the plaintiff.

Dated this 23rd day of June, 1967.

CHIEF JUDGE

APPENDIX A

PLAINTIFF'S EXHIBIT 31

Oct. 5, 1965 D. E. ISBELL 3,210,767

FREQUENCY INDEPENDENT UNIDIRECTIONAL ANTENNAS

Filed May 3, 1960 2 Sheets-Sheet 1

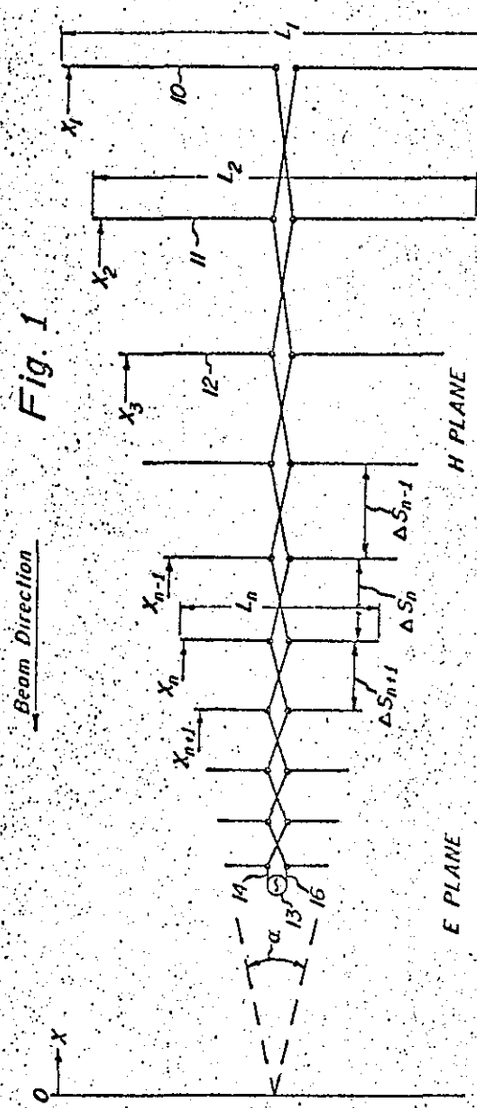

Fig. 1

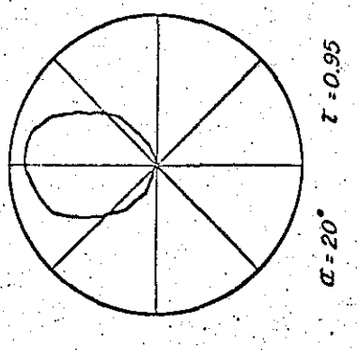

Fig. 4

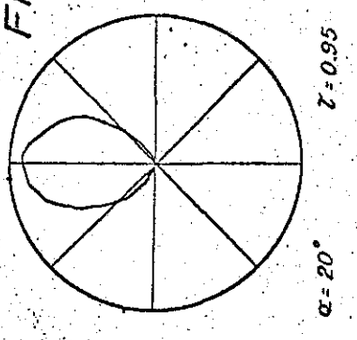

Fig. 3

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BY

Merriam, Smith & Marshall
ATTORNEYS

PLAINTIFFS
Exhibit 31
Cause No. 3-695-D Civil
Date FEB 13 1967
U. S. District Court
Southern Dist. of Texas

Oct. 5, 1965 D. E. ISBELL 3,210,767

FREQUENCY INDEPENDENT UNIDIRECTIONAL ANTENNAS

Filed May 3, 1960 2 Sheets-Sheet 2

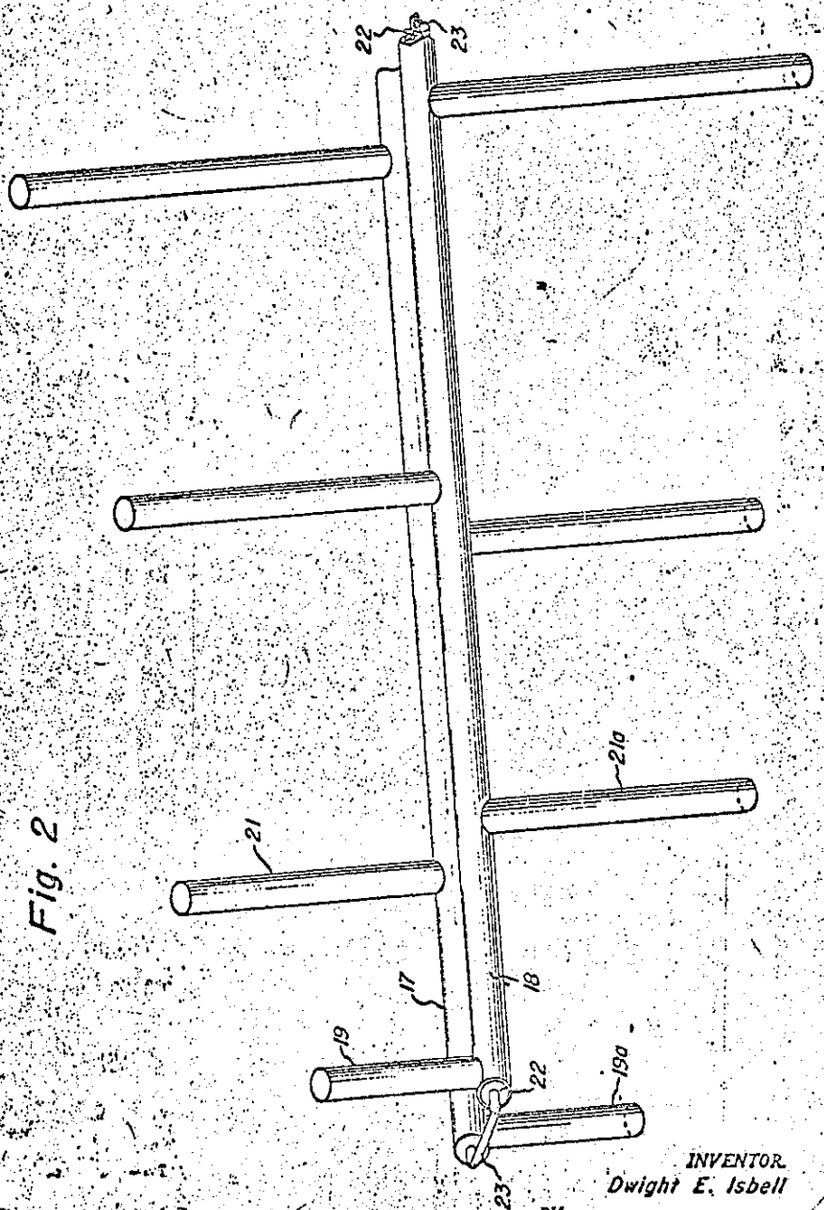

Fig. 2

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United States Patent Office

3,210,767

Patented Oct. 5, 1965

3,210,767

FREQUENCY INDEPENDENT UNIDIRECTIONAL ANTENNAS

Dwight E. Isbell, Seattle, Wash., assignor to The University of Illinois Foundation, a non-profit corporation of Illinois

Filed May 3, 1960, Ser. No. 26,589
15 Claims. (Cl. 343—792.5)

This invention relates to antennas, and more particularly, it relates to antennas having unidirectional radiation patterns that are essentially independent of frequency over wide bandwidths.

The antennas of the invention are coplanar dipole arrays consisting of a number of dipoles arranged in side-by-side relationship in a plane, the length and the spacing between successive dipoles varying according to a definite mathematical formula, each of the dipoles being fed by a common feeder which introduces a phase reversal of 180° between connections to successive dipoles. The antennas of the invention provide unidirectional radiation patterns of constant beamwidth and nearly constant input impedances over any desired bandwidth.

The invention will be better understood from the following detailed description thereof taken in conjunction with the accompanying drawing, in which:

FIGURE 1 is a schematic plan view of an antenna made in accordance with the principles of the invention;

FIGURE 2 is an isometric view of a practical antenna embodying the invention; and

FIGURES 3 and 4 are radiation patterns of a typical antenna, in the E plane and H plane, respectively.

Referring to FIGURE 1, it will be seen that the antenna of the invention was composed of a plurality of dipoles 10, 11, 12, etc., which are coplanar and in parallel, side-by-side relationship. It will be noted that the lengths of the successive dipoles and the spacing between these dipoles is such that the ends of the dipoles fall on a pair of straight lines which intersect and form an angle α. In the preferred embodiment the antenna is symmetrical about a line passing through the midpoints of the dipoles, as shown.

The antenna is fed at its narrow end from a conventional source of energy, depicted in FIGURE 1 by alternator 13, by means of a balanced feeder line consisting of conductors 14 and 16. It will be seen that the feeder lines 14 and 16 are alternated between connections to consecutive dipoles, thereby producing a phase reversal between such connections.

The lengths of the dipoles and the spacing between dipoles are related by a constant scale factor τ defined by the following equations:

$$\tau=\frac{L_{(n+1)}}{L_n}=\frac{\Delta S_{(n+1)}}{\Delta S_n}$$

where τ is a constant having a value less than 1, L_n is the length of any intermediate dipole in the array, $L_{(n+1)}$ is the length of the adjacent smaller dipole, ΔS_n is the spacing between the dipole having the length L_n and the adjacent larger dipole, and $\Delta S_{(n+1)}$ is the spacing between the dipole having the length L_n and the adjacent smaller dipole.

It will be seen from the geometry of the antennas, as given above, that the distance from the base line 0 at the vertex of the angle α to the dipoles forming the array are defined by the equation:

$$\tau=\frac{X_{(n+1)}}{X_n}$$

where X_n is the distance from the base line 0 to the dipole having the length L_n, $X_{(n+1)}$ is the corresponding distance from the base line to the adjacent smaller dipole, and τ has the significance previously given.

The radiation pattern of the antennas of the invention, having the geometrical relationship among the several parts as defined above, is unidirectional in the negative X direction, i.e., extending to the left from the narrow end of the antenna of FIGURE 1.

The construction of an actual antenna made in accordance with the invention is shown in FIGURE 2. In this antenna the balanced line consists of two closely-spaced and parallel electrically conducting small diameter tubes 17 and 18 to which are attached the dipoles, each of which consists of two individual dipole elements, e.g., 19 and 19a, 21 and 21a, etc. It will be noted that each of the two elements making up one dipole is connected to a different one of said conductors 17 and 18, in a direction perpendicular to the plane determined by said conductors 17 and 18. Moreover, considering either one of the conductors 17 and 18, consecutive dipole elements along the length thereof extend in opposite directions. It will be seen that this construction has the effect of alternating the phase of the connection between successive dipoles, as depicted schematically in FIGURE 1. Although the dipoles of FIGURE 2 are not precisely coplanar, differing therefrom by the distance between the parallel conductors, in practice this distance is very small so that the dipole elements are substantially coplanar and the advantages of the invention are maintained. The antenna of FIGURE 2 may be conveniently fed by means of a coaxial cable 22 positioned within conductor 18, the central conductor 23 thereof extending to and making electrical connection with conductor 17 as shown.

As an example of the invention, an antenna of the type shown in FIGURE 2 was constructed using 0.125 inch diameter tubing for the balanced line and 0.050 inch diameter wire for the elements. The elements were attached to the feeder line with soft solder, and the array was fed with miniature coaxial cable inserted through one of the balanced line conductors. The antenna was defined by the parameters τ=0.95 and α=20°. The antenna had a total of 15 dipoles, with the longest dipole element being 2½" long, while the shortest element was one-half of this length, or 1¼". The array was 7½" long.

Typical radiation patterns for the above-described antenna in the E plane and the H plane are shown in FIGURES 3 and 4, respectively. These patterns were found to remain essentially constant over the band of about 1100 to 1800 mc./sec. The minimum front-to-back ratio over this band was 17 db and the directivity over the range from about 1130 to 1750 mc./sec. was better than 9 db over isotropic.

The performance of the above-described antenna clearly indicates that the antennas of the invention provide excellent rotatable beams for use particularly in the HF to UHF spectrum. In comparison to the well-known parasitic types of antennas which bear some resemblance to those of the invention, such as the Yagi array, the antennas of the invention provide a much wider bandwidth with essentially comparable directivity. Advantageously, however, the antennas of the invention need no adjusting for their performance over a wide bandwidth, compared to the parasitic types which must be adjusted by cut-and-try procedures for each frequency. Further experimental work with other antennas similar to that described above has indicated that the preferred values for the parameters which define the antennas of the invention include a range of values for angle α between about 20° and 100°, with τ having a value between about 0.8 and about 0.95. When these parameters have values within the preferred ranges the antennas were

found to have essentially frequency independent performance over any desired bandwidth. The upper and lower limits of the bandwidths may be adjusted as desired by fixing the lengths of the longest dipole and the shortest dipole, respectively. It has been determined experimentally that the longest dipole element should be approximately 0.47 wavelength long at the lower limit and the shortest element should be about 0.38 wavelength long at the upper limit. Moreover, in order to provide a suitable front-to-back ratio at the low frequency limit, there should be at least 3 dipoles in the array and preferably about 10 to 30 dipoles.

The foregoing detailed description has been given for clearness of understanding only, and no unnecessary limitations should be understood therefrom, as modifications will be obvious to those skilled in the art.

What is claimed is:

1. A broadband unidirectional antenna comprising an array of substantially coplanar and parallel dipoles of progressively increasing length and spacing in side-by-side relationship, the ratio of the lengths of any two adjacent dipoles being given by the formula

$$\frac{L_{(n+1)}}{L_n}=\tau$$

where L_n is the length of any intermediate dipole in the array, $L_{(n+1)}$ is the length of the adjacent smaller dipole and τ is a constant having a value less than 1, the spacing between said dipoles being given by the formula

$$\frac{\Delta S_{(n+1)}}{\Delta S_n}=\tau$$

where ΔS_n is the spacing between the dipole having the length L_n and the adjacent larger dipole, $\Delta S_{(n+1)}$ is the spacing between the dipole having the length L_n and the adjacent smaller dipole, and τ has the significance previously assigned, said dipoles being fed in series by a common feeder which alternates in phase between successive dipoles.

2. The array of claim 1 which is symmetrical about a line passing through the midpoint of each dipole in the array.

3. A broadband unidirectional antenna comprising an array of a plurality of substantially coplanar and parallel dipoles of progressively increasing length in side-by-side relationship, the ends of said dipoles falling on a V-shaped line forming an angle α at its vertex, the ratio of the lengths of any pair of adjacent dipoles being given by the formula

$$\frac{L_{(n+1)}}{L_n}=\tau$$

where L_n is the length of the longer dipole of the pair, $L_{(n+1)}$ is the length of the shorter dipole, and τ is a constant having a value less than 1, the dipoles in said array being fed in series by a common feeder which alternates 180° in phase between successive dipoles.

4. The antenna of claim 3 in which the angle α has a value between about 20° and 100° and the constant τ has a value between about 0.8 and 0.95.

5. The antenna of claim 3 in which said feeder is a balanced line which twists 180° between the connections to successive dipoles.

6. A broadband unidirectional antenna comprising a balanced feeder line consisting of two closely spaced, straight and parallel conductors, a plurality of dipoles each consisting of two dipole elements, one of which elements is connected to one of said conductors, the other element being connected directly opposite the first to the other of said conductors, the elements of any dipole extending in opposite directions perpendicular to the plane determined by said conductors, consecutive dipole elements on each of said conductors extending in opposite directions, the ratio of the lengths of the elements in any two adjacent dipoles being given by the formula

$$\frac{l_{(n+1)}}{l_n}=\tau$$

where l_n is the length of an element of any dipole in the antenna, $l_{(n+1)}$ is the length of an element in the adjacent smaller dipole and τ is a constant having a value less than 1, the spacing between said dipoles being given by the formula

$$\frac{\Delta S_{(n+1)}}{\Delta S_n}=\tau$$

where ΔS_n is the spacing between the dipole having the element length l_n and the adjacent larger dipole, $\Delta S_{(n+1)}$ is the spacing between the dipole having the element length l_n and the adjacent smaller dipole, and τ has the significance previously assigned.

7. The antenna of claim 6 wherein τ has a value of about 0.8 to 0.95.

8. The antenna of claim 6 wherein said feeder line conductors are tubular.

9. An aerial system including at least one set of parallel dipoles spaced along and substantially perpendicular to the longitudinal axis of a two-conductor balanced feeder to which the halves of the dipoles are connected at their inner ends, said dipoles being of different electrical lengths increasing substantially logarithmically from the connected end of the feeder to the other end and the dipole feeder connections being crossed over one another between adjacent dipoles, the spacings between which also increase substantially logarithmically from said connected end to the other end.

10. An antenna system for wide-band use comprising a plurality of substantially parallel conducting dipole elements arranged in substantially collinear pairs, the opposite dipole elements of each pair constituting dipole halves, a two-conductor balanced feeder having one conductor connected to each of said elements at substantially the inner end thereof, each of said dipole halves in a pair being connected to a different feeder conductor, adjacent dipole elements being reversely connected to different conductors of the feeder, said dipole elements being selectively spaced along and substantially perpendicular to said feeder, the elements of each pair being of substantially equal length, adjacent dipole elements of different pairs differing in length with respect to each other by a substantially constant scale factor, the selective spacings between adjacent dipoles generally decreasing from one end of the feeder to the other with the greatest spacing being between the longest dipoles, and means to connect the feeder to an external circuit at substantially the location of the smallest of the dipole elements.

11. An antenna system for wide-band use comprising a plurality of substantially parallel conducting dipole elements arranged in substantially collinear pairs, the opposite dipole elements of each pair constituting dipole halves, a two-conductor balanced feeder having one conductor connected to each of said elements at substantially the inner end thereof, each of said dipole halves in a pair being connected to a different feeder conductor, adjacent dipole elements being reversely connected to different conductors of the feeder, said dipole elements being selectively spaced along and substantially perpendicular to said feeder, the elements of each pair being of substantially equal length, adjacent dipole elements of different pairs differing in length with respect to each other by a substantially constant scale factor, the selective spacings between the dipoles along the feeder differing from each other also by a substantially constant scale factor, the greatest spacing being between the longest dipoles, and means to connect the feeder to an external circuit at substantially the location of the smallest of the dipoles.

12. The aerial system of claim 11 in which said scale

factors have values within the range from about 0.8 to about 0.95.

13. An antenna system for wide-band use comprising an array of at least three linear substantially parallel conducting dipoles, each dipole being composed of two opposite substantially collinear conducting elements, a two-conductor balanced feeder having one conductor connected to each of said elements at substantially the inner end thereof, adjacent parallel dipole elements being reversely connected to a different conductor of the feeder, the two elements of each dipole being of substantially equal length and successive elements being of lengths which differ from one dipole to the next by a substantially constant scale factor within the range from about 0.8 to about 0.95, the dipoles being spaced from each other in a generally decreasing manner in the direction of decreasing element length, and means to connect the feeder conductors to an external circuit at substantially the location of the smallest dipole elements.

14. An antenna system for wide-band use comprising a minimum of three pairs of linear substantially parallel conducting elements arranged substantially coplanarly, each pair being substantially collinear and comprising the halves of a dipole, a two-conductor feeder connected to the inner ends of said collinear pairs of elements, adjacent parallel elements being connected to different conductors of the feeder so that the halves of the dipoles connect to different conductors of the feeder and adjacent dipoles are reversely connected, the halves of each dipole being substantially the same length, adjacent dipole elements being selectively spaced from each other along the feeder, the length of the successive dipole elements along the feeder decreasing in accordance with a substantially constant scale factor, each dipole and the feeder between it and the adjacent dipole constituting a cell, the dimension of the several cells measured from the point of connection of one dipole and the feeder to the outer end of the next smaller adjacent dipole also decreasing from one cell to the next in the direction of decreasing dipole length according to a substantially constant scale factor so that the combination of cells provides a substantially uniform wide-band response, and means to

connect an external circuit to the feeder elements at substantially the location of the shortest of the dipoles.

15. An antenna system for wide-band use comprising a minimum of three pairs of substantially parallel and coplanar linear conducting elements arranged in substantially collinear pairs, each pair of elements comprising the halves of a dipole, a two-conductor feeder, one conductor of which is connected to each of said elements substantially at the inner end thereof, adjacent parallel elements being connected to different conductors of the feeder so that the halves of the dipoles connect to different conductors of the feeder and adjacent dipoles are reversely connected, the halves of each dipole being substantially the same length, adjacent dipole elements being selectively spaced from each other along the feeder, the lengths of the elements decreasing from one end of the feeder to the other substantially in accordance with a substantially constant scale factor within the range from about 0.8 to 0.95, each dipole and the feeder between it and the adjacent dipole constituting a cell, the cell dimension from the inner end of one dipole to the outer end of the next smaller adjacent dipole also generally decreasing from one cell to the next in the direction from the longer to the shorter dipoles so that the combination of cells provides a substantially uniform wide-band response, and means to connect an external circuit to the feeder elements at substantially the location of the shortest of the dipoles.

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HERMAN KARL SAALBACH, *Primary Examiner.*

GEORGE N. WESTBY, ELI LIEBERMAN, *Examiners.*

APPENDIX B

March 5, 1940. M. KATZIN 2,192,532

DIRECTIVE ANTENNA

Filed Feb. 3, 1936

Fig. 1

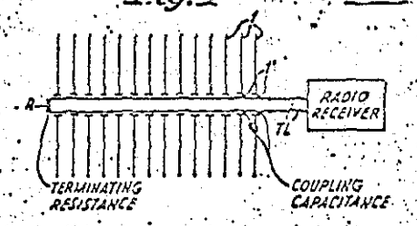


Fig. 2

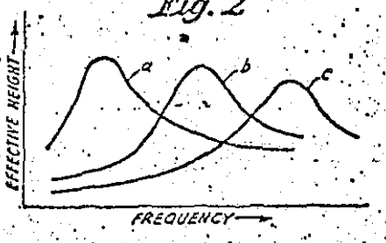


Fig. 3a

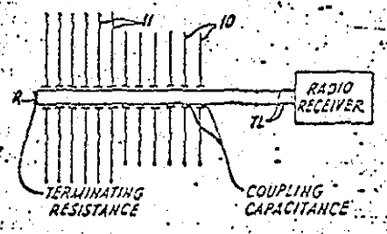


Fig. 3b

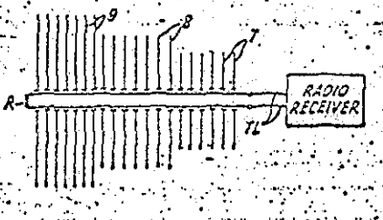


Fig. 3c

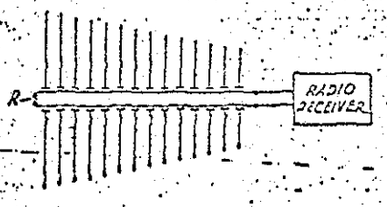


Fig. 4

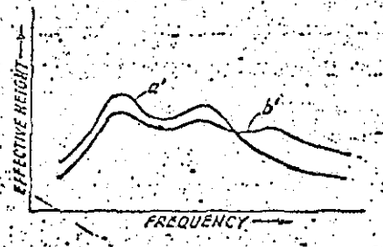
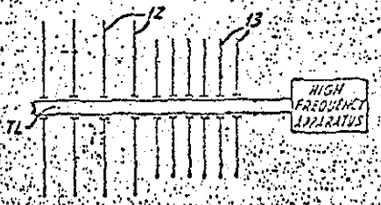


Fig. 3d



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ATTORNEY

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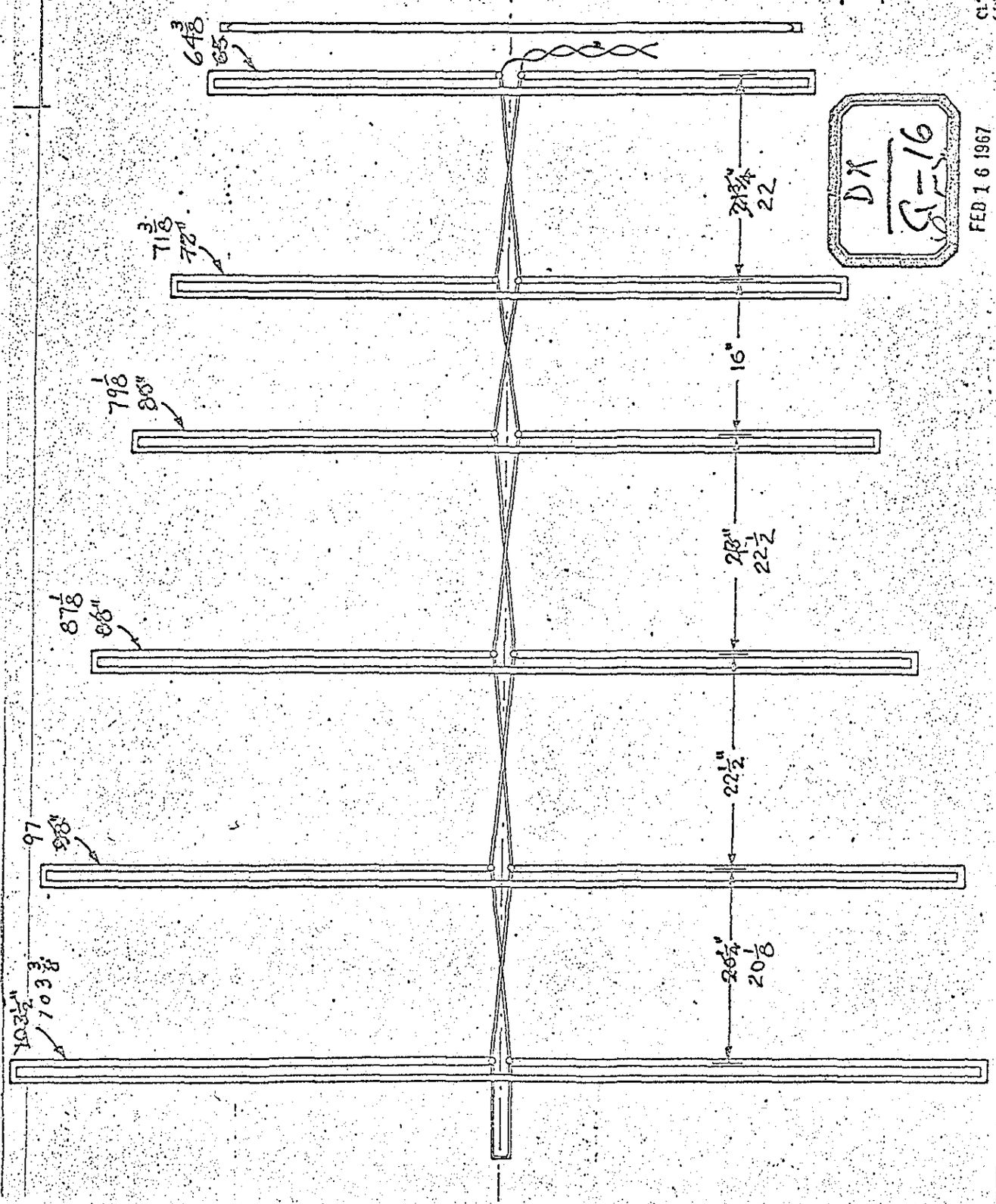
E-4

APPENDIX C

CHANNEL MASTER
"K.O"-model 1023



APPENDIX D

June 26, 1934. N. KOOMANS 1,964,189

DIRECTIVE ANTENNA

Filed Sept. 11, 1928

Fig. 1.

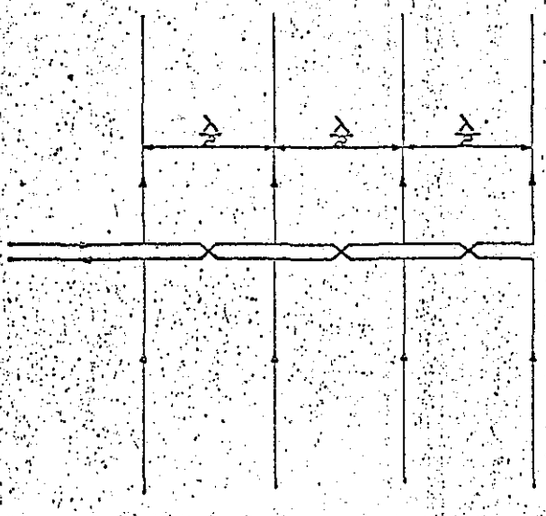
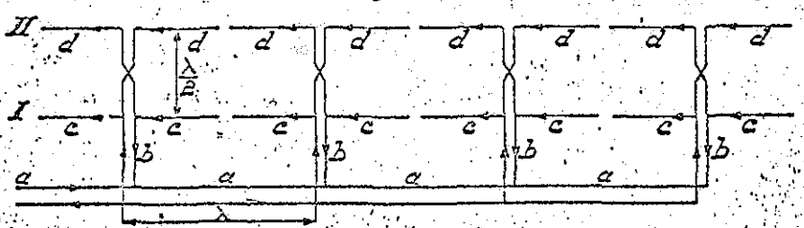


Fig. 2.



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E-1

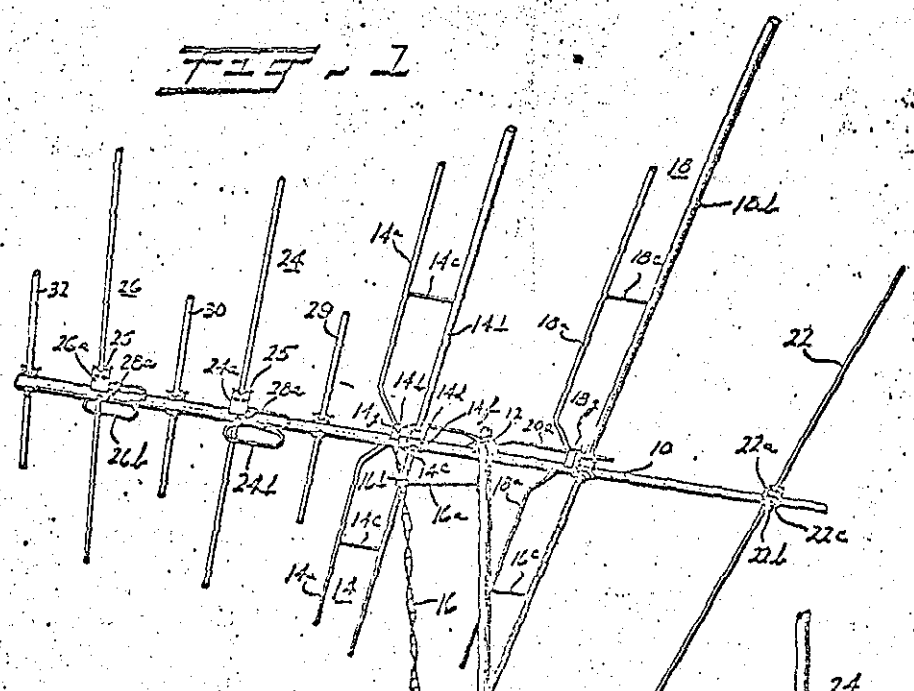
APPENDIX E

Jan. 18, 1955 J. R. WINEGARD 2,700,105

T. V. ANTENNA ARRAY

Filed July 26, 1954 2 Sheets-Sheet 1

FIG - 1



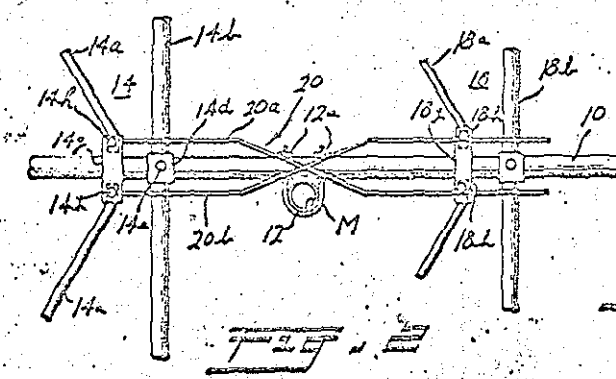


FIG - 3

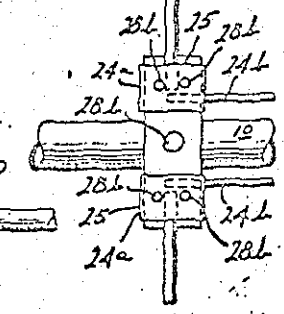


FIG - 2

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D-1

APPENDIX F

Jan. 18, 1938. E. L. C. WHITE ET AL 2,105,569

DIRECTIONAL WIRELESS AERIAL SYSTEM

Filed April 6, 1936

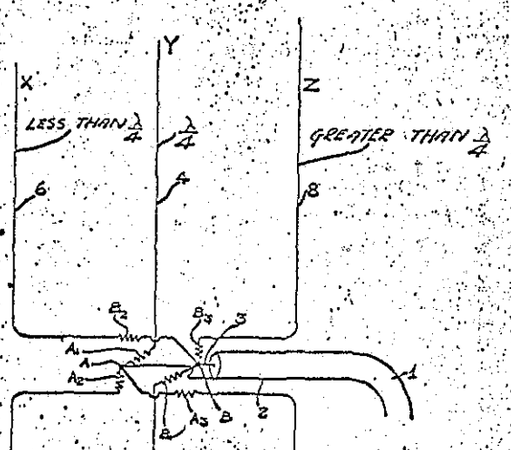

Fig. 1.

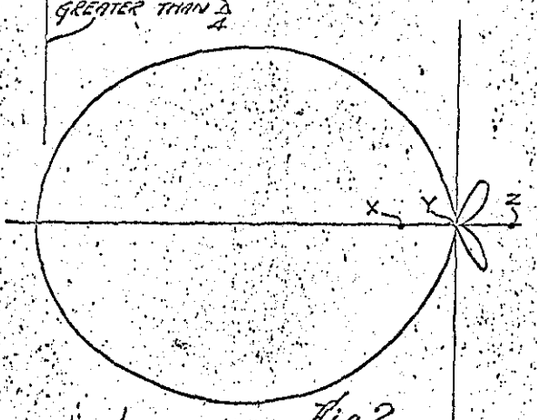

Fig. 2.

Fig. 3.

INVENTORS
E. L. C. WHITE
W. S. PERCIVAL

BY W. S. Grover,
ATTORNEY

DX
E-3

LAW OFFICES

HOFGREN, WEGNER, ALLEN, STELLMAN & McCORD

20 NORTH WACKER DRIVE

CHICAGO 60606

TELEPHONE
FINANCIAL 6-1630
AREA CODE 312

AXEL A. HOFGREN
ERNEST A. WEGNER
JOHN REX ALLEN
WILLIAM J. STELLMAN
JOHN B. McCORD
BRADFORD WILES
JAMES C. WOOD
STANLEY C. DALTON
RICHARD S. PHILLIPS
LLOYD W. MASON
TED E. KILLINGSWORTH
CHARLES L. ROWE
JAMES R. SWEENEY
W. E. RECKTENWALD
J. R. STAPLETON

WILLIAM R. McNAIR
JOHN P. MILNAMOW
DILLIS V. ALLEN
W. A. VAN SANTEN, JR.
JOHN R. HOFFMAN

February 13, 1967

Mr. Robert H. Rines
Rines and Rines
No. Ten Post Office Square
Boston, Massachusetts 02109

RE: UIF v. BT v. JFD

Dear Bob:

I had a call from JFD's attorneys asking whether we would waive Mr. Blonder's signature to the transcripts of his depositions. Apparently this was not of record at the time the depositions were taken.

It's my understanding that you have no additional corrections to suggest in the depositions. If it is satisfactory with you to waive signature, let me know.

Very truly yours,

Richard S. Phillips

RSP:iag

LAW OFFICES

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ERNEST A. WEGNER
JOHN REX ALLEN
WILLIAM J. STELLMAN
JOHN B. McCORD
BRADFORD WILES
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HOFGREN, WEGNER, ALLEN, STELLMAN & McCORD

20 NORTH WACKER DRIVE

CHICAGO 60606

TELEPHONE
FINANCIAL 6-1630
AREA CODE 312

August 8, 1967

Mr. Robert H. Rines
Rines and Rines
No. Ten Post Office Square
Boston, Massachusetts 02109

RE: UIF v. BT v. JFD

Dear Bob:

* I enclose a memo from our docket clerk with regard to Judge Hoffman's calendar. Unfortunately, when he checked, the minute clerk was on vacation. It is my understanding that case number 4 has a set date in October but that case number 3 does not.

We will check again with the minute clerk when he gets back and also about the end of August to find out what the criminal calendar looks like.

Our office manager tells me that he has not received any payment on your overdue account. The deficiency will be charged against Jack Allen and me personally if this is not paid. We would appreciate your early attention to this.

Very truly yours,

Dick

Richard S. Phillips

RSP:iag

* Enclosure

M E M O R A N D U M

TO: RICHARD S. PHILLIPS August 8, 1967

FROM: JOHN R. HOFFMAN

Re: U. Ill. v. Blonder

I have checked the status of Judge Hoffman's trial calendar, and the following is a list of the cases which precede the Blonder case.

1. 65 C 800 Jeremiah Stamler v. Hon. Edwin Willis
2. 65 C 2050 Jeremiah Stamler v. Hon. Edwin Willis
3. 66 C 267 Skil Corp. v. Sears, Roebuck & Co.
4. 66 C 381 Hillside Enterprises v. World's Finest Chocolate, Inc.
5. 66 C 567 U. Illinois v. Blonder Tongue

Judge Hoffman's secretary told me that we should watch for cases 3 and 4 because the first two cases have been set for a date certain some time in October. No one in Hoffman's office knew the precise date because his minute clerk is on vacation. Case 3, therefore, may possibly precede the first two cases some time in September or October depending upon the condition of his criminal docket.

Report No. 2

ANTENNA LABORATORY

Quarterly Engineering Report

RESEARCH STUDIES ON PROBLEMS RELATED TO ECM ANTENNAS

This report is not to be announced or distributed automatically, in accordance with AFR 205-43A, Paragraph 6d.

Contract No. AF33(616)-6079
Project No. 9-(13-6278) Task 40572

Sponsored by
WRIGHT AIR DEVELOPMENT CENTER

ELECTRICAL ENGINEERING RESEARCH LABORATORY
ENGINEERING EXPERIMENT STATION
UNIVERSITY OF ILLINOIS
URBANA, ILLINOIS

October 4, 1967

VIA AIR MAIL

John F. Pearne, Esq.
McNenny, Farrington, Pearne & Gordon
920 Midland Building
Cleveland, Ohio 44115

Re: Log Periodic Patent Litigation

Dear John:

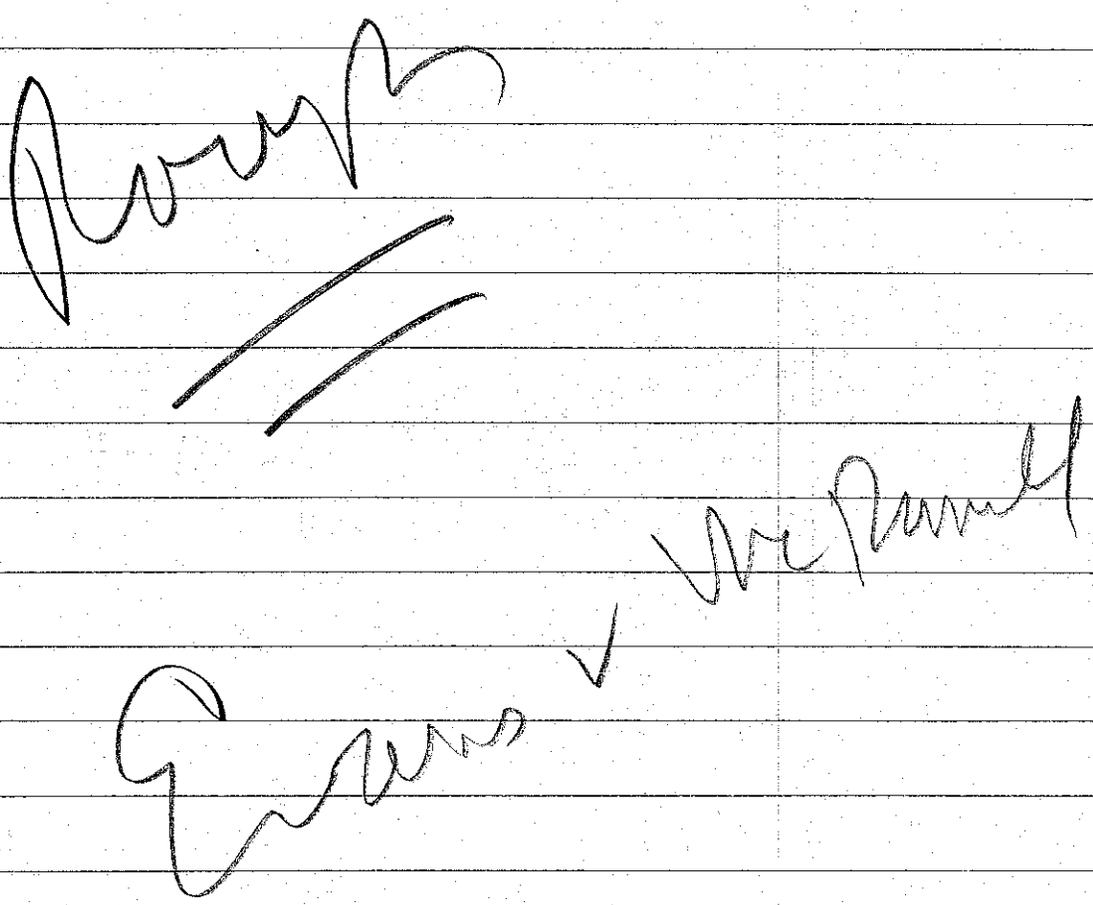
Many thanks for your kind letters of September 27th and September 28th and the deaf reporter's epistle.

Cordially,

RINES AND RINES

RHR:H

By_____



(1) P Clearly Defendant could merely manufacture on the plane control or monitor the number of bars and do the manufacturing, the number removed, or other types of [illegible] and the procedures. It voluntarily chose the convenience of Plaintiff's connection.

P Defendant now states on pages 3 & 4 of its Reply Brief that its use ~~of~~ that Plaintiff ~~alleges~~ complains is an infringement was

> "only to locate any radioactive bars lost on a plane which could damage a plane in flight."

~~Whereas, Defendant's "use"~~

P This is not, then, even the "use" of a tool ~~to practice~~ to manufacture the stem used by the government!

(296 F. 718, 722)

P As stated by the Court in Wood v. Atlantic Gulf & Pacific Co., D.C.S.D. Ala. (1924), the language of the statute (--the amended Act of 1918, P 719, is substantially identical with 28 USC, 1498(a) --):

> the purpose was to provide for the work being done where the terms of the contract with the government required the use by the contractor of the patented articles, and did not contemplate the use by the contractor for his own convenience, or for his own purposes in doing the government work, where he might have used that or any other tool.

Further reasons above, 28 USC 1498 does not apply to the present case.

(2)

But even had this been a trial actually used to manufacture the aircraft, Wood v Atlantic, supra, pursuant to, p. 719,

> conceding the need of the government ~~that unrestricted grant should be granted as well as~~ to protect one who used a patented article in work done for the government, still such use should not be extended to a case where it was not with the knowledge and consent of the government.

In none of its affidavits or briefs does Defendant even pretend that the government had "knowledge" that Defendant was going to use Plaintiff's invention -- much less that any such particular "knowledge and consent" was obtained by giving.

For this further reason, 28 USC 1498 is inapplicable to the present case.

And lastly, ~~on this point~~, in ~~Defendant's~~ the first affidavit of Lawton filed by Defendant, it was represented to this Court that patent indemnity clause 41 ~~which~~

Even a ruling of a Contracting Officer

(3)

Defendant now appears to concede that the preserved clause (41) would completely vitiate any attornment and consent (clause 42) for the use of Plaintiffs' unspecified renovations. Was part of the contract at the time of the infringement. changed

And retraction of the first affidavit the representation that was the actual contract. The second affidavit now contains

Now we witness a second affidavit from the same author on another scrap of paper

that "clause 40" (the affiant means "clause 41") was "excluded from the final contract".

Note the new words "final contract".

Does this mean that clause 41 applied during the infringing use, as the first affidavit stated, since it was later removed as a "final contract"?

Certainly Plaintiff is entitled to discovery to clarify the extent of attornment and consent in each of the contracts of Exhibit A and whether not be dismissed

(4) We also question the completeness of Defendants production of documents and communications between Defendants and third parties, including but not limited to [illegible]

(4)

and apparently contradictory

sua of Court on the basis of these conflicting and piece-meal, and carefully worded ~~[illegible]~~ ex parte statements.

Plaintiffs maintain that they are entitled that ~~[illegible]~~ no specific authorization and consent for the use of Plaintiffs' particular invention and patents was given or intended in these contracts and that they ~~[illegible]~~ are entitled to their day in Court.

(5)

28 U.S.C. 1498 Is Not the Sole Remedy

The 1918 Richmond Screw Anchor Co. case (245 U.S. 331) does not thwart the clear statement by Congress that 28 USC 1498 is not the only remedy, even against the United States.

28 U.S.C. 1346(a) (enacted after 1918) clearly & unequivocally states:

> The district courts shall have original jurisdiction, concurrent with the Court of Claims of
> Any ... civil action or claim against the United States, not exceeding $10,000 in amount, founded ... upon ... any Act of Congress ..."

The Patent Act of 1952 35 U.S.C. 1 is certainly an "Act of Congress".

Because neither was amended or repealed by the enactment (1948) of the Judicial Code, the 1918 Richmond decision no longer controls the meaning of the unamended (unrepealed) statute.

Defendant says that Plaintiff's [illegible] cited only cases [illegible] the statute speaks for itself. Cases demonstrating that "concurrent" jurisdiction "ordered" [illegible]

(e) appeals pursuant to Case 1 Section 1292 "of its own initiative or on any party's motion" or any other and on your Honor's reasoning."

this Court has

P That jurisdiction if the United States is a party defendant is thus clear; and should this Court disagree with Plaintiff's position that the United States is not a necessary party, Plaintiffs have requested authorization leave to amend to add the United States as a party. P In fact Rule 21 would also be resolved at this

P Since McDonnell Horgan a fact issue as to whether the United States as Defendant is dismissed under the circumstances, for the purpose of implement, Rule 20 or Rule 21 would appear to permit the continued presence of McDonnell as Defendant.

7

Clear

Pg 4 on - Government

Infringement

infringement in connection with

Repeated attempts to explain away the non-government answers of McDonnell as having been made earlier in 1960 than the up-to-date statistical summaries allows Plaintiffs to recover for in this action.

(MPL check dates)

But the Exhibits accompany the Rules Affidavit ~~attempt~~ show the attempts to induce non-government customers in the very period of necessary infringement (Nov 23'60 & June 12'62), to give McDonnell orders to make this answer.

Since the infringer is involved in the making of the answer, such activities by McDonnell in trying to induce others to contract for such manufacture itself constitutes infringement:

> Whoever actively induces infringement of a patent shall be liable as an infringer (35 U.S.C. 271(b)).

6

- There is thus clear jurisdiction in this Court for this infringement action against Defendant.

~~Note, also, that while defendant's Post Answer~~ Plaintiff's motion for summary judgment was timely filed ~~Plaintiff's motion~~ Therefore, Plaintiff's motion is timely pursuant to prior repairs & maintenance & work arounds during the period of alleged infringement, ~~which repairs & maintenance~~ involving the use and re-use of the infringing bars ~~used in the claimed manufacture~~ ~~are~~.

~~It~~

~~Even~~

Even assuming, arguendo, that the claimed manufacture took place at an early time, Plaintiff's claims are not time barred/ summarily denied

And from the summary Fourth Affidavit of Ilhan Ilsen, it is evident that repeated requests were made of the Atomic Energy Commission to use radioactive material with other items than uranium bars, including the very "ejection pens" mentioned in the Complaint.

A decided fact issue as to this material matter is thus also drawn.

McNENNY, FARRINGTON, PEARNE & GORDON

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PATENT AND
TRADEMARK LAW

LLOYD L. EVANS
OF COUNSEL

F. O. RICHEY (1878-1964)

HAROLD F. McNENNY
DONALD W. FARRINGTON
JOHN F. PEARNE
CHARLES B. GORDON
WILLIAM A. GAIL
RICHARD H. DICKINSON, JR.
THOMAS P. SCHILLER
LYNN L. AUGSPURGER

September 28, 1967

Robert H. Rines, Esq.
10 Post Office Square
Boston, Massachusetts

Re: Log Periodic Patent Litigation

Dear Bob:

I learned this morning that the call of the Finney Company v. JFD et al. case on September 29, for disposition of our Motion for Summary Judgment and consideration of a trial date, has been postponed by the Court to October 20. I don't know what this will mean, but the indications are that our motion will be decided (not postponed to await trial of the Blonder-Tongue suit).

During our meeting at the Newark airport on September 7, I mentioned an interesting prior art patent that I thought you should consider, but was unable to remember the name of the patentee at that time. The patent is No. 2,703,840 to Carmichael and a copy is enclosed. As I mentioned during our discussion of this patent, there are some features of the specification and claims that indicate a lack of knowledge of antenna theory and practice. However, there are several significant features of this patent which you will quickly appreciate. I shall discuss them only briefly in order to call them to your attention.

Although the illustrated embodiment of the patented antenna includes only two active elements of different lengths that might be termed "tripoles" and are connected by feeders with phase transposition, and although the feed point is located on the feeders between the two active elements, the specification describes several variations of that embodiment, involving the following:

1. Either simple dipoles or folded dipoles may be substituted for the illustrated active elements.

2. Any larger number of active elements may be used as desired.

3. The recommended spacing of two adjacent active elements is one-tenth of the average of the wave lengths to which those elements are resonant as half wave elements.

4. Changing the active element spacing may require repositioning the feed point toward or away from the front active element.

The performance of the antenna is described as essentially unidirectional with a high front-to-back ratio over a broad band of frequencies determined by the resonant lengths of the longest and shortest active elements.

Most interesting of all are the claims of this patent, which appear to dominate every so-called "backfire" antenna on the market today.

The Foundation's position in our suit has been that the folded dipoles of the prior art endfire arrays are not "dipoles" within the meaning of the log period patents in suit. Thus, the enclosed patent is significant in disclosing the equivalency in such arrays of simple dipoles, folded dipoles, and more complex types of dipoles such as the three element dipoles illustrated in the patent.

Sincerely,

John

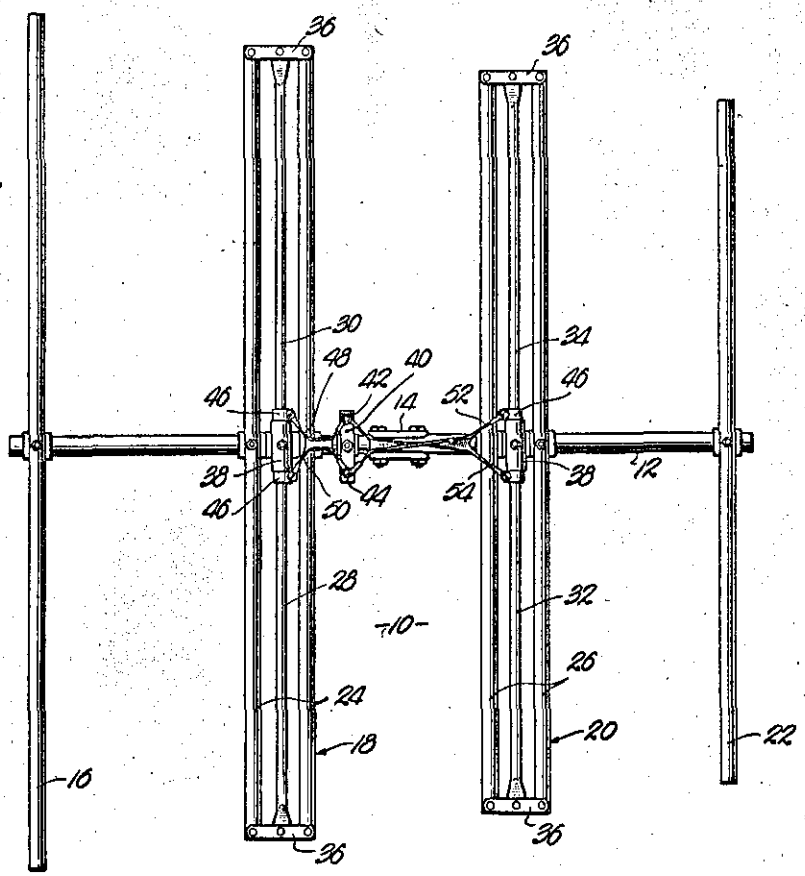
JFP/jdc
Enc.
cc: Richard S. Phillips, Esq.

March 8, 1955 G. N. CARMICHAEL 2,703,840

MULTIFREQUENCY ANTENNA ARRAY

Filed Feb. 9, 1951

Fig. 1.



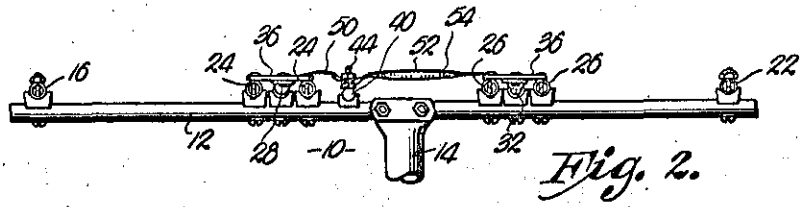


Fig. 2.

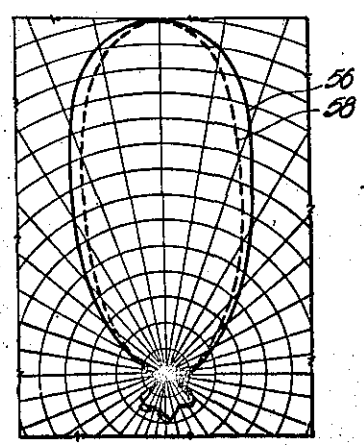


Fig. 3.

INVENTOR.
Gershom N. Carmichael
BY
Reed Hovey
ATTORNEY.

United States Patent Office

2,703,840

Patented Mar. 8, 1955

2,703,840

MULTIFREQUENCY ANTENNA ARRAY

Gershom N. Carmichael, Griggsville, Ill.

Application February 9, 1951, Serial No. 210,108

5 Claims. (Cl. 250—33.53)

This invention relates to antenna structure of the kind having both active and parasitic elements, the primary object being to provide optimum gain on any of a number of radio frequencies through advantageous use of all of the remaining elements in the array whenever any one element is active on its particular frequency.

The use of parasitic elements in antenna arrays as directors and reflectors to provide optimum gain and minimum interference in an active element on a particular frequency, is well known. Such parasitic elements, however, serve no other purpose so far as becoming active on other frequencies. Accordingly, each active element, in conventional structures, is provided with its own set of parasitic elements and even when the latter are rendered common to a number of active elements, an expensive, cumbersome and inefficient antenna system must be provided.

It is the most important object of this invention, therefore, to provide a number of active elements in a single array, so interconnected electrically as to render each alternately parasitic to the other, depending on which is active, not only from the standpoint of providing additive voltage directly, but from the standpoint of serving in a reflection and/or directive capacity.

Another important object of this invention is the provision of antenna structure wherein the elements, when operating parasitically, provide voltage gain for an active element by direct connection therewith and with the feed line through proper phasing relationships.

A further important object of this invention is to provide an antenna array having a number of elements each of a length corresponding to a respective frequency, critically spaced and interconnected with proper proportions and electrical distances with a common feed line, to effect the necessary phasing for accomplishing the above mentioned results relative to gain and output voltages.

It is an object of this invention to provide an antenna array which can be used for reception or transmission on either of two or more predetermined frequencies and which requires no manual adjustment at the antenna to accomplish a change from one frequency to the other.

Many other minor objects, including details of construction will be made clear or become apparent as the following specification progresses, reference being had to the accompanying drawings, wherein:

Figure 1 is a top plan view of a multi-frequency array made according to my present invention.

Fig. 2 is a side elevational view thereof.

Fig. 3 is a graphic representation of the voltage patterns for two selected frequencies.

Previously, it has been necessary to provide a separate antenna array for each frequency employed. Such a requirement has made operation on more than one frequency prohibitive to many users because of the cost and difficulty of installation of separate antennas. It is natural to consider the possibility of one conventional array having sufficiently broad frequency response to cover two adjacent frequencies, but the experiments in tuning the elements to obtain this result have not been successful. Since the functioning of the parasitic elements is dependent on dimensions and spacing of such elements to provide the proper phasing, it is not possible to have characteristic parasitic behavior over a range of frequencies which is any considerable percentage of the fundamental frequency.

Nearly all of the properties possessed by an antenna as a radiator or transmitter also apply when it is used as a receiving antenna. Current and voltage distribution, impedance and resistance, and directional characteristics are the same in a receiving antenna as they would be if it were used as a transmitting antenna. This reciprocal behavior makes possible the design of a receiving antenna of optimum performance based on the same considerations going into the design of a transmitting antenna. Accordingly, as will hereinafter become apparent, in describing the antenna structure hereof, it is to be understood that the array may be used within the broad concepts of the invention with equal advantages either for transmitting or receiving radio frequency signals. Additionally, while the novel features of the array have been developed primarily because of the dire need thereof in the field of television, it is not limited to such use and may have tremendous importance to the radio field, as will become clear to those skilled in the art.

For purposes of description and illustration, a four element array is shown. However, it is to be understood that this invention is not to be limited as to the number of elements employed, since anyone skilled in the art is capable of adding elements to amplify the signal received or transmitted.

In the following description of such an antenna, when used for reception, an active element shall be understood to be an element which is connected to the feed-line so that the voltage induced in it is delivered directly to the feed-line. A parasitic element shall be understood to be an element which re-radiates its induced voltage in such a way that voltage phases will produce a desired result in the active element, such as addition, in the case of a director, and cancellation or rejection, in the case of a reflector. The functioning of a parasitic element as a reflector or as a director is determined by its physical dimensions and spacing from the active element.

A parasitic array, in general, consists of an active element, together with one or more parasitic elements, designed to deliver a voltage by means of a feed-line to some certain point. The parasitic elements are designed to provide gain for signals from one direction and rejection of signals from some other direction, these elements being designed ordinarily to provide gain in one direction and rejection from the opposite direction. In general, in such a parasitic array, the forward gain and backward rejection can be maintained only over a very narrow band of frequencies. An array made in accordance with the principles hereof is, however, operative on two or more of such narrow band of frequencies.

Basically, the principle involved calls for a single element in an array to function in a dual way, both as an active element on one frequency and as a parasitic element on a different frequency. In the simplest case, such an array would consist of two elements, one of which acts as an active element on a frequency, f_1, while the other acts as a parasitic element on that frequency. On some other frequency, f_2, the first element would act as a parasitic element, while the second would be the active element for the frequency, f_2. This is possible since the functioning as a parasitic element necessitates a length different from that of an active element. In this case, each of the elements is also an active element and it is necessary to connect each to the feed-line. This means that the two elements have a direct connection to each other, and this connection must be made in such a way that the voltages, both from the direct connection and from the re-radiated signal, will have the proper phase relation.

The antenna array chosen for illustration in Figs. 1 and 2 of the drawing, is broadly designated by the numeral **10** and includes an elongated supporting bar **12** that is horizontally disposed when the array **10** is used in one common manner. The supporting bar **12** is secured intermediate its ends to a vertical mast or standard **14**.

The array **10** illustrated is provided with four elements **16, 18, 20 and 22.** The elements **18** and **20** being known

in the trade as "folded dipoles." It is noted that the dipoles 18 and 20 are of differing lengths, that the element 16 is longer than the dipole 18 and that the element 22 is shorter than dipole 20. It is well known that such lengths are critical, and, in the instance shown, the length of dipole 18 has been chosen to receive or transmit radio signals having a frequency of 66–72 megacycles, while the length of dipole 20 has been chosen to receive or transmit on 76–82 megacycles. Likewise, the lengths of elements 16 and 22 should be chosen to render the same operative as a reflector and as a director respectively for the frequency ranges of the two primary elements 18 and 20. Such precise physical lengths vary directly with the frequencies employed and are well known to those skilled in this field.

Thus, in the illustrated antenna 10, dipole 18 is 80 inches long, dipole 20 is 69 inches long, reflector 16 has a length of 85 inches, and director 22 is preferably 66 inches long.

Each dipole 18—20 includes a pair of spaced-apart elongated, preferably tubular members 24 and 26 respectively, of metallic or other conducting material, together with a center member of the same length in spaced parallelism with the outermost members 24 and 26, as the case may be. In a folded dipole such center member consists of a left segment 28 and a right segment 30 for element 18, as well as a left segment 32 and a right segment 34 for the element 20. The three members of each dipole 18—20 are interconnected electrically at the outermost ends in any suitable manner such as by metallic plates 36. Proper operation demands, however, that the left and right segments be electrically separated at their proximal ends and thus there is provided in the present construction, tubular insulators 38 telescopically receiving the segments and serving as a means of joinder thereof to the bar 12.

Following the principles of this invention, the center segments of the dipoles 18 and 20, must be joined with each other electrically and with a feed-line (not shown) whether the latter serves to supply voltages to a receiver or to receive voltages from a transmitter. To this end, a terminal bar 40 of insulating material is secured to bar 12 between the elements 18 and 20 for mounting a pair of spaced terminal posts 42 and 44, one conductor of the feed-line being joined to each post 42–44 respectively.

Each segment 28—30—32—34 is provided with a conductible clamp 46 adjacent the corresponding tube 38 serving as a means for joining such segments with the posts 42 and 44 and thus with the feed-line. A conductor 48 joins segment 30 with post 42; a conductor 50 connects segment 28 and post 44; a conducting line 52 is attached to segment 34 and to post 44; and a fourth conductor 54 joins the segment 32 with the post 42. It is thus seen that, in the illustrated array 10, conductors 52 and 54 are transposed between element 20 and the feed-line connected to posts 42 and 44.

As above indicated, the purposes of such arrangement include rendering the elements 18 and 20 alternately active on their respective frequencies within a single bay. However, by following certain important considerations, the other element is not completely inactivated, but serves to provide an appreciable voltage gain for the active element, not only through parasitic functioning, but by direct inducement to the feed-line or, in the case of use with a transmitter, to the atmosphere. It is thus clear that in order to render the elements 18 and 20 mutually cooperative in this respect, a proper phasing relationship must be established therebetween.

With the lengths of dipoles 18 and 20 chosen for the above mentioned frequencies, it has been found preferable to space the same at a distance equal to one-tenth of the average of the wave lengths of dipoles 18 and 20. Accordingly, the distance between the center segments of dipoles 18 and 20 is approximately 22 inches.

The spacing and lengths of the elements 16 and 22 which are purely parasitic are designed to provide the best compromise between three primary objectives, i. e., high forward gain, broad frequency response, and high front-to-back ratio. To this end, the distance between reflector 16 and the center element of dipole 18 should be equal to approximately one-tenth of the wave length of the latter or substantially 25 inches. The same proportion has been found preferable in establishing the

distance between the center segment of dipole 20 and director 22 or approximately 20 inches.

All of the above dimensions may be varied within virtually infinite ranges but with the distance between the dipoles chosen, proper phasing can be establishing only by effecting a proper ratio of electrical lengths between the dipoles through conductors 48, 50, 52 and 54. In the present instance, the electrical distance from the outermost end of segment 34 (adjacent its plate 36) to its clip 46 and thence through conductor 52 to post 44 is equal to the electrical distance from the outermost end of segment 30 to post 42 through conductor 48. Likewise, the electrical distance from the outer end of segment 32 through conductor 54, to post 42, is equal to the electrical distance from the outermost end of segment 28 to post 44 via conductor 50. Such 1 to 1 ratio varies directly with the chosen distance between the dipoles and even with the precise location of the terminal posts 42 and 44 relative to the dipoles. In the present antenna, such posts are co-planar with the dipoles and spaced approximately 7½ inches from the segments 28—30.

It is well appreciated in this field that no precise formula can be set forth for establishing the proper phasing relationship produced by the dimensions and ratios above set forth. Thus, changing of the distance between the dipoles may require one or more additional alterations such as varying the electrical distance ratio above set forth, or re-positioning the terminal posts 42—44 toward or away from the dipole 18 or in another plane.

Such factors as the diameters of the members forming a part of the dipoles, the widths thereof, the electrical resistance of the interconnecting conductors, and so forth, may also affect the desired phasing characteristics. To this end, it is also recognized that in some constructions, the transposition between conductors 52 and 54 must be eliminated to effect the results of the present invention.

Extensive tests have proved that the operation of antenna array 10 is substantially as follows:

Assuming first that dipole 18 is rendered active on its particular frequency, even at maximum efficiency, it will deliver little more than fifty percent of the induced voltage to the feed-line through posts 42 and 44. Since an active element has some of the necessary characteristics of a parasitic element, the remaining voltage is, in a large part, re-radiated. Such re-radiated voltages are directed to a considerable extent to the inactive dipole 20, and induced thereby through segments 32—34 and conductors 52—54 to the feed-line to provide gain in the output voltage of dipole 18. In addition, added voltages on the frequency of dipole 18 are received directly by the dipole 20 and fed to the feedline to provide additive effect.

Such operation on the part of inactive dipole 20 is made possible solely because of the fact that proper phasing is provided in the connection of the dipoles with each other and with the feed-line while maintaining the critical values above described. In absence of a proper choosing of the distance between the dipoles, the parasitic effect would be seriously affected. And, without proper phasing, the voltages received by dipole 20 either directly or by re-radiation from dipole 18 would not produce the desired gain in the feed-line.

It is seen therefore, that when dipole 18 is active, its operation is enhanced not only by element 16 operating as a reflector and element 22 as a director, but by the dipole 20 also operating as a director but inducing its received voltages directly to the feed-line.

Conversely, when the dipole 20 is active on its frequency, the dipole 18 operates parasitically as a reflector for cancelling undesired signals from other directions. However, in such instance, the dipole 18 receives voltages that are re-radiated by dipole 20 and also receives directly voltages corresponding to the frequency of dipole 20, both of which are impressed upon the feed-line to provide a very significant and extremely important additive effect.

It can now be understood why the precise physical characteristics of antenna 10, as illustrated in the drawing have no importance whatever to the principles involved herein. The new departure from conventional parasitic antennas contemplates two or more active elements, whether or not the same are formed as dipoles

and whether or not the additive elements 16 or 22 are utilized. In its simplest form, a pair of active elements such as segments 30 and 34 mounted on a suitable support 12, may be coupled together and to a feed-line irrespective of the position of the point of connection with the feed-line, in which case such active elements would most likely be arranged vertically.

Another possibility, still within the principles hereof, would contemplate the elimination entirely of members 16, 22, 24 and 26 from the array illustrated in Figs. 1 and 2.

Still further, a virtually unlimited number of active elements such as dipoles 18 and 20, could be provided, each operating in an additive way when any one element is active.

Finally, the number of reflectors and directors may be varied as desired.

Antenna 10, therefore, is characterized by its high gain, sharp lobe pattern, high front-to-back ratio and low vertical wave angle response. Figure 3 of the drawing shows graphically voltage lobes 56 and 58 for the frequencies of dipoles 18 and 20 respectively, it being noted that the front-to-back ratio is high and remains above 20 decibels from the carrier wave for the frequency of dipole 18 through the carrier frequency of dipole 20.

Through use of the antenna structure hereof, the problem of attempting to produce a single bay having sufficiently broad frequency response to cover two or more adjacent frequencies is overcome. Irrespective of the fact that the functioning of parasitic elements is dependent upon dimensions and spacing to provide proper phasing, rendering cost and installation difficulties prohibitive, particularly in fringe areas, in order to cover a wide range of frequencies, following the principles of this invention affords excellent parasitic behavior in a single bay.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. A multielement, multifrequency, unidirectional, broadside antenna array adapted for high gain operation selectively on any one of a number of separated, distinct frequency channels, throughout the respective band widths thereof, with each channel centered about a single predetermined frequency, by minimizing losses of reradiated energies, and notwithstanding any inherent impedance mismatching resulting from different self-impedances of the elements, said single predetermined frequencies being different and separated, said antenna array comprising a plurality of antenna elements, each of said elements being self-resonant to a different one of said single predetermined frequencies and the elements progressively decreasing in electrical length as one end of the array is approached, whereby the frequencies to which the same are tuned are progressively higher as said one end of the array is approached, each element having conductor means coupled thereto; structure mounting said elements against relative movement and in predetermined spaced relationship, whereby to electro-magnetically couple each element with the remaining elements and thereby render each a parasitic element at the resonant frequencies of the remaining elements in order to utilize a substantial portion of said reradiated energies; and transmission line terminal means coupled with said conductor means to render each of said elements a driven element on its respective resonant frequency.

2. A multielement, multifrequency, unidirectional, broadside antenna array adapted for high gain operation selectively on any one of a number of separated, distinct frequency channels, throughout the respective band widths thereof, with each channel centered about a single predetermined frequency, by minimizing losses of reradiated energies, and notwithstanding any inherent impedance mismatching resulting from different self-impedances of the elements, said single predetermined frequencies being different and separated, said antenna array comprising a plurality of antenna elements, each of said elements being self-resonant to a different one of said single predetermined frequencies and the elements progressively decreasing in electrical length as one end of the array is approached, whereby the frequencies to which the same are tuned are progressively higher as said one end of the array is approached; structure mounting said elements against relative movement and in predetermined spaced relationship, whereby to electro-magnetically couple each element with the remaining elements and thereby render each a parasitic element at the resonant frequencies of the remaining elements in order to utilize a substantial portion of said reradiated energies; transmission line terminal means; and means for rendering each of said elements a driven element on its respective resonant frequency and comprising conductor means for each element respectively, coupling the elements with the transmission line terminal means and provided with predetermined electrical lengths for delivering voltages carried thereby in phase.

3. A multielement, multifrequency, unidirectional, broadside antenna array adapted for high gain operation selectively on any one of a number of separated, distinct frequency channels, throughout the respective band widths thereof, with each channel centered about a single predetermined frequency, by minimizing losses of reradiated energies, and notwithstanding any inherent impedance mismatching resulting from different self-impedances of the elements, said single predetermined frequencies being different and separated, said antenna array comprising a plurality of elongated antenna elements having parallel, longitudinal axes and median, transverse, aligned axes, said axes all being in a common horizontal plane, each of said elements being self-resonant to a different one of said single predetermined frequencies and the elements progressively decreasing in length as one end of the array is approached, whereby the frequencies to which the same are tuned are progressively higher as said one end of the array is approached, each element having a pair of colinear, quarter-wave segments, each segment having a conductor coupled thereto and disposed to render each element a center-fed, half-wave dipole; structure mounting said elements against relative movement and in predetermined spaced relationship, whereby to electro-magnetically couple each element with the remaining elements and thereby render each a parasitic element at the resonant frequencies of the remaining elements in order to utilize a substantial portion of said reradiated energies; and a pair of spaced, transmission line terminals spaced from said elements and connected directly with said conductors to render each of said elements a driven element on its respective resonant frequency.

4. A dual element, dual frequency, unidirectional, broadside antenna array adapted for high gain operation alternately on either of a pair of separated, distinct frequency channels, throughout the respective band widths thereof, with each channel centered about a single, predetermined frequency, by minimizing losses of reradiated energies, and notwithstanding any inherent impedance mismatching resulting from different self-impedances of the elements, said single predetermined frequencies being different and separated, said antenna array comprising a pair of elongated antenna elements having parallel, longitudinal axes and median, transverse, aligned axes, said axes all being in a common plane, each of said elements being self-resonant to a different one of said single predetermined frequencies, one element being longer than the other, whereby the frequency to which it is tuned is lower than the frequency to which said other element is tuned, each element having a pair of colinear, quarter-wave segments; structure mounting said elements against relative movement with the shorter element ahead of the longer element and in predetermined spaced relationship, whereby to electro-magnetically couple each element with the other and thereby render the shorter element a parasitic director for the longer element at the resonant frequency of the latter and render the longer element a parasitic reflector for the shorter element at the resonant frequency of the latter in order to utilize a substantial portion of said reradiated energies; a pair of spaced, transmission line terminal means spaced from said elements; and means for rendering each of said elements a driven, center-fed, half-wave dipole on its respective resonant frequency and comprising conductor means for each element respectively, coupling the elements with the transmission line terminal means and provided with predetermined electrical lengths for delivering voltages carried thereby in phase.

5. A dual element, dual frequency, unidirectional, broadside antenna array adapted for high gain operation alternately on either of a pair of separated, distinct frequency channels, throughout the respective band widths

thereof, with each channel centered about a single, predetermined frequency, by minimizing losses of reradiated energies, and notwithstanding any inherent impedance mismatching resulting from different self-impedances of the elements, said single predetermined frequencies being different and separated, said antenna array comprising a pair of elongated antenna elements having parallel, longitudinal axes and median, transverse, aligned axes, said axes all being in a common horizontal plane, each of said elements being self-resonant to a different one of said single predetermined frequencies, one element being longer than the other, whereby the frequency to which it is tuned is lower than the frequency to which said other element is tuned, each element having a pair of colinear, quarter-wave segments, each segment having a conductor coupled thereto and disposed to render each element a center-fed, half-wave dipole; structure mounting said elements against relative movement with the shorter element ahead of the longer element and in predetermined spaced relationship, whereby to electro-magnetically couple each element with the other and thereby render the shorter element a parasitic director for the longer element at the resonant frequency of the latter and render the longer element a parasitic reflector for the shorter element at the resonant frequency of the

latter in order to utilize a substantial portion of said reradiated energies; and a pair of spaced, transmission line terminals spaced from said elements and connected directly with said conductors to render each of said elements a driven element on its respective resonant frequency, the conductors of the shorter element being longer than the conductors of the longer element, the electrical length of each segment of the longer element plus the electrical length of its conductor being substantially the same as the electrical length of each segment of the shorter element plus the electrical length of the conductor of the latter.

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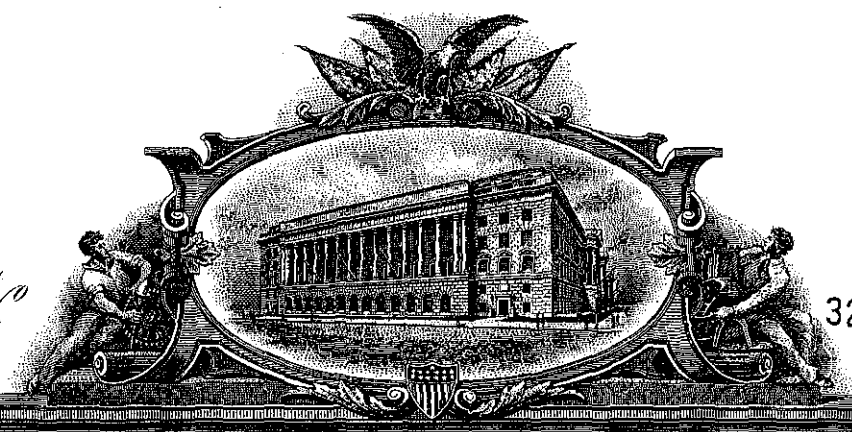

No. 3259904

THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

Whereas, THERE HAS BEEN PRESENTED TO THE

Commissioner of Patents

A PETITION PRAYING FOR THE GRANT OF LETTERS PATENT FOR AN ALLEGED NEW AND USEFUL INVENTION THE TITLE AND DESCRIPTION OF WHICH ARE CONTAINED IN THE SPECIFICATION OF WHICH A COPY IS HEREUNTO ANNEXED AND MADE A PART HEREOF, AND THE VARIOUS REQUIREMENTS OF LAW IN SUCH CASES MADE AND PROVIDED HAVE BEEN COMPLIED WITH, AND THE TITLE THERETO IS, FROM THE RECORDS OF THE PATENT OFFICE IN THE CLAIMANT (S) INDICATED IN THE SAID COPY, AND WHEREAS, UPON DUE EXAMINATION MADE, THE SAID CLAIMANT (S) IS (ARE) ADJUDGED TO BE ENTITLED TO A PATENT UNDER THE LAW.

NOW, THEREFORE, THESE **Letters Patent** ARE TO GRANT UNTO THE SAID CLAIMANT (S) AND THE SUCCESSORS, HEIRS OR ASSIGNS OF THE SAID CLAIMANT (S) FOR THE TERM OF SEVENTEEN YEARS FROM THE DATE OF THIS GRANT, SUBJECT TO THE PAYMENT OF ISSUE FEES AS PROVIDED BY LAW, THE RIGHT TO EXCLUDE OTHERS FROM MAKING, USING OR SELLING THE SAID INVENTION THROUGHOUT THE UNITED STATES.

In testimony whereof I have hereunto set my hand, and caused the seal of the Patent Office to be affixed at the City of Washington this fifth day of July, in the year of our Lord one thousand nine hundred and sixty-six, and of the Independence of the United States of America the one hundred and ninety-first.

Attest:

Attesting Officer.

Edward J. Brenner

Commissioner of Patents.

FORM PO 377A
(10-65)

BUREAU OF ENGRAVING AND PRINTING, USTND.

July 5, 1966 I. S. BLONDER ETAL 3,259,904

ANTENNA HAVING COMBINED SUPPORT AND LEAD-IN

Filed Nov. 21, 1963

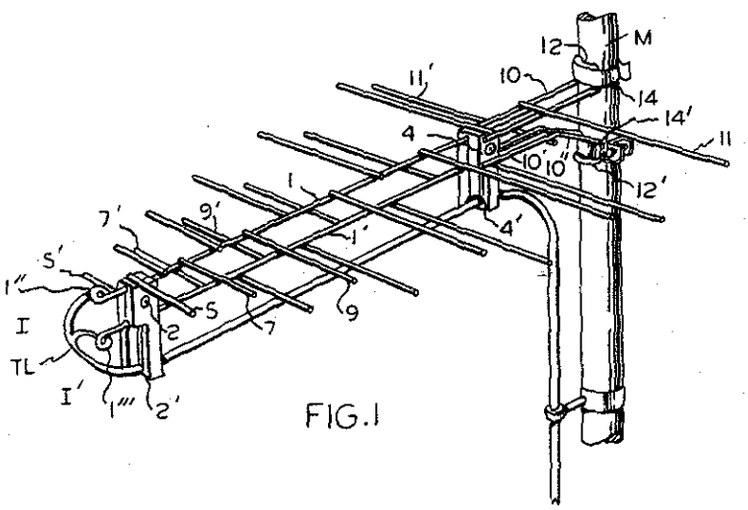

FIG. 1

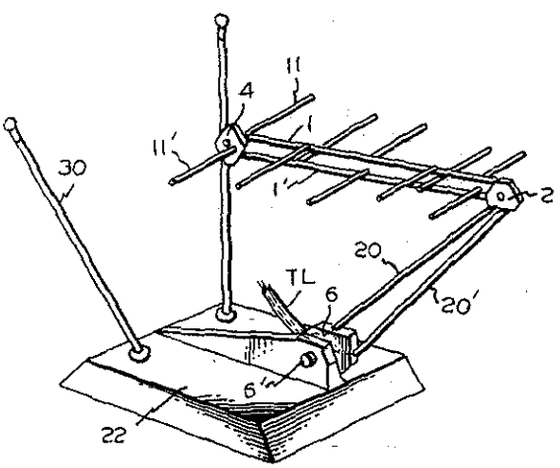

FIG. 2

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members 1–1', 20–20' may be adjusted as a unit for both electrical impedance-matching purposes and appropriate pivoting action for reception-direction adjustment, the length of the preferably diverging extension lines 20, 20' is made substantially equal to the length of the rigid antenna-supporting conductors 1, 1'.

If VHF reception is also to be provided, it has been found that minimal interference is caused by the antenna of the present invention if V-type VHF dipoles 30 are mounted on the base forward of the pivoted clamp 6 and with a sufficient included angle in the V to contain the array of the invention.

Further modifications will occur to those skilled in the art and all such are considered to fall within the spirit and scope of the invention as defined in the appended claims.

What is claimed is:

1. An antenna for ultra-high-frequency operation and the like, having, in combination, a pair of rigid conductors held spaced a predetermined vertical distance apart in a vertical plane, first and second pluralities of horizontal dipole elements lying in corresponding first and second vertically spaced horizontal planes containing the respective conductors, the dipole elements extending from opposite sides of each conductor at successive points therealong with dipole elements connected to one conductor extending in opposite horizontal directions to the corresponding dipole elements of the other conductor, the length of the dipole elements successively increasing from one end of the conductors towards the other end thereof, means for connecting a parallel-wire transmission line to the said one end of the conductors and means for mounting the antenna comprising a further pair of rigid diverging conductive extensions of said conductors mechanically secured in rigid spaced-apart relation at an end thereof, the said diverging conductive extensions being provided at the said other end of the pair of rigid conductors and each comprising a pair of horizontally spaced conductors terminally provided with a vertical loop, and the said mechanical securing means comprising mast-strapping means for strapping the said vertical loops, and the distance of the said mast-strapping loops from the said other end being comparable to the distance between the longest and next-to-longest pairs of dipole elements of the antenna.

2. An antenna for ultra-high-frequency operation and the like, having, in combination, a pair of rigid conductors held spaced a predetermined vertical distance apart in a vertical plane, first and second pluralities of horizontal dipole elements lying in corresponding first and second vertically spaced horizontal planes containing the respective conductors, the dipole elements extending from opposite sides of each conductor at successive points therealong with dipole elements connected to one conductor extending in opposite horizontal directions to the corresponding dipole elements of the other conductor, the length of the dipole elements successively increasing from one end of the conductors towards the other end thereof, means for connecting a parallel-wire transmission line to the said one end of the conductors and means for mounting the antenna comprising a further pair of rigid diverging conductive extensions of said conductors mechanically secured in rigid spaced-apart relation at an end thereof, the transmission-line connecting means and the diverging conductive extensions being combined and extending downward from the said one end to include an acute angle between the dipole carrying conductors and their extensions.

3. An antenna as claimed in claim 2 and in which the conductive extensions are clamped at their free ends against relative movement with the clamp being pivotally mounted upon a base to permit adjustment, as a unit, of the dipole-carrying conductors and their extensions.

4. An antenna as claimed in claim 3 and in which a pair of V-type dipole elements for different frequency reception, are mounted on the said base forward of the pivotal clamp, with the said horizontal dipole elements contained within the V.

5. An antenna for operation over a predetermined frequency band, having, in combination, a pair of rigid longitudinal conductors held spaced a predetermined vertical distance apart in a vertical plane, first and second pluralities of dipole elements lying in corresponding first and second vertically spaced horizontal planes containing the respective conductors, the dipole elements extending from opposite sides of and transversely at an angle to each conductor at successive points therealong with dipole elements connected to one conductor extending in opposite direction to the corresponding dipole elements of the other conductor, the length of the dipole elements successively increasing from one end of the conductors towards the other end thereof, means for connecting a parallel-wire transmission line to the said one end of the conductors, rigid insulating means securing the said connecting means mechanically in spaced-apart relation and connected with means for supporting the transmission line near the said one end, and means for mounting the antenna at a region of the said conductors remote from the said one end, further rigid insulating means being provided for securing the said longitudinal conductors mechanically in rigid spaced-apart relation near the said region, the said vertical distance being less than the distances between the said successive points and less than the wavelengths of the said band.

6. An antenna as claimed in claim 2 and in which the lengths of the said conductors and of their extensions are substantially equal.

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ANTENNA HAVING COMBINED SUPPORT AND LEAD-IN

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6 Claims. (Cl. 343—792.5)

The present invention relates to directive antennas and, more specifically, to antennas adapted for receiving very high frequencies, such as the ultra-high-frequency television band.

Numerous types of antennas have been evolved for broad-band directive radio and television reception including driven arrays, Yagi-type arrays, log periodic linear and V-type antennas, helical antennas and other configurations. The problems of mounting such antennas upon masts for outdoor operation or upon portable structures adapted for directional adjustment in connection with indoor reception have, however, long plagued the art; the mounting and adjusting structures introducing "ghosts" and other deleterious electrical field-pattern aberrations over the band. It is to the improvement of such mounting structures and the minimizing of electrical interfering effects over a wide band of frequencies, including stabilizing of outdoor performance and providing for ready adjustability in indoor performance, that the present invention is primarily directed.

A further object of the invention is to provide a new and improved antenna particularly adapted for ultra-high-frequency television reception.

Still another object is to provide a novel antenna of improved performance for more general use, also.

Other objects will be made more evident hereinafter and will be particularly pointed out in the appended claims. In summary, however, the invention contemplates a pair of rigid conductors held spaced a predetermined vertical distance apart in a vertical plane, first and second pluralities of horizontal dipole elements lying in corresponding first and second vertically spaced horizontal planes containing the respective conductors, the dipole elements extending from opposite sides of each conductor at successive points therealong with dipole elements connected to one conductor extending in opposite horizontal directions to the corresponding dipole elements of the other conductor, the length of the dipole elements successively increasing from one end of the conductors towards the other end thereof, means for feeding the energy received by the antenna at the said one end of the conductors, and means for mounting the antenna comprising a further pair of rigid, preferably diverging, conductive extensions of the said conductors mechanically secured in rigid spaced-apart relation at the end thereof. Further preferred details are hereinafter set forth.

The invention will now be described in connection with the accompanying drawing, FIG. 1 of which is an isometric view of an outdoor preferred embodiment thereof; and

FIG. 2 is a similar view of a modified indoor version.

Referring to FIG. 1, the antenna comprises a pair of rigid conductors **1**, **1'** held spaced apart a predetermined vertical distance in a vertical plane by forward and rearward insulating clamps **2** and **4**. While the terms "vertical" and "horizontal" as herein employed describe the preferred orientation for ultra-high-frequency television reception, they are intended more generically to be illustrative of relative orientations without being confined to actual direction. Similarly, though the invention is described in connection with radio-wave reception, the antenna may also be used for transmission, if desired, as is well known.

Unlike prior-art arrays, including Yagi arrays, conventional log-periodic structure and the like, first and second pluralities of horizontal dipole elements **5**, **7**, **9** . . . **11** and **5'**, **7'**, **9'** . . . **11'** are provided, lying in corresponding first and second vertically spaced horizontal planes I and I' containing the respective longitudinal conductors **1** and **1'**. The dipole elements are shown angularly extending transversely from opposite sides of each conductor at successive points therealong. The dipole elements connected to one conductor, moreover, extend in opposite horizontal directions to the corresponding dipole elements of the other conductor (such as **5** to the right **5'** to the left; **7** to the right, **7'** to the left; and so on). The length of the dipole elements preferably successively increases from one end (**5**, **5'** being shortest) towards the other end (**11**, **11'** being longest), as is well known, to provide directivity. A parallel-wire transmission line TL is connected at looped terminal portions **1''** and **1'''** beyond the clamp **2** that secures the connecting portions **1''** and **1'''** in spaced-apart relation, extending outside or to the left of the smallest dipole elements **5**, **5'**. The line TL may be supported below the antenna by depending guides **2'** and **4'** in the respective clamps **2** and **4**, the latter being shown positioned near the largest dipole elements **11**, **11'**.

The antenna of FIG. 1 is mounted upon a mast M through the use of pairs of horizontally spaced conductor-loop extensions **10** and **10'**, shown extending to the right beyond the longest dipole elements **11**, **11'**. The extensions **10**, **10'**, respectively, terminate in upwardly and downwardly extending vertical loops **12** and **12'** that may be transversely curved to fit the mast M, as shown, and are securely mechanically strapped at **14** and **14'** to the mast to hold the system **1**–**1'** in rigid spaced-apart relation at the mast end. Further to aid in mechanical stability, the extension **10'**, while in part initially extending in the lower horizontal plane I', diverges downwardly at **10''**. Fortuitously, this mechanical stability-providing diverging construction has been found minimally to affect the electrical field pattern, particularly if the length of the extension between the longest elements **11**, **11'** and the mast M is made comparable to the separation along conductors **1** and **1'** of the last dipole elements **11** from the next-to-the-last element, to its left in FIG. 1. Minimal field abberations and "ghost" reflections over the complete ultra-high-frequency band, for example, has been thus attained with the above construction, together with satisfactory broad-band impedance matching, provided further that the vertical separation distance of the rigid conductors **1**, **1'** is kept less than the average distance between successive dipole elements (preferably the order of an inch for UHF band operation), and which, in turn, is kept much less than the wavelengths involved, as is well known. At the UHF channel 47 frequency, for example (671 megacycles), a 20 decibel front-to-back ratio has been obtained with this construction, providing about a 36-degree half-power horizontal beam width and no detectable forward secondary lobes.

This same general type of construction has also been found admirably suited for indoor direction adjustable antennas, as shown in FIG. 2. In this embodiment, however, the small-dipole end of the antenna is used not only for the connection to the transmission line, but also for the support-providing extensions. These extensions are illustrated as rigid conductors **20** and **20'** depending at preferably an acute angle below the antenna at the insulating clamp **2** and slightly diverging for mechanical and impedance-matching purposes, being clamped at their bottom or free ends by a further insulating clamp **6**. The transmission line TL is thus connected to the conductors **1** and **1'** by these combined extension-supporting and transmission-line feed members **20**, **20'**. The clamp **6** is pivoted at **6'** to a bracket carried by a base **22** so that the