McNENNY, FARRINGTON, PEARNE & GORDON

ATTORNEYS AT LAW

920 MIDLAND BUILDING

CLEVELAND, OHIO 44115

TELEPHONE
(216) 623-1040
CABLE ADDRESS
RICHEY

PATENT AND
TRADEMARK LAW

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

LLOYD L. EVANS
OF COUNSEL

May 9, 1967

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

Re: The University of Illinois Foundation
v. Winegard Company

Dear Bob:

At Dick Phillips' suggestion during my telephone conversation with him today regarding the status of the Blonder-Tongue suit, I am enclosing herewith our copies of the briefs filed by the parties in the above-noted Winegard suit. I would appreciate your returning these copies when you have had an opportunity to peruse them and make copies if you wish.

The Foundation devoted less than two pages in its reply brief to an effort to brush-off Quarterly Engineering Report No. 2 as a statutory bar. They cited no law contrary to that cited by Winegard and, on the facts, seemed to rely primarily on the fact that the "Local Library" in the E. E. Dept. was not an official library. (See our Memorandum, pp. 29-34 and 42-43).

I am still unimpressed by the job done by both parties to that suit. On the other hand, if the Judge reads Winegard's Reply Brief carefully, he should see the many inconsistencies and weaknesses of the Foundation's position and, I trust, find favorably for Winegard on both validity and infringement.

Sincerely,

JFP:jh
Enclosures

cc: Richard S. Phillips, 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 Action No. 3-695-D.

PLAINTIFF'S BRIEF AFTER TRIAL.

WILLIAM A. MARSHALL,
BASIL P. MANN,
30 West Monroe Street,
Chicago, Illinois 60603,
Area Code 312-346-5750,
Attorneys for Plaintiff.

Of Counsel:
CHARLES J. MERRIAM,
MERRIAM, MARSHALL, SHAPIRO & KLOSE,
30 West Monroe Street,
Chicago, Illinois 60603,

COOK, BLAIR, BALLUFF & NAGLE,
409 Putnam Building,
Davenport, Iowa 52801.

THE GUNTHORP-WARREN PRINTING COMPANY, CHICAGO

TABLE OF CONTENTS.

		PAGE
I.	Introduction	1
II.	Statement of Facts	2
	A. Background	2
	B. The Invention Disclosed and Covered by the Patent in Suit	7
III.	Summary of Argument	9
IV.	Infringement	11
	A. Claims Asserted Against Winegard and Winegard Antennas Infringed Thereby	11
	B. Discussion	12
	1. The Isbell Patent is Infringed	12
	2. The Doctrine of Equivalents	17
	3. There is No File Wrapper Estoppel	19
	4. The Use of Parasitic Elements in the VHF Section of Winegard's Antennas Does Not Avoid Infringement	21
	5. Tabular Summary of Infringement	22
V.	Isbell Patent 3,210,767 is Valid	29
	A. Introduction	29
	B. Conditions of Patentability	30
	1. The Isbell Invention is Useful	31
	2. The Prior Art Does Not Anticipate Isbell's Invention	31
	(a) Quarterly Engineering Report No. 2 Was Not Published Prior to May 3, 1959	33
	3. The Isbell Invention Was Not Obvious	38
	C. No "New Matter" Was Introduced Into the Application	45
VI.	Miscellaneous	45
VII.	Conclusion	46

TABLE OF AUTHORITIES.

Admiral Corp. v. Zenith Radio Corp., 296 F. 2d 708 (10 Cir. 1961) 15

Artmoore Co. v. Dayless Mfg. Co., 208 F. 2d 1 (7 Cir. 1953) 29

Badowski v. United States, 164 F. Supp. 252 (Ct. Clms. 1958) 36

Browning Mfg. Co. v. Bros, Inc., 126 U. S. P. Q. 499 (D. C. Minn. 1960) 36

Camp Bros. & Co. v. Portable Wagon Dump & E. Co., 251 Fed. 603 (7 Cir. 1917) 37

D & H Electric Company v. M. Stephens Mfg., 233 F. 2d 879 (9 Cir. 1956) 20

Ditto, Inc. v. Minnesota Mining & Mfg. Co., 336 F. 2d 67 (8 Cir. 1964) 29

Ekco Products Co. v. Chicago Metallic Manufacturing Co., 321 F. 2d 550 (7 Cir. 1963) 20

Ex parte Suozzi, 125 U. S. P. Q. 445 (P. O. Bd. App. 1959) 37

Ezee Stone Cutter Mfg. Co. v. Southwest Indus. Prod., 262 F. 2d 183 (8 Cir. 1958) 29

Graham v. John Deere Co., 383 U. S. 1 (1965) 30, 40

Helms Products v. Lake Shore Mfg. Co., 227 F. 2d 677 (7 Cir. 1955) 45

Hoeltke v. Kemp Mfg. Co., 80 F. 2d 912 (4 Cir. 1935) 40

I. C. E. Corp. v. Armco Steel Corp., 250 F. Supp. 738 (D. C. N. Y. 1966) 36

Jewell Filter Co v. Jackson, 140 Fed. 340 (8 Cir. 1905) 17

Kirsch Mfg. Co. v. Gould Mersereau Co., 6 F. 2d 793 (2 Cir. 1925) 39

Kohn v. Eimer et al., 265 Fed. 900 (2 Cir. 1920) 16

L. S. Donaldson Co. v. LaMaur, Inc., 299 F. 2d 412 (8 Cir. 1962) 33

McDonough v. Johnson-Wentworth Co., 30 F. 2d 375 (8 Cir. 1928) 22

Mumm v. Decker & Sons, 301 U. S. 168 (1937) 30

Nasco Inc. v. Vision-Wrap, Inc., 352 F. 2d 905 (7 Cir. 1965) 33

Priebe & Sons Co. v. Hunt, 188 F. 2d 880 (8 Cir. 1951) 19

Protein Foundation, Inc. v. Brenner, Comr. Pats., 151 U. S. P. Q. 561 (D. C. D. C. 1966) 37

Reiner v. I. Leon Co., 285 F. 2d 501 (2 Cir. 1960) 38

Reynolds v. Whitin Mach. Works, 167 F. 2d 78 (4 Cir. 1948) 40

Schnell v. Allbright-Nell Co., 348 F. 2d 444 (7 Cir. 1965) 33

Stauffer v. Slenderella Systems of California, 254 F. 2d 127 (9 Cir. 1957) 33

Technicon Instruments Corp. v. Coleman Instruments Corp., 255 F. Supp. 630 (N. D. Ill. 1966) 45

University of Illinois Foundation v. Block Drug Co., 133 F. Supp. 580 (E. D. Ill., 1955), aff'd 241 F. 2d 6 (7 Cir. 1957) 29

Williams Iron Works Co. v. Hughes Tool Co., 109 F. 2d 500 (10 Cir. 1940) 15

Winans v. Denmead, 56 U. S. 330 (1853) 18

York Ice Machinery Corp. v. L. & K. Ice Corp., 6 F. Supp. 544 (S. D. N. Y. 1934) 21

IN THE

United States District Court

FOR THE SOUTHERN DISTRICT OF IOWA,

DAVENPORT DIVISION.

UNIVERSITY OF ILLINOIS FOUNDATION, *Plaintiff,* *vs.* WINEGARD COMPANY, *Defendant.*	Civil Action No. 3-695-D.

PLAINTIFF'S BRIEF AFTER TRIAL.

I. INTRODUCTION.

This action involves Isbell Patent No. 3,210,767, covering an antenna of a novel type which provides the best solution to date of the problems involved in television reception (R. 315-317, 617, 618)* and particularly those of color television reception, which are especially stringent (R. 173, 174, 472).

Wide-spread interest in antennas having broad-band properties had existed for many years prior to Isbell's invention (R. 318, 319). When Isbell's antenna was disclosed, it was quickly adopted for use by many organizations involved in defense activities (R. 323, 324).

The Isbell antennas have also been widely used for commercial and industrial purposes in addition to television reception (R. 171, 172). Their acceptance for television re-

* "R." refers to Transcript of Record; "PX" refers to Plaintiff's Exhibits; "DX" refers to Defendant's Exhibits.

ception may be gauged by the fact that within the two-year period ending January 1, 1967, defendant's production of the accused television antennas rose from about 5% to about 40% of its total production (PX-62).

II. STATEMENT OF FACTS.

A. Background.

Television, in common with other methods of communication, requires that information be conveyed from one point to another. Television broadcasting, in particular, involves the sending of information via radio waves from a broadcasting station, usually in all directions, to a mass audience consisting of the individual owners of television receivers.

The television transmitter is usually located on top of a tall structure, such as a building or a tower, near the center of the population area. The television transmitter sends power in the form of radio frequency waves through the earth's atmosphere, usually in all directions toward the television receivers in the area (R. 43).

Within any given metropolitan television broadcast service region, the atmosphere contains many complex electrical disturbances in the form of radio frequency waves of various types, including those of the television transmitters operating in the area (R. 47, 48). In order to receive a particular television transmission, the owner of a television set must use a receiving antenna to pick up the television signal and deliver it to the television set in a form that can be used (R. 43, 44). Depending on the circumstances, it is possible to use antennas having several different configurations. For example, in the case of television receivers located relatively close to the transmitter, the simple whip or "rabbit-ear" rod antenna mounted directly on the television receiver cabinet can be used (R. 52) to give satisfactory performance, particularly with

black and white television for which the requirements are not stringent in comparison with those of color television transmission.

As the distance between the broadcasting station and the individual television receiver increases, however, the radio waves rapidly become weaker and weaker (R. 43) and it is advantageous to use an antenna having a greater capability of electrical energy extraction from the atmosphere than the simple whip or "rabbit-ear" configurations. 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 (R. 46). Obviously, other considerations being equal, it is desirable in an antenna to have as high a gain as possible so as to insure that the receiver has a signal of sufficient size for proper reception (R. 47).

Another consideration in the desirable properties of television antennas stems from the fact that television signals are capable of bouncing or reflecting from many types of man-made and natural obstructions, such as tall buildings and hills or mountains. It is, therefore, possible for a given location to receive, in addition to the primary signal coming directly from the television transmitter, a second signal from a different direction which arrives as the result of reflection from an obstruction. This reflected signal also produces a picture in the television receiver, but, because of the fact that it arrives a short time later than the original signal, the second picture is slightly displaced and produces an undesirable "ghost" image (R. 44, 45). A solution to a problem of this type is to use an antenna capable of receiving signals only from the desired direction or directions while excluding signals which arrive

from other directions. The ability of a television receiver to discriminate in this manner is a measure of the antenna's "directivity." (R. 44.)

When most of the television transmitters which serve a given metropolitan area are located reasonably close to one another, a situation which is usual in many metropolitan areas, it is an obvious advantage that a television antenna have a unidirectional directivity (R. 55, 56), i.e., that it be capable of receiving signals only from the direction in which it is pointed while rejecting signals from the side or rear. The antennas of the patent in suit have this desirable unidirectional property (PX-31, Col. 1, ll. 21-23).

Another property which is important in a television antenna, and indeed crucial for color reception, is its ability to receive signals equally well over a wide band of frequencies (R. 172-174, 471, 472). Every user of a television set knows that television programs are received on one or more of twelve broadcasting channels known as VHF (*V*ery *H*igh *F*requency) channels 2 through 13. These channels were established shortly after World War II by the Federal Communications Commission on fixed frequency assignments which have been maintained ever since. More recently, additional UHF (*U*ltra *H*igh *F*requency) channels 14 through 83 at higher frequency assignments were established and are coming into increasing use (R. 57-62). Although some of the defendant's antennas are designed to cover both the VHF and UHF channels, only the VHF section of such combination antennas is accused as infringing the patent in suit.

The channel assignments by the Federal Communications Commission in the VHF range provided for twelve channels, numbers 2 through 13, inclusive, which occupied frequencies in the radio spectrum from 54 megacycles through

216 megacycles, arranged in two bands, channels 2 through 6 designated as the low band (54 through 88 megacycles), and channels 7-13 as the high band (174 through 216 megacycles), with FM radio using a portion of the gap between the bands (PX-56). These channel assignments created such problems in the antenna engineering art and presented such extreme challenges to the television receiving antenna designers (R. 63-64) that it was necessary to use compromise techniques (R. 76, 77) to provide satisfactory receiving antennas for television, since there was no available antenna design at that time which would cover such a broad range of frequencies.

It is possible, of course, to design and use an individual dipole antenna for each channel. Such an attempted solution, however, presents a number of difficulties (R. 64, 65). In addition to greatly increased cost (R. 65), there are further difficulties resulting from the unpredictable effects stemming from interreaction of antennas spaced close together. Still another difficulty is presented by the method to be used in connecting the individual antennas to the television set. Multiple transmission lines cannot be simply connected to the input of a television receiver without special matching sections which are necessary to avoid a severe impedance mismatch between the antenna and the receiver with consequent deterioration of performance (R. 69-71).

The "impedance" (R. 46, 47, 51, 68, 69) of an antenna is its apparent resistance to the flow of alternating current therein. The impedance is an inherent property which is determined by the antenna design and by the frequency of operation. The other major component of the antenna system, i.e., the transmission line to the receiver, also has a characteristic impedance, the value of which depends in part on its physical dimensions. In order to

maximize the transmission of signal power from the antenna to the transmission line (and, therefore, from the transmission line to the receiver), the impedances of the antenna and of the transmission line should be equal (R. 69). Additionally, therefore, the antenna impedance should match as closely as possible the impedance of the transmission line, which has a value of about 300 ohms for the commonly used twin-lead line (R. 45), which is accepted as the standard of the industry (R. 69). Moreover, although the impedance of the antenna varies with frequency, it is desirable to minimize this variation as much as possible in order to maintain a close "impedance match" between the antenna and the transmission line (R. 51).

In order to avoid, insofar as possible, the problems mentioned above, it was common to use a compromise antenna for the low band of VHF channels (2 through 6) and another compromise antenna to cover the high band of VHF channels 7 through 13 (R. 76, 77).

While this compromise method of operation was satisfactory for black and white television, it was not good enough for color television. The underlying difficulty which precludes the use of compromise antennas intended to receive an average frequency or one in the approximate middle of the desired band stems from the fact that each television channel is not a single, fixed frequency, but rather a range of frequencies 6 megacycles wide (R. 58). For optimum reception of the sound and picture information transmitted on a given channel, all of the frequencies within the band should be received by the antenna and supplied to the receiver in the same relative magnitude as sent by the broadcasting station. Thus, unless the television antenna has a uniform gain across the channel, it will vary the relative magnitude of the various frequencies it receives and thereby introduce distortion in the signal

fed to the receiver (R. 471, 472). When all television broadcasting was black and white, the distortion caused by nonuniform reception across the band was of relatively little concern since it did not greatly affect the quality of the picture. With color television, such frequency discrimination caused by the antenna can result in deterioration of the colors in the picture (R. 174, 472).

The antenna of the invention provided a solution to the problem of satisfactory television reception, particularly of color television signals, in that one broadband antenna could be made to cover the entire television broadcasting band, including the UHF channels, if desired, with a uniformly high gain across the entire band, thereby eliminating color deterioration problems (R. 172). In addition, the antenna requires only one transmission line to the television set, eliminating impedance matching problems and, in addition, has unidirectional directivity which can be used to eliminate ghosts and other unwanted signals.

B. The Invention Disclosed and Covered by the Patent in Suit.

Isbell patent No. 3,210,767 (PX-31), discloses and claims antennas consisting of several straight, parallel dipoles arranged approximately in a plane, each dipole being connected to a feeder line consisting of two conductors which are transposed, i.e., cross over each other, between connections to adjacent dipoles.

In the Isbell antenna, the lengths of the dipoles vary progressively from the longest at the back to the shortest at the front, which is the feed-point of the antenna. In the ideal form specifically described in the patent, the lengths of the dipoles vary in accordance with a constant scale factor having a value less than one, the length of any dipole being calculated by multiplying the length of the adjacent longer dipole by the scale factor.

In its ideal form, the Isbell antenna is a true log-periodic antenna (R. 88) in which the "cell" is a dipole plus a section of transmission line (R. 89). In order to satisfy the requirement that successive cells in an ideal log-periodic antenna are similar in shape (R. 87, 163), the spacing between adjacent dipoles ideally varies in the same manner as the dipole length.

In the form described, i.e., with both dipole lengths and spacings varying by a common scale factor, the Isbell antenna is truly independent of frequency over a band of frequencies as large as may be desired, the only limitations being those involved in making dipoles of the proper size to correspond to the frequencies desired to be covered (DX-31, col. 2, l. 65 to col. 3, l. 12).

For many practical uses, the Isbell invention may depart from the ideal log-periodic form described above without seriously affecting its performance. As might be expected, a departure from the theoretical ideal results in a narrowing of the band width of the antenna (R. 132). Since the change of performance is gradual with deviation from the idealized structure, the extent to which variations in the scale factors relating to dipole length and spacing are permissible depends on the bandwidth which is desired (R. 129-133).

As set forth in the patent (PX-31, col. 3, ll. 2-8), the upper and lower limits of the frequency range which is covered by an Isbell antenna are determined by the lengths of the shortest and longest dipole elements, respectively, in the group or array. Operation of the antenna in this fashion is based on the fundamental or one-half wavelength mode (R. 49, 50) in which the dipoles have lengths which correspond to about one-half wavelength at the frequency of operation.

Because of the property possessed by the dipoles in

the array of being active at several frequencies, the antenna will also be strongly receptive at frequencies three times those of the fundamental mode, at which the dipoles are about 3/2 wavelengths long (R. 79, 80).

The Winegard antennas accused in this suit are designed to cover channels 2-6 with the fundamental mode of operation discussed above. Since high band VHF channels 7-13 have frequencies about three times those of low band VHF channels 2-6, the Winegard antennas make use of the 3/2 wavelength mode for operation at the high band VHF frequencies. The multiple lobes which normally appear in the radiation pattern at the higher frequencies (R. 79, 80) are suppressed in a known manner (R. 111) by the use of suppressor parasitic elements (R. 108, 109). In this fashion, the accused Winegard antennas minimize the total number of dipoles required, by making the dipoles function at two different frequency ranges, viz., the low band VHF and the high band VHF.

III. SUMMARY OF ARGUMENT.

1. There was no guidepost which led to the Isbell invention, and it therefore was not obvious.

2. The accused antennas were designed by defendant's president after reading Isbell's publications which disclosed the Isbell invention.

3. The Isbell invention, and *no others* prior to Isbell, accomplished unexpected wide band reception in a practical manner to permit the assertion by defendant that:

> "With the new Winegard Chroma-Tel antenna, we have eliminated *half* the bulk, *half* the wind loading, *half* the storage space, *half* the truck space, and *half* the weight . . . yet still have the best working, easiest installing UHF-VHF-FM antenna ever developed!" (PX-46, p.2.)

The evidence proves defendant could not have come close to this boast without the Isbell invention.

4. A printed publication must be both printed *and* published. Quarterly Engineering Report No. 2 was not published until May 5, 1959 and therefore did not bar the patent.

5. File wrapper estoppel cannot apply to unamended claims.

6. There was no "new matter" introduced into the patent. The "cell" concept is inherent in the original disclosure and was known to those skilled in the art. The Patent Office is the best judge of inherency.

7. Claims 14 and 15 are literally infringed by all the accused antennas. Antenna CT-100 (PX-44) in addition infringes claims 1, 2, and 9-12. Those claims which do not literally cover the accused antennas are infringed because the substance of the invention is used in the construction of such antennas.

IV. INFRINGEMENT.

A. Claims Asserted Against Winegard and Infringed by Winegard Antennas.

The patent in suit (PX-31) contains fifteen claims. Defendant is accused of infringing Claims 1-5 and 9-15 by its manufacture, use and/or sale of twenty-two antenna models embodying the claimed invention. These various models, because of certain structural similarities, can be grouped as shown in Table 1:

Table 1.

Group I			Group II
(PX-32)* Chromaflex B-445 B-550 (PX-52)** B-555 B-660 B-770	(PX-33)* Chromaflex B-105	(PX-34)* Chromaflex B-335	(PX-35) RCA 10 B 200 (PX-53)** 10 B 300 10 B 400

Group III				
(PX-36) RCA 10 B 1050 (PX-50 A-B)**	(PX-37) RCA 10 B 1010 10 B 1020 (PX-49)**	(PX-38) RCA 10 B 1030 10 B 1040	(PX-39)* Chromatel CT-40	(PX-40)* Chromatel CT-80 (PX-69)** CT-90

Group IV			Group V
(PX-41)* RCA 10 B 1120 (PX-51)**	(PX-42)* RCA 10 B 1130	(PX-43)* RCA 10 B 1140	(PX-44)* Chromatel CT-100

* Includes a UHF section.

** Also represented by actual antenna model.

The antenna models included in several of the above groups, as noted, contain separate sections for receiving UHF and VHF channels. It is the VHF sections which receive channels 2-6 (low band VHF) and channels 7-13 (high band VHF) which infringe the specified claims. The UHF sections which receive channels 14-83 do not utilize the teachings of this invention.

Although the same array of dipoles in the VHF section is used to receive both low band and high band VHF signals, the Isbell invention is used by Winegard; in the dipole lengths and spacing to cover low band VHF operation (R. 105-11). High band VHF operation, using these same dipole elements, is effected by the multi-mode characteristics of the dipole elements, as discussed above (page 9), and the use of parasitic elements, viz, reflectors, directors and suppressors (R. 105, 106). PX-32-44 show in a schematic manner the *driven* dipole elements of the VHF sections of the antenna array which infringe. It is this arrangement of dipoles, dipole lengths, spacings and cross feeding which follows the teachings of the Isbell invention and which affects its operation in receiving low band VHF signals. Eliminated from these exhibits, for reasons of clarity, are the conventional parasitic elements, directors, reflectors and suppressors, the use of which by defendant does not avoid infringement as will be shown below.

B. Discussion.

1. The Isbell Patent Is Infringed.

The frequency independent, unidirectional antennas constructed in accordance with the teachings of the patent in suit, because of their desirable electrical characteristics, can be employed in a number of so-called broad band applications (PX-31, Col. 1, lines 20-23). Reference to the electromagnetic frequency spectrum (PX-56) will show that each television channel has a bandwidth of 6 Mc/s (megacycles per second) and the VHF television band in which the infringing sections of defendant's antennas function cover a four to one bandwidth. While there is no unique definition of bandwidth, the VHF television band is considered broadband (R. 28, 311-12); the VHF sections of the Winegard antennas are broad or wideband antennas as called for in the preamble of the claims.

Analysis of the claims is further simplified by the inclusion of a basic antenna structure in each of the claims charged to infringe. Although the claim language used varies slightly, this basic structure is generally defined as a co-planar, dipole array consisting of a number of dipoles arranged in side by side relationship in a plane. Each of the dipoles is connected by a two conductor, common cross-feeder, the conductors of which cross over each other between connections to successive dipoles.

This basic antenna structure is employed in each of the VHF sections of the antennas included in the aforementioned Groups I-V (PX-1, 4-11, 13-25, 32-44, 49-53).

Other claimed structural characteristics which define the frequency independent antennas of this invention are (1) dipole length and (2) spacing between the dipoles or cell dimension.

Plaintiff's expert, Mr. Harris, initially grouped the infringing antennas into the aforementioned Groups (R. 91 *et seq.*) and thereafter reviewed each of the infringing structures and prepared the diagrams PX-32-44 which schematically illustrate them based upon information provided directly from Winegard (PX-1, 4-11, 13-25). From this information, the scale factors (tau) for the dipole

length, spacing and cell were also determined and are tabularly summarized on each of exhibits PX-32-44.

Mr. Harris selected as a representative infringing antenna the Group V antenna, Chromatel 100, and with reference to DX-44 explained the schematic drawing and the tabular summaries of the scale factors for the element length, spacing and cell (R. 120-123). He then testified that, with respect to this antenna, the element length, spacing and cell factors were substantially constant and less than one, and, further, the scale factors for the element length and cell are substantially the same (R. 125-126).

Mr. Harris then reviewed PX-32-43, which were derived in the same manner as PX-44 and represented the Group I-IV infringing antennas, and testified that the scale factors for element length and cell are substantially constant and less than one for the antennas included in these Groups (R. 127, 132-3). Although Mr. Harris testified that the spacing scale factor for these antennas was 1, he attributed only minor significance to the fact that the spacing scale factor was not less than 1 (R. 129) and stated that the result would be practically unobservable in the operation of defendant's antennas (R. 130). Only a minor effect is manifested by having a spacing scale factor of one because, in the order of importance in the design of defendant's broad band, frequency independent antennas, the element length scale factor was the most important followed by the cell scale factor. The spacing scale factor is the least important (R. 132-3). In these antennas, the element length and cell scale factors being substantially constant and less than 1 literally followed the Isbell invention. On the other hand, a spacing factor of 1 complied with the substance of the invention which calls for this factor ideally but not critically to be less than 1.

It is important to consider that any modifications from

the optimum Isbell antenna designs would result from practical considerations necessary to produce a television antenna for commercial manufacture and sale. For example, the use of uniform spacing, i.e., a spacing scale factor of 1, would be employed from a practical standpoint for a television antenna constructed to cover the low band VHF properly and satisfactorily (R. 626-7). An antenna having such practical modifications would still fall within the scope of the Isbell patent (R. 629).

In copying the substance of the invention, it is not necessary that the most efficient form of the invention need be used. An infringement may be found, and, by the same token, equivalents may be recognized even though the infringing device utilizes only a part of the patent in suit, or otherwise utilizes it imperfectly. *Admiral Corp.* v. *Zenith Radio Corp.*, 296 F. 2d 708, 717 (10 Cir. 1961).

> "Identity of function exists where the function is the same, although impaired in degree, and identity of result exists where the result is the same in kind, although lesser in degree. *Impairment of function and lessening of result, in degree only, does not avoid infringement.*" *Williams Iron Works Co.* v. *Hughes Tool Co.*, 109 F. 2d 500, 503 (10 Cir. 1940) and cases cited therein. (Emphasis added.)

No probative evidence was presented by defendant to rebut Mr. Harris' testimony relative to the infringement of the Isbell patent by the defendant's television antennas. Although Dr. Yang, defendant's expert, who admittedly had no experience in the design of television antennas (R. 524), did not classify Winegard's infringing antennas as frequency independent log periodic (R. 516-17), he based his conclusion on the uniform spacing of the dipole elements (R. 515-16). In spite of this, he did recognize that commercial considerations may require a deviation from strict theory (R. 526-7). Dr. Yang, in the end result, only testified in

generalities and did not compare any specific Winegard antennas with the frequency independent unidirectional antennas covered by the patent in suit (PX-31).

The testimony of Mr. Cook, defendant's patent expert, was pure argument of a paid advocate who was *not* skilled in the antenna art. He had absolutely no experience in the antenna art and had not done any actual work in connection with his testimony (R. 589). As a result, his testimony was without probative effect because:

> "... the words of a patent or a patent application, like the words of specific claims therein, always raise a question of law for the court and may not be determined by the opinion of experts." *Sanitary Refrigerator Co.* v. *Winters,* 280 U. S. 30 (1929).

The value of Mr. Cook's testimony was aptly characterized by Judge Learned Hand in *Kohn* v. *Eimer et al.,* 265 Fed. 900, 902 (C. A. 2, 1920) where he stated:

> "Specifications are written to those skilled in the art, among whom judges are not. It therefore becomes necessary, when the terminology of the art is not comprehensible to a lay person, that so much of it as is used in the specifications should be translated into colloquial language; in short, that the judge should understand what the specifications say. This is the only permissible use of expert testimony which we recognize. When the judge has understood the specifications, he cannot avoid the responsibility of deciding himself all questions of infringement and anticipation, and the testimony of experts upon these issues is inevitably a burdensome impertinence."

In the final analysis, even considering Mr. Cook's testimony, it is therefore seen that probative rebuttal evidence was not presented by defendant. Dr. Yang did not consider *specifically* the various Winegard antennas which have been charged to infringe. Even Mr. Cook, who was more specific, tacitly did not contest infringement of Claims

1, 2, 4, 5 and 9-15 at least in any charts discussed by him because this type of presentation was limited to Claims 3 and 10. While argument was presented by Mr. Cook on the asserted noninfringement of Winegard antenna models B-105, 10 B 200, 10 B 1010, CT-40 and 10 B 1120 falling within Groups I-IV, no argument was made by Mr. Cook concerning Group V.

The 8th Circuit Court of Appeals in the classic case of *Jewell Filter Co.* v. *Jackson,* 140 Fed. 340, 344 (8th Cir. 1905), analyzed various approaches which a variety of courts had taken in considering the issue of infringement and concluded that:

> "The clue which leads through the labyrinth of the opinions upon this subject is an endeavor to find in each case, by a reading of both the claim and the specification, the actual invention which the patentee made and intended to claim, and then to give effect to that intention, unless by the terms of the specification or claim he has renounced his right to that result. The true rule is that the specification of a patent, which forms a part of the same application as its claims, must be read and construed with them, not for the purpose of expanding nor for the purpose of limiting or contracting the latter, but for the purpose of ascertaining their true meaning and the actual intention of the parties when they were made and allowed."

Applying the rule of the 8th Circuit it is clear that the Isbell patent is infringed.

2. The Doctrine of Equivalents.

As shown above, claims 14 and 15 are literally infringed by all of the accused antennas, and claims 1, 2, and 9-12 are infringed by antenna CT-100. Although the other antennas may not literally fall within the language of the remaining claims they nevertheless infringe these claims because they use the substance of the invention.

It is evident that where the substance of the invention may be copied it is the duty of the court to look through the form to the substance of the invention. *Winans* v. *Denmead,* 56 U. S. 330, 342, 343 (1853). This rule is necessary because:

> "Rarely do we find an example of what might be called perfect infringement. No patent infringer would be so silly as to make and vend a device similar in every minute detail to a patent. Infringement connotes, between the patent and the accused device, merely correspondence as to the substantial, dominant and essential elements. Any other view would make of a patent a foolish and fatuous thing." *City of Grafton, W. Va., et al.* v. *Otis Elevator Co.,* 166 F. 2d 816, 821 (4 Cir. 1948).

Even Mr. Cook's consideration of the specific antenna models is based upon a narrow and improper literal interpretation of the claims without regard to the substance of the invention. Properly, Mr. Cook should not have considered patent infringement to be a mere matter of words, and should not have depended upon the mere application of claim phraseology.

Defendant's infringing antennas are broadband frequency independent antennas which have a high front to back ratio, good directivity, uniform impedence characteristics and uniform gain characteristics (See PX-30, 30A-C). They are manufactured and sold for television reception and particularly color reception which requires that these characteristics obtain for desired performance. Similarly the antennas covered by the Isbell patent "provide unidirectional radiation patterns of constant beam width and nearly constant input impedances over any desired bandwidth" (PX-31, Col. 1, lines 21-22). Even assuming arguendo that the element length, cell and spacing scale factors are not substantially constant or less than one, the accused antenna models are infringements under the doctrine of

equivalents because the accused devices do substantially the same work (function as a broadband antenna) in substantially the same way (employ the structure of the Isbell invention) and accomplish the same result (provide good front-to-back ratio, good directivity, i.e., unidirectional, constant all impedance characteristics and uniform gain).

> "The test of infringement is whether the accused device does substantially the same work in substantially the same way to accomplish the same result by the same or equivalent means and infringement is not to be avoided by a substitution of equivalence whether the equivalent is verbally within the claim or not . . ." *Priebe & Sons Co.* v. *Hunt,* 188 F. 2d 880, 883 (8 Cir. 1951).

3. There Is No File Wrapper Estoppel.

Mr. Cook is mistaken as to the existence of a file wrapper estoppel applicable to the claims charged to be infringed, because it is well-established law that a limitation cannot be read into a claim by the statement of applicant's attorney made during the prosecution of the patent when no amendment of the claims is made and the statement is contrary to the plain language of the claims.

Defendant attempts to limit the scope of the patent by reason of a casual remark made once at the outset of the prosecution of the application by applicant's attorney (R. 595). In discussing a secondary reference, the statement was made that the reference "does not teach or disclose either the progressive variation in dipole length and spacing which is essential in applicant's invention" (DX-F1-F4, p. 23).

No amendment, however, was made to the claims in order to distinguish over the references (R. 592).

The doctrine of file wrapper estoppel arises only when: (1) a claim in an application has been re-

jected by the Patent Office as unpatentable; (2) the applicant adds a limitation to the claim (or cancels the claim and replaces it with a new claim containing a limitation not contained in the replaced claim); and (3) the addition of the limitation to the claim results in allowance of the claim by the Patent Office. *D & H Electric Company* v. *M. Stephens Mfg.*, 233 F. 2d 879, 883 (9 Cir. 1956). When such a situation has occurred, the patentee is estopped from subsequently contending that there is infringement by any device which does not contain a feature which falls within the literal terms of the additional limitation which resulted in the allowance of the claim. However, the doctrine of file wrapper estoppel cannot be invoked without the three essential elements enumerated above.

The claims which were in the case and before the Patent Office were *not* amended either before or after the casual statement of applicant's attorney (R. 592). The courts have consistently held that file wrapper estoppel cannot be based merely upon arguments submitted to the Patent Office, but must be based upon limitations added to a claim following a rejection. In the case of *Ekco Products Co.* v. *Chicago Metallic Manufacturing Co.*, 321 F. 2d 550, 555 (7th Cir. 1963) the Court stated:

> "The claim must be construed to cover the actual invention and may not be limited by extraneous remarks in argument unaccompanied by actual amendment of the claim."

The above-quoted proposition of law merely reaffirms the law followed by the Courts.

> "We perceive no limitation or disclaimer in the file wrapper. Arguments and explanations, and amendments to emphasize them, are not to be so construed." *McCormick W. P. Cement Co.* v. *Medusa Concrete W. Co.*, 222 Fed. 288, 292 (7th Cir. 1915).

> "'[I]t is well settled that mere arguments of an applicant for a patent have no bearing on that question; . . . (Limiting the scope of the claim.)'" *The University of Illinois Foundation* v. *Block Drug Co.*, 133 F. Supp. 580, 590, n. 24 (E. D. Ill. 1955), affirmed 241 F. 2d 6.
>
> "On the issue of infringement with respect to Patent No. 1,718,310, the defendant first insists that in the Patent Office proceedings the claims were so limited in scope as to exclude the defendant's apparatus. But it is well settled that mere arguments of an applicant for a patent have no bearing on that question; *Spalding & Bros.* v. *John Wanamaker* (C. C. A.) 256 F. 530, 534; and unless limitations are placed by the applicant on the claims for the purpose of meeting objections of the Examiners, or otherwise, there is no basis for an estoppel." *York Ice Machinery Corporation* v. *L. K. Ice Corporation*, 6 F. Supp. 544, 546 (S. D. N. Y. 1934).

4. The Use of Parasitic Elements in the VHF Section of Winegard's Antennas Does Not Avoid Infringement.

Winegard employs conventional parasitic elements such as reflectors, directors and suppressors in the VHF section of its antennas (PX—49-53). It is uncontradicted that these elements are used for the functional purposes for which they have long been known, and the use of all these parasitic elements was known prior to 1960 (R. 111, 169-70).

In the operation of the infringing antennas in the low band VHF channels, the reflector and director elements may improve such characteristics as directivity and front-to-back ratio. However, the fundamental characteristics of good front to back ratio, directivity, uniform impedance and uniform gain provided by the dipole arrays of Isbell's invention are still employed in the operation of defendant's antennas (R. 170-1). It is well-settled law that an addition to a patented apparatus does not avoid infringe-

ment. This is true even where the added elements improve the effectiveness of the patented device. *McDonough* v. *Johnson-Wentworth Co.*, 30 F. 2d 375, 385 (8 Cir. 1924) and cases cited therein.

5. Tabular Summary of Infringement.

Claims 14 and 15 which cover the substance of Isbell's invention in terms of the cell structure as well as element length scale factor are literally infringed by all of the accused antennas. Reference to Table 2 shows the literal conformance of all the groups with the language of these claims. Group V antennas also literally infringe Claims 1, 2, 9, 10, 11 and 12. (See pages 13-15 above). The accused antennas are within the inventive concept of the other claims.

TABLE 2

	Group				
	I	II	III	IV	V
14. An antenna system for wideband use comprising:					
1) a minimum of three pairs of linear substan-					

TABLE 2

	Group I	II	III	IV	V
14. An antenna system for wideband use comprising:					
1) 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	x	x	x	x	x
2) 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	x	x	x	x	x
3) adjacent dipole elements being selectively spaced from each other along the feeder	x	x	x	x	x
4) the length of the successive dipole elements along the feeder decreasing in accordance with a substantially constant scale factor	x	x	x	x	x
5) 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 wideband response	x	x	x	x	x
6) and means to connect an external circuit to the feeder elements at substantially the location of the shortest of the dipoles.	x	x	x	x	x
15. An antenna system for wide-band use comprising:					
1) 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	x	x	x	x	x
2) 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	x	x	x	x	x
3) adjacent dipole elements being selectively spaced from each other along the feeder	x	x	x	x	x
4) the length 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	x	x	x	x	x
5) 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	x	x	x	x	x
6) means to connect an external circuit to the feeder elements at substantially the location of the shortest of the dipoles.	x	x	x	x	x

25

As pointed out at the outset of this discussion on infringement, although the exact language used may vary slightly, claims 1-5 and 10-13 are common to broadband, unidirectional antennas comprising an array of substantially co-planar and parallel dipoles of progressively increasing length, each of the dipoles being fed by a common feeder that introduces a phase reversal of 180° between connections to successive dipoles, viz, cross-feeder. Several claims, viz, 10-13, include as an element, means for connecting the cross-feeder at substantially the locations of the smallest dipole elements, a feature found in all of defendant's antennas.

Claims 1-5 and 10-13 also vary with respect to the dipole length and spacing scale factor. Table 3 shows these factors as included in each of these claims and the manner in which the element length and spacing scale factors of the Groups of infringing antennas are applied against these claims. (See pages 14-15 and 17-19 above).

Table 3.

	Group				
	I	II	III	IV	V
1. A) the ratio of the lengths of any two adjacent dipoles being given by the formula $\frac{L(n+1)}{Ln} = \tau$ where Ln is the length of any intermediate dipole in the array, L(n+1) is the length of the adjacent smaller dipole and r is a constant having a value less than 1	x	x	x	x	x*
B) the spacing between said dipoles being by the formula $\frac{\Delta S(n+1)}{Sn} = \tau$ where Δ Sn is the spacing between the dipole having the length Ln and the adjacent larger dipole, Δ S(n + 1) is the spacing between the dipole having the length Ln and the adjacent smaller dipole, and τ has the significance previously assigned	1*	1*	1	1	x
3. A) the ends of said dipoles falling on a V-shaped line forming an angle α at its vertex	1	1	1	1	1
B) the ratio of the lengths of any pair of adjacent dipoles being given by the formula $\frac{L(n+1)}{Ln} = \tau$ where Ln 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	x	x	x	x	x
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.	x	x	x	x	x
9. A) said dipoles being of different electrical lengths increasing substantially logarithmically from the connected end of the feeder to the other end	x	x	x	x	x
B) the spacings between which also increase substantially logarithmically from said connected end to the other end.	1	1	1	1	x
10. A) adjacent dipole elements of different pairs differing in length with respect to each other by a substantially constant scale factor	x	x	x	x	x
B) 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	1	1	1	1	x
11. A) adjacent dipole elements of different pairs differing in length with respect to each other by a substantially constant scale factor	x	x	x	x	x
B) 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	1	1	1	1	x
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. (A)	x	x	x	x	x
(B)	1	1	1	1	x

* "x" means element present.
"1" is value of scale factor.

ative defense. The grant of a patent is prima facie evidence that the patentee is the first inventor of the device

Claim 9, the interference claim, defines (1) said dipoles being of different electrical lengths increasing substantially logarithmically from the connected end of the feeder to the

Claim 9, the interference claim, defines (1) said dipoles being of different electrical lengths increasing substantially logarithmically from the connected end of the feeder to the other end; and (2) the spacings betwen which also increase substantially logarithmically from said connected end to the other end. As above discussed, the dipoles of the accused antennas fall within (1). Although the spacing does not literally increase substantially logarithmically, the spacing is such that the substance of the Isbell invention is being followed.

V. ISBELL PATENT 3,210,767 IS VALID.

A. Introduction.

The patent statutes provide that a patent is presumed valid, and the burden of proof rests with the defendant to rebut this presumption. 35 U. S. C. § 282. In all patent cases, the Court must start wtih the presumption of validity which attaches to the grant. It is axiomatic that a patent, from the fact of its issuance, is presumed to be valid. *Ditto, Inc.* v. *Minnesota Mining & Mfg. Co.*, 336 F. 2d 67, 69 (8th Cir., 1964); *Ezee Stone Cutter Mfg. Co.* v. *Southwest Indus. Prod.*, 262 F. 2d 183, 187, 188 (8 Cir., 1959); *University of Illinois Foundation* v. *Block Drug Co.*, 241 F. 2d 6 (7 Cir., 1957).

This presumption is a positive factor which must be overcome by clear and convincing evidence by one who asserts invalidity. *Artmoore Co.* v. *Dayless Mfg. Co.*, 208 F. 2d 1 (7 Cir., 1953).

In a suit for infringement of a patent, it is not part of the plaintiff's case to negative a prior publication or prior use of the patented invention. These are matters of affirmative defense. The grant of a patent is prima facie evidence that the patentee is the first inventor of the device

described in the patent and of its novelty, utility, and unobviousness. The issuance of the patent is enough to show, until the contrary appears, that all the conditions on which patentability depends under the statutes have been met. The burden of proving that the standards for patentability have not been met is upon him who avers it, and this burden is a heavy one, *Mumm* v. *Decker & Sons,* 301 U. S. 168.

B. Conditions of Patentability.

The Supreme Court in a recent decision (*Graham* v. *John Deere Co.,* 383 U. S. 1) reaffirmed the general rule that the patentability of an invention is dependent on its utility, novelty, and non-obviousness over the prior art. Each of these elements has a statutory basis found in 35 U. S. C. § 101,[1] § 102,[2] and § 103,[3] respectively. Each of these conditions is met by the Isbell invention, and Isbell patent 3,210,767 was validly issued.

1. "Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title." (35 U. S. C. § 101.)

2. "A person shall be entitled to a patent unless—(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for patent, or (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of the application for patent in the United States, or (c) he has abandoned the invention, or (d) the invention was first patented or caused to be patented by the applicant or his legal representatives or assigns in a foreign country prior to the date of the application for patent in this country on an application filed more than twelve months before the filing of the application in the United States, or (e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or (f) he did not himself invent the subject matter sought to be patented, or (g) before the applicant's invention thereof the invention was made in this country by another who had not abandoned, suppressed, or concealed it. In determining priority of invention there shall be considered not only the respective dates of conception and reduction to practice of the invention, but also the reasonable diligence of one who was first to conceive and last to reduce to practice, from a time prior to conception by the other." (35 U. S. C. § 102.)

3. "A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made." (35 U. S. C. § 103.)

1. The Isbell Invention Is Useful.

The invention covered by the Isbell patent is of obvious utility, as attested to by the sales of such antennas by defendant (PX-62) as well as its use for purposes other than television reception (R. 171, 172).

2. The Prior Art Does Not Anticipate Isbell's Invention.

Although the novelty of an invention may be destroyed in several ways under 35 U. S. C. § 102, the most pertinent evidence presented by defendant pertains to subparagraph (b) which states that a person shall be entitled to a patent unless:

> "the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of the application for patent in the United States . . ."

Anticipation (lack of novelty) and obviousness are not the same, the former being based on 35 U. S. C. § 102 whereas the latter is based on § 103. Anticipation has been defined as follows:

> " 'Anticipation means disclosure in the prior art of a thing substantially identical with the art or instrument for which a patent is sought.' *Interchemical Corporation* v. *Sinclair & Carroll Co.,* 50 F. Supp. 881, 890 (S. D. N. Y., 1943).
>
> Anticipation is *not* established by reconstructing a reference in light of later accomplishments. *Topliff* v. *Topliff,* 145 U. S. 156, 161 (1891)."

Of the prior art references and purported instances of prior use which defendant relies on to show that Isbell's

invention was anticipated, the most pertinent is the K. O. Antenna (DX-J-6), which is described in DX-B-4. This antenna, which was last produced commercially in 1959 (R. 383), used dipole elements of varying length fed from the front by a transposed feeder. The K. O. antenna, however, used *folded* dipoles (R. 382) instead of the straight dipoles used by Isbell, and for this reason neither corresponds to Isbell's antenna nor would it suggest Isbell's invention.

A folded dipole has both an inherently wider bandwidth than does a straight dipole (R. 75, 547, 661) and a higher impedance, i.e., 300 ohms rather than 75 ohms (R. 68, 392).

Prior to Isbell's invention in 1959, the substitution of straight dipoles (narrow-band elements) for the folded dipoles (broad-band elements) of the K. O. antenna would have appeared to one skilled in the art as a step in the wrong direction, if the objective was to increase the bandwidth of the antenna (R. 661).

Moreover, such a substitution would apparently have created a great impedance mismatch between the antenna and the twin-lead transmission line, which has an impedance of 300 ohms (R. 69) to match the impedance of a folded dipole. In view of the known undesirable effects of impedance mismatch (R. 70-75), the substitution of low-impedance straight dipoles for high impedance, folded dipoles would not have been obvious, but rather another step in the wrong direction (R. 661-662).

The unobviousness of this substitution is borne out by the fact that this substitution was never made in the commercial K. O. antenna (R. 382), in spite of the obvious simplification of the antenna structure and the reduction in cost which would have resulted thereby.

The pertinency of the K. O. antenna as an anticipation of the patent in suit is greatly diminished by the fact that this

antenna was known to and obviously considered by the Examiner who allowed the Isbell application (R. 663, 664), since the reference which defendant now relies on had been cited by the Patent Office during the prosecution of a patent application which issued to plaintiff on another antenna (Mayes Reissue Patent No. 25,740, PX-66). *L. S. Donaldson Co.* v. *LaMaur, Inc.*, 299 F. 2d 412, 420 (8th Cir., 1962); *Schnell* v. *Allbright-Nell Co.*, 348 F. 2d 444 (7th Cir., 1965); *Nasco Inc.* v. *Vision-Wrap, Inc.*, 352 F. 2d 905, 909 (7th Cir., 1965).

None of the other references cited by defendant discloses an antenna containing the same elements combined in the same way as in the Isbell invention (R. 658). For this reason there is no anticipation. *Stauffer* v. *Slenderella Systems of California*, 254 F. 2d 127, 128 (9 Cir. 1957).

(A) Quarterly Engineering Report No. 2 Was Not Published Prior to May 3, 1959.

Defendant Winegard alleges that Quarterly Engineering Report No. 2 (DX-A-3(b)) was published on or before May 2, 1959, i.e., more than one year prior to the filing date (May 3, 1960) of the Isbell patent, and therefore constitutes a statutory bar under 35 U. S. C. § 102. This argument cannot be sustained.

The facts relative to the publication of this Report are simple. The printed copies of Quarterly Engineering Report No. 2 were returned by the printer to Miss Marge Johnson, who then served as Technical Editor for the Electrical Engineering Department of the University of Illinois, on April 30, 1959 (R. 238, 239). Copies of the Report were mailed on May 5, 1959 to the persons on the distribution list at the end of the Report (R. 681). There is no evidence of when and to whom local (i.e., campus) distribution of this Report was made, although it was the

usual practice to distribute a small number of copies of similar reports to various individuals and University departments on the campus. Both Miss Johnson (R. 207) and Mr. Lawler (R. 681) testified that distribution to those on the local circulation list normally occurred at the same time that the main distribution was made, i.e., on or about May 5, 1959.

Miss Johnson further testified that the copies of the Report were sent to her by the printer in packages containing 10 to 20 copies (R. 240). There is no evidence that these packages were opened at any time prior to the mailing which occurred on May 5, 1959.

Defendant argues that the above facts establish that Quarterly Engineering Report No. 2 was "published" on April 30, 1959, and became a "printed publication" within the meaning of 35 U. S. C. 102(b) on that date.

This argument is fallacious in that under the circumstances of this case, it equates "printing" with "publication". The statute (35 U. S. C. 102(b)) provides that a reference, in order to be a statutory bar, must be both "printed" and a "publication".

In this connection, the dictionary meanings of "publish" and "publication" are of some interest. Webster's New International Dictionary, 2nd Edition, defines "publication" as:

> "1. Act of publishing, or state of being published; public notification, whether oral, written or printed; proclamation; promulgation; as, the *publication* of the law at Mount Sinai of the gospel, of statutes.
>
> "2. The issuing to the public of copies, now usually printed or similarly produced copies, of a book, engraving, or the like; hence, the business of printing, etc., such copies; as, to defer or to announce the *publication* of a book; engaged in the *publication* of text books.

> "3. That which is published; esp., any book, pamphlet, etc., offered for sale or to public notice."

while "publish" is defined as:

> "1. To make public announcement of; to make known to people in general; to divulge; to disseminate; as, to *publish* one's opinions far and near.
>
> "2. To make known (a person, situation, discovery, etc.), as by exposing or presenting it to view, or by openly declaring its character or status; . . .
>
> "3. To bring before the public, as for sale or distribution; esp.: (a) To print, or cause to be printed, and to issue from the press, either for sale or general distribution, as a book, newspaper, piece of music, engraving, etc."

Similarly, Black's Law Dictionary, 3rd Edition, defines "publication" as:

> "The act of publishing anything or making it public; offering it to public notice, or rendering it accessible to public scrutiny. *Linley* v. *Citizens Nat. Bank of Anderson,* 108 S. C. 372, 94 S. E. 874, 877. An advising of the public; a making known of something to them for a purpose. *Associated Press* v. *International News Service* (C. C. A.) 245 F. 244, 250. It implies the means of conveying knowledge or notice. *Daly* v. *Beery,* 45 N. D. 287, 178 N. W. 104, 106."

These definitions implicitly contain a requirement that some positive action be taken towards rendering the thing published accessible to the public. Otherwise, the mere act of printing would constitute publication. In this case, the fact that copies of Quarterly Engineering Report No. 2 may have been physically available on April 30, 1959 at Miss Johnson's office when they were received from the printer, does not mean that they were "published" on that date within the meaning of the statute. There is no evidence that any active steps were taken to circulate these copies among the public or to inform the public of their availability, until the mailing which occurred on May 5, 1959.

The distinction set forth above is followed by the decisions relating to the time of publication within the meaning of the patent laws.

In a recent decision, *I. C. E. Corp.* v. *Armco Steel Corp.*, 250 F. Supp. 738, 743 (D. C. N. Y. 1966), the Court held that a document must be disseminated in order to be a "publication", saying:

> "After reviewing the cases, in this area, it might be said that the term 'printed publication' as contemplated by Congress in 35 U. S. C. 102 can include a document printed, reproduced or duplicated by modern day methods, including microfilming, upon a satisfactory showing that such document *has been disseminated or otherwise made available to the extent that persons interested and ordinarily skilled in the subject matter or art, exercising reasonable diligence, can locate it,* and recognize and comprehend therefrom the essentials of the claimed invention without need of further research or experimentation." (Emphasis added.)

Further, in order for a printed document to constitute a printed publication under 35 U. S. C. 102(b), it has been held that numerous copies must be made accessible to the general public. Thus, in *Badowski* v. *United States,* 164 F. Supp. 252, 255 (Ct. Clms. 1958), the Court said:

> "But defendant urges that the Russian document is a *prior publication.* The statutory language, 'printed publication,' implies that numerous copies were printed and were made *accessible* to the general public." (Emphasis in original).

In *Browning Mfg. Co.* v. *Bros. Inc.,* 126 U. S. P. Q. 499, 503 (D. C. Minn. 1960) it was held that the exhibition of drawings of a machine at a trade show was not a publication:

> "And to be a publication, also a requirement under Section 102(b), 35 United States Code, *there must be a distribution of a substantial number of the documents to the public generally,* at least more than one; mere evidence of ability to mass produce is not enough. There is no evidence adduced relating to the number of drawings made and observed by the public. No other similar drawings have been proven to have been distributed or otherwise published prior to November 17, 1948. It seems clear that there has not been a disclosure in a printed publication within the meaning of Section 102(b)." (Emphasis added.)

In *Camp Bros. & Co.* v. *Portable Wagon Dump & E. Co.,* 251 F. 603, 607 (7th Cir. 1918), the Court held:

> "Public disclosure or publication to be effective as such must be *a revelation* of an invention so publicly published or disclosed *as to raise a presumption that the public concerned with the art would know of it.*" (Emphasis added.)

In *Protein Foundation, Inc.* v. *Brenner, Comr. Pats.,* 151 U. S. P. Q. 561, 562 (D. C. D. C. 1966), the Court held that publication of a printed magazine did not even occur when the magazine was mailed, but rather when it was received by the addressees.

Defendant has, by hypothetical questions to Miss Johnson, attempted to establish (R. 216), that a copy of Quarterly Engineering Report No. 2 would have been available to a member of the public on April 30, 1959. Defendant has not, however, even alleged that a copy of this report was actually made available to the general public on this day or that a copy of a similar report had ever been given to the public on the day it was received from the printer. In connection with this type of hypothetical reasoning to establish publication, see *Ex parte Suozzi,* 125 U. S. P. Q. 445, 447 (P. O. Bd. App. 1959). In that case, the Examiner contended the individuals in a distribution list of a government technical report might have given copies of the report to the general public. The Board of Appeals held:

". . . his asserted proposition that there would be no reason to assume that the report did not have availability to the public in general is based on mere speculation. *At best, even assuming that there was no prohibition against the author of the report, or the named or other official recipients of copies thereof, from giving copies or imparting information contained in said report to others who would be classed as the public in general, this would be merely permissive and would not show unequivocally that there was in fact any publication of the report* on the July 15, 1953 date here of concern." (Emphasis added.)

Under the facts of this case, it is clear that no publication of Quarterly Report No. 2 occurred prior to May 5, 1959 at the earliest and that this Report has no effect on the validity of the patent in suit.

3. The Isbell Invention Was Not Obvious.

Defendant, in attacking Isbell's invention as obvious, has applied infallible hindsight after obtaining intimate knowledge of the invention, rather than foresight based on what was known to the art at the time that Isbell made the invention. To guard against the temptation to apply the test of obviousness using present knowledge rather than the state of the art at the time he invention was made, the Second Circuit Court of Appeals has set forth the following standards (*Reiner* v. *I. Leon Co.*, 285 F. 2d 501, 503-4 (1960)):

"The test laid down is indeed misty enough. It directs us to surmise what was the range of ingenuity of a person 'having ordinary skill' in an 'art' with which we are totally unfamiliar; and we do not see how such a standard can be applied at all except by recourse to the earlier work in the art, and to the general history of the means available at the time. To judge on our own that this or that new assemblage of old factors was, or was not, 'obvious' is to substitute our ignorance for the acquaintance with the subject of those who were familiar with it. There are indeed some sign posts: e.g., how long did the need exist; how many tried to find the way; how long did the surrounding and accessory arts disclose the means; how immediately was the invention recognized as an answer by those who used the new variant?"

The question of obviousness is a knotty one with which the Courts have wrestled for many years. Ultimately there can be and are no statutory criteria that can be used to resolve the issue. The difficulty has been aptly stated by Judge Learned Hand in *Kirsch Mfg. Co.* v. *Gould Mersereau Co.*, 6 F. 2d 793, 794 (2 Cir. 1925) as follows:

"An invention is a new display of ingenuity beyond the compass of the routineer, and in the end that is all that can be said about it. Courts cannot avoid the duty of divining as best they can what the day to day capacity of the ordinary artisan will produce. This they attempt by looking at the history of the art, the occasion for the invention, its success, its independent repetition at about the same time, and the state of the underlying art, which was a condition upon its appearance at all. Yet, when all is said, there will remain cases when we can only fall back upon such good sense as we may have, and in these we cannot help exposing the inventor to the hazard inherent in hypostatizing such modifications in the existing arts as are within the limited imagination of the journeyman. There comes a point when the question must be resolved by a subjective opinion as to what seems an easy step and what does not."

The cited case has given rise to a proposition widely applied by many Courts that invention exists:

1. If a serious problem existed in the field for which interested parties were searching a solution (R. 87, 310, 323);

2. If the inventor solved the problem (R. 315-317, 618); and

3. If the solution was accepted in the industry and the invention widely used (R. 172, 324).

Each of these criteria is satisfied in the present case.

The Supreme Court has approved the use of the above criteria as indicators of invention in *Graham* v. *John Deere Co.*, 383 U. S. 1, saying:

> "They may also serve to 'guard against slipping into hindsight,' and to resist the temptation to read into the prior art the teachings of the invention in issue."

The unobviousness of the invention is further evidenced by the fact that defendant originally cited 61 references in support of its contention that the patent in suit is invalid. This number of references is, in itself, evidence of the validity of the patent. *Reynolds* v. *Whitin Mach. Works*, 167 F. 2d 78, 83 (4 Cir., 1948); *Hoeltke* v. *Kemp Mfg. Co.*, 80 F. 2d 912, 917 (4 Cir., 1935).

None of the references cited by defendant as teaching or suggesting the Isbell invention, has, in fact, any disclosure which would have enabled one skilled in the art to make the Isbell antenna prior to Isbell's invention thereof. Defendant's claim that the Isbell invention was obvious may be put into proper perspective by initially considering the fact that the accused antennas were designed with full knowledge of the invention (R. 464-465).

The White patent No. 2,105,569 (DX-E-3), on which defendant appears to put much reliance, contains no disclosure or suggestion having any relation to the Isbell invention. In fact, as defendant's witness, Dr. Yang, admitted (R. 503), the White disclosure is similar to the Isbell invention in only two respects, namely, the use of radiating elements of differing lengths and the use of a transposed feedline. The White antenna, however, is fed in the center rather than at the front, and further uses a complicated impedance network in the feed system which could not be

eliminated without great difficulty (R. 50), and without modifying the structure to an extent that it would no longer correspond to that disclosed in the patent (R. 650). Moreover, the White antenna has an extremely narrow bandwith and there is no teaching in the patent of how to increase the bandwidth of this antenna (R. 651). As Dr. Yang admitted (R. 504), the modification of this antenna to cover television channels 2-6, would require a cut-and-try procedure which might or might not work and which would not be obvious to those skilled in the art (R. 651).

The proposed modification of DuHamel's log-periodic antenna disclosed in DX-A-1, which was discussed at some length by defendant's witness, Dr. Yang (R. 507-511), is strictly conjectural and based on after-acquired knowledge. Dr. Yang analyzed the theoretical relationship between the antennas disclosed in DX-A-1 and the Isbell log-periodic dipole antenna. Although Dr. Yang indicated that if certain substitutions are made in some of the structures shown in DX-A-1, such as by replacing the circular segments shown in the reference with solid trapezoidal sections (R. 509), replacing the solid trapezoidal sections with wire outlines thereof (R. 510), replacing the trapezoidal outlines with triangular outlines (R. 510), collapsing the triangular outlines to thin dipoles (R. 511), and collapsing the two halves of the antenna so that they are parallel to each other (R. 511), there would result a structure corresponding to the Isbell invention (R. 511). While this analysis is interesting in showing the theoretical development and logical relationship among the various forms of antennas referred to by Dr. Yang, there was no evidence that all these substitutions and modifications would have been apparent to one skilled in the art prior to Isbell's invention. They apparently didn't occur to Dr. Yang, nor did they occur to Professor DuHamel since, as Dr. Yang testified (R. 512) in commenting on DuHamel's failure to position the halves of the antenna in parallel relationship,

"he [DuHamel] wasn't successful to design this kind of antenna, because he couldn't foresee—well, he didn't quite get there yet, so he quit at 7 degrees."

Further evidence of the unobviousness of Isbell's invention is found in DX-A-1 itself, in which, on page 151, the author stated,

"Many types of logarithmically periodic antenna structures have been built and tested. Most of those which gave essentially frequency independent operation have been reported here but there were many structures for which the pattern and/or impedance were quite frequency sensitive. *Unfortunately, no theory has been established which even predicts the types of structures which will give frequency independent operation.*" (Emphasis added.)

Similarly, in DX-A-10(b), an excerpt from Jasik's handbook on antenna engineering, there appears, on page 18-13, the statement,

"It should be pointed out that many types of log-periodic structures are not broad-band because of either extreme variation over a period or severe end-effect which destroys the periodicity of the electrical characteristics. Only the successful structures are described herein. *Unfortunately it is not possible to determine a priori the frequency-independent types of logo-periodic antennas.*" (Emphasis added.)

Even defendant's expert witness, Dr. Yang, agreed with Jasik that it is impossible to predict which log-periodic structures will make successful antennas (R. 541).

The unpredictable nature of log-periodic antenna design is also borne out by the experience at the University of Illinois antenna laboratories. As Professor Mayes testified (R. 164), only three or four successful log-periodic antennas were developed over the period from 1954 to 1960, although many attempts were made, the principal difficulties being those referred to in DX-A-10(b), i.e., severe end-

effects and non-uniform performance over a period of operation (R. 167-168). As Professor Mayes further testified (R. 168), even today, when the understanding of log-periodic antennas is much greater than that which existed when Isbell made his invention, it is still impossible to predict whether any given log-periodic structure will function successfully as a log-periodic antenna.

The other references cited by defendant have so little bearing on the Isbell invention that they can be dismissed very briefly.

The Koomans patent (DX-E-1) discloses an antenna having broadside (*i.e.*, at right angles to the plane of the elements) radiation, while the radiation in the Isbell antenna is in the plane of the elements (R. 645-646). There is nothing in the teaching of the Koomans patent which shows how to obtain broad-band performance in an end-fire antenna (R. 648).

The Katzin patent (DX-E-4) teaches an array in which loose coupling, rather than direct connections, between the radiating elements and the feedline is essential and in which there is no transposition of the feedline in the manner employed by Isbell (R. 652-653).

The Hillison patent (DX-E-5) relates only to a method of stacking (*i.e.*, combining) two Yagi antennas, each of which individually bears no resemblance to the Isbell invention. There is no teaching or suggestion in this patent which is pertinent to the Isbell invention (R. 653-655).

The antenna disclosed in Schwartz patent (DX-E-7) uses hairpin dipoles rather than straight dipoles used in Isbell and does not employ a transposed feeder (R. 655-658).

The Winegard antenna shown in DX-D-1 contains only two driven elements. There is no teaching in the patent that more than two driven elements could be used nor how they should be connected if they could be used. There is

certainly no teaching that multiple elements could be connected to achieve a wide band effect (R. 658).

The references on which plantiff relies clearly do not individually teach or suggest the invention which was made by Isbell. There is, moreover, no basis for combining these patents in a manner which would teach or suggest to one skilled in the art the Isbell invention (R. 659, 660). Thus, the Koomans and White patents could not be combined because of the contradictory nature of the inventions to which each relates. Koomans refers to a broadside antenna, while White is directed to an end-fire antenna. One skilled in the art would have no basis for combining the individual teachings of these patents in order to produce Isbell's invention.

The contradictory nature of the teachings is also apparent in the combination of the Koomans and Katzin patents, one (Katzin) referring to end-fire radiation, while Koomans refers to broadside radiation (R. 659). The same defect is also found in the combination of the Schwartz and Koomans patent. In addition, the feed network disclosed in the Schwartz patent was developed by cut-and-try methods and one skilled in the art would find it impossible to replace this feed network while following the teachings of the patent (R. 660).

None of the other references relied on by defendant discloses prior art which is more pertinent than those discussed above. The advertising brochures (*e.g.*, DX-B-2, B-7) cited by defendant do not disclose antennas in which a plurality of straight dipoles of varying lengths are connected with a transposed feeder, which is fed at the short end of the antenna to produce a wide-band operating characteristic. Thus, for example, the antenna shown in DX-B-2 employs folded dipoles and there is no teaching concerning the method of feed. The antenna shown in DX-B-7 employs "fat" or "hairpin" dipoles and does not

have a transposed feeder, while there was no evidence presented concerning the specific construction of the antenna shown in DX-B-6.

The other references cited by defendant are apparently not being relied on as prior art, since there was no amplification of the teaching of these references presented during the trial, and the references themselves are too indefinite and obscure to warrant further consideration.

C. No "New Matter" Was Introduced Into the Application.

Defendant argues that certain of the claims (*i.e.*, claims 14 and 15) are invalid as based on "new matter" not originally present in the application. The purported new matter, however, was inherent in the original description (R. 87, 158) and therefore was disclosed therein. *Technicon Instruments Corp.* v. *Coleman Instruments Corp.*, 255 F. Supp. 630, 640-1 (N. D. Ill., 1966). As a matter of fact, the Patent Office specifically considered the issue of new matter in connection with claims 14 and 15. In the office action dated June 15, 1965 (DX-F-1, p. 42), the Examiner rejected claim 15 of the application on the ground of new matter, but at the same time considered and allowed claims 16 and 17 of the application (claims 14 and 15 of the patent). Accordingly, the decision of the Patent Office to allow the claims after consideration of the question of "new matter" (R. 601) is entitled to particularly great weight. *Helms Products* v. *Lake Shore Mfg. Co.*, 237 F. 2d 677, 679 (7 Cir., 1955).

VI. MISCELLANEOUS.

In addition to the defenses based on anticipation and obviousness discussed above, defendant has also raised a number of hypertechnical defenses based on alleged deficiencies in the patent disclosure, such as failure to set

forth the best mode contemplated by the inventor for carrying out the invention (35 U. S. C. § 112).

The record shows that these defenses were not supported with proof and were therefore presumably abandoned by defendant.

VII. CONCLUSION.

That the invention of the Isbell patent solved a problem which had long perplexed television antenna designers is clear, as demonstrated by the commercial success of antennas following Isbell's design. After seeing Isbell's publications and when the acceptance by the industry of such antennas became evident, defendant only then went to the accused structures. The contribution to the art of the Isbell patent should be recognized by this Court by finding the patent to be valid and infringed by defendant's antennas.

Respectfully submitted,

WILLIAM A. MARSHALL,
BASIL P. MANN,
30 West Monroe Street,
Chicago, Illinois 60603,
Area Code 312-346-5750,
Attorneys for Plaintiff.

Of Counsel:
CHARLES J. MERRIAM,
MERRIAM, MARSHALL, SHAPIRO & KLOSE,
30 West Monroe Street,
Chicago, Illinois 60603,

COOK, BLAIR, BALLUFF & NAGLE,
409 Putnam Building,
Davenport, Iowa 52801.

IN THE UNITED STATES DISTRICT COURT
FOR THE SOUTHERN DISTRICT OF IOWA
DAVENPORT DIVISION

UNIVERSITY OF ILLINOIS FOUNDATION, Plaintiff, -vs- WINEGARD COMPANY, Defendant.	Civil Action No. 3-695-D

BRIEF FOR WINEGARD COMPANY

Keith J. Kulie
Donald B. Southard
135 South LaSalle Street
Chicago, Illinois,

Edward W. Dailey
National Bank Building
Burlington, Iowa,

Its Attorneys.

Of Counsel:

Burmeister & Kulie
135 South LaSalle Street
Chicago, Illinois

March, 1967

INDEX TO BRIEF

I. STATEMENT OF FACTS. 1

A. Nature Of The Action And The Pleadings. 1

B. The Parties 1

C. The Isbell Patent In Suit - Number 3,210,767. . .2

D. The Winegard Company Antenna Structures 3

II. STATUTORY PROVISIONS INVOLVED IN THIS SUIT 4

A. 35 United States Code, Section 102(b) 4

B. 35 United States Code, Section 103. 4

C. 35 United States Code, Section 112. 4

III. THE PATENT IN SUIT IS NOT VALID 5

The Invention Was Disclosed In A Printed Publication Which Was Publicly Available More Than One Year Before The Filing Date Of The Isbell Patent And Is Barred Under 35 U.S.C. 102(b) 5

1. Quarterly Engineering Report No.2 discloses the Isbell patent structure sufficiently for one skilled in the art to construct the antenna set forth in the patent 6

2. Quarterly Engineering Report No.2 was published and available as a library reference, and otherwise, more than one year before the Isbell application date 8

IV. THE ANTENNA STRUCTURE AS DISCLOSED AND CLAIMED IN THE ISBELL PATENT IN SUIT WAS OBVIOUS TO ANYONE SKILLED IN THE ART PRIOR TO THE TIME OF THE ISBELL DEVELOPMENT AND THEREFORE DID NOT MEET THE REQUIREMENTS OF 35 U.S.C. 103 13

A. The Isbell Development Is Merely A Combination of Elements All Known In The Art Prior Thereto And Does Not Rise To The Dignity Of Invention But, At Best, Merely Evidences The Application Of Mechanical Skill. 13

B. Isbell Was Not The Originator Of Frequency Independent Antennas; Nor Of That Class Of Frequency Independent Antennas Commonly Referred To As Log-Periodic Antennas; Nor Of An Antenna Array Employing More Than One Linear Or Straight Dipole Elements Interconnected By A Transposed Feeder Line. 17

C. The Dipole Array As Disclosed And Claimed In The Isbell Patent Was Obvious To Anyone Skilled In The Art In Light Of The Previous Development And Publications Concerning Log-Periodic Antennas By Dr. R.H. DuHamel And Others 20

D. The Subject Matter Disclosed In The Isbell Patent Was Obvious To Anyone Skilled In The Art In Light Of The Patented Prior Art References, And Particularly In Light Of The Pertinent Prior Art References Not Cited In Or During The Prosecution. 23

1. The Patent Office erred in issuance of the patent here in suit. 23

E. The Subject Matter Set Forth In The Isbell Patent Was Obvious To Anyone Skilled In The Art In Light Of The Prior Art Antenna Structures On Sale And In Public Use Prior To The Time Of The Alleged Isbell Invention 34

V. CLAIMS 3, 9, 10, 14 AND 15 ARE INVALID. 43

A. Claim 9 Is Invalid As Having No Basis In The Isbell Patent Disclosure 43

B. Claims 14 And 15 Are Invalid As Having No Basis In The Disclosure. 45

C. Claims 9, 14 And 15 Are Invalid In That They Involve New Matter In The Application And Were Introduced For The First Time More Than One Year After a Publication Disclosing The Subject Matter Of the Claims. 47

D. Claims 3 And 10 Are Invalid For Failure To Include An Essential Element As A Positive Limitation, Thereby Overclaiming The Purported Invention. 51

VI. THE ISBELL PATENT TEACHING IS DIRECTED TO A VERY NARROW STRUCTURAL CONCEPT WHICH CANNOT BE BROADENED OR OTHERWISE MODIFIED IN VIEW OF THE EXPRESS REPRESENTATIONS MADE TO THE PATENT OFFICE 54

A. The Nature And Scope Of The Isbell Purported Invention As Embodied In The Patent Claims. . . .54

B. The Isbell Patent Discloses A Specific Antenna Array Where The Dipole Lengths And Spacings Between Dipoles Are Determined By Specific Design Parameters. 55

VII. THE ISBELL PATENT CLAIMS ARE NOT INFRINGED BY ANY OF THE ACCUSED WINEGARD ANTENNAS. 61

A. Claims 1 And 2 Require That Dipole Lengths And Spacings Vary In Accordance With The Formulae Given In The Claims And Where The Scale Factor Is Less Than Unity 61

B. Claims 3, 4 And 5 Require That The Ends Of The Dipoles Fall On A V-Shaped Line Forming An Angle At Its Vertex With The Dipole Lengths Varying In Accordance With The Formula Of Claim 1. 66

C. Claim 9 Requires That Dipole Lengths And Spacings Vary Logarithmically From One End Of The Feeder To The Other. 68

D. Claim 10 Requires That Dipole Lengths Vary In Accordance With A Substantially Constant Scale Factor And That Spacing Between Dipoles Generally Decrease From One End To The Other With The Greatest Spacing Between The Longest Dipoles Of The Array. 69

E. Claims 11 And 12 Are Substantially The Same As Claim 10 Except That The Spacing Varies Also By A Substantially Constant Scale Factor With The Greatest Spacing Between The Longest Dipoles. 70

F. Claim 13 Is Similar To Claim 10 Except That In Addition It Specifically Relates To An Antenna Array Where The Length Scale Factor Be In The Range Of 0.8 to 0.95 71

G. Claims 14 And 15, To The Extent That They May Be Understood, Require Dipole Lengths To Decrease According To A Substantially Constant Scale Factor And The "Cells" To Decrease By A Substantially Constant Scale Factor. 72

VIII. THE DOCTRINE OF EQUIVALENTS IS NOT AVAILABLE TO ISBELL TO EXTEND THE SCOPE OF ANY CLAIM TO INCLUDE ANY OF THE ACCUSED STRUCTURES. 81

IX. CONCLUSION. 88

TABLE OF CASES

A & P Tea Co. v Supermarket Corp., 340 US 147 ---------14, 26

Atlantic Works v Brady, 107 US 192 ------------------ 15

Baldwin-Lima-Hamilton Corp. v Hi-Way Equipment Co. 250 FSupp. 574 ---------- 42

In re Billingsly, 279 F2d 689 ---------- 26

Bishop & Babcock v Western Auto Supply Co. 105 F2d 886 --------- 56

Caldwell v Kirk Mfg. Co., 269 F2d 506 ---------- 14

Cignarella de Testa, 151 USPQ 464 ---------- 12a

Cincinnati Milling Machine Company v Turchan, 208 F2d 222 ---------- 60

City of St. Louis v Pendergast, 29 F2d 188 ---------- 16

Cohn v United States Corset Co., 93 US 366 ---------- 6

Continental Farm Equipment Co. v Love Tractor Co., 199 F2d 202 ---------- 15

Continental Paper Bag Co. v Eastern Paper Bag Co., 210 US 405 ---------- 82

Cuno Engineering Corp. v Automatic Devices Corp., 314 US 84 ---------- 13

Cutter Laboratories, Inc. v Lyophile-Cryochem Corporation, 179 F2d 80 ---------- 56

Ex parte De Grunigen, 132 USPQ 152 ---------- 12a

Fairchild v Poe, 259 F2d 329 ---------- 27

Graver Tank & Mfg. Co. v Linde Air Products Co., 336 US 271 ---------- 52, 81

Gulliksen v Halberg, 75 USPQ 252 ---------- 12a

Hamilton Laboratories, Inc. v Massengil, 111 F2d 584 ---------- 12a

Application of Heritage, 182 F2d 639 ---------- 12a

Ex parte Hershberger, 254 F2d 624 ---------- 12a

I.C.E. Corp. v Armco Steel Corporation, 250 FS 738 ---------- 12a

Indiana General Corporation v Lockheed Aircraft Corporation, 249 FS 537 ---------- 12a

Interchemical Corp. v Sinclair & Carroll Co., 50 FS 881 ---------- 5

I.T.S. Rubber Co. v Essex Rubber Co., 272 US 429 -- 56

John Deere Co. of Kansas City v Graham, 333 F2d 529, affd. 383 US 1 ---------- 13, 14

John Crossley & Sons v Hogg, 83 Fed. 488 ---------- 6

King Ventilating Co. v St. James Ventilating Co., 17 F2d 615 ---------- 6

Koehring Co. v National Automatic Tool Co, Inc., 257 FS 282 ---------- 52

Koolvent Metal Awning Corporation of America v Kool-Vent Metal Awning Corporation of Missouri, 138 FS 95 ---------- 50

Lincoln Engineering Co. v Stewart-Warner Corp., 303 US 545 ---------- 25

Marconi Wireless Telegraph Co. v United States, 320 US 1 ---------- 6

Miller v Eagle Mfg. Co., 151 US 186 ---------- 41

Minnesota Mining and Manufacturing Co. v Permacel-LePage's, 222 FS 540 -------- 70

Moder Products v Drachenberg, 152 F2d 203 ------- 56

Monroe Auto Equipment Co. v Heckethorn Mfg. Co., 141 USPQ 549, 332 F2d 406 ---------- 41

Muncie Gear Works Inc. v Outboard Marine Mfg. Co., 315 US 759 ---------- 47, 48

Parmelee Pharmaceutical Company v Zink Safety Equipment Company, 285 F2d 465 -------- 82

Perino Inc. v Hudson-Ross, 179 F2d 386 ---------- 42

Pierce v Aeronautical Communications Equipment, Inc., 255 F2d 458 ---------- 15

Rosenwasser v Spieth, 129 US 47 ---------- 5

Seymour v Osborne, 78 US 516 ---------- 6

Shakespeare v Perrine, 91 F2d 199 ---------- 41

Shepard v Carrigan, 116 US 593 ---------- 50

Steffan v Weber Heating & Sheet Metal Co., 237 F2d 601 ---------- 13

In re Stewart, 222 F2d 747 ---------- 14

Stiegele v J. M. Import-Export Co., 312 F2d 588 -- 56

Sutter v Robinson, 119 US 530 ---------- 50

In re Tenney, Frank and Knox, 254 F2d 619 -------- 12a

Toledo Pressed Steel Co. v Standard Parts, Inc., 307 US 350 ---------- 25

Topliff v Topliff, 145 US 156 ---------- 81

Tropic-Aire v Sears, Roebuck & Co., 44 F2d 580 --- 16

Truman v Carvill Mfg. Co., 87 Fed. 470 ---------- 5

In re Twomey, 218 F2d 593 ---------- 15

Valley Shoe Corp. v Tober-Saifer Shoe Co., 25 FS 860 ---------- 41

Weber Electric Co. v E. H. Freeman Electric Co., 256 US 668 ---------- 50

West Disinfecting Co. v United States Paper Mills, 44 F2d 790 ---------- 82

Westinghouse v Schwartze, 108 F2d 352 ---------- 15

White v Dunbar, 119 US 47 ---------- 42

Willamette-Hyster Co. v Pacific, 122 F2d 492 -- 6

I. STATEMENT OF FACTS.

A. Nature Of The Action And The Pleadings.

This is an action under the patent laws of the United States for infringement of United States Letters Patent 3,210,767 issued on October 5, 1965 to Dwight E. Isbell on an application filed in the Patent Office on May 3, 1960 entitled Frequency Independent Unidirectional Antennas.

The action was initiated by filing of a complaint in the District Court for the Southern District of Iowa, Eastern Division on March 8, 1966, and was transferred for trial to the Davenport Division after filing.

An answer to the complaint was filed on April 13, 1966 alleging invalidity of the patent on various grounds and non-infringement of any of the claims of the patent by any of the antennas manufactured or sold by the Winegard Company.

B. The Parties.

Plaintiff, University of Illinois Foundation, is a not for profit corporation organized under the laws of the State of Illinois, having its place of business at Urbana, Illinois, as set out in the complaint.

Defendant, Winegard Company, is a corporation organized and existing under and by virtue of the laws of the State of Iowa having it principal place of business at 3000 Kirkwood Street, Burlington, Iowa.

C. The Isbell Patent In Suit - Number 3,210,767.

Isbell patent 3,210,767 relates to frequency independent unidirectional antennas of the type having a plurality of driven elements in a substantially co-planar array, the length and spacing between successive dipoles varying according to a specified mathematical formula, each of the dipoles being fed by a common feeder which introduces a phase reversal of approximately 180° between successive dipoles. The mathematical formula for varying the dipole lengths and spacing between successive dipoles is given in the patent as follows:

$$\tau = \frac{L\ (n+1)}{L_n} = \frac{\Delta S\ (n+1)}{\Delta S_n}$$

where τ is a constant having a value less than 1; where L_n is the length of any given dipole in the array; and $L\ (n+1)$ 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.

D. The Winegard Company Antenna Structures.

The antenna structures manufactured and sold by Defendant and which are accused as infringing are:

1) Frequency dependent antennas designed to cover the low and high VHF television bands;

2) Such that the low VHF band operation is provided by dipole driven elements;

3) High VHF television band coverage is provided by the dipole driven elements in combination with the associated parasitic element in the array;

4) Have strict frequency limitations because of the specific design parameter and the operating bandwidth cannot be significantly extended beyond these limitations by simply adding elements to the existing array.

II. STATUTORY PROVISIONS INVOLVED IN THIS SUIT.

A. 35 United States Code, Section 102 (b).

A person shall be entitled to a patent unless —

> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of the application for patent in the United States,

B. 35 United States Code, Section 103.

A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

C. 35 United States Code, Section 112.

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same, and shall set forth the best mode contemplated by the inventor of carrying out his invention. * * *

III. THE PATENT IN SUIT IS NOT VALID

The Invention Was Disclosed In A Printed Publication Which was Publicly Available More Than One Year Before The Filing Date Of The Isbell Patent And Is Barred Under 35 U.S.C. 102(b).

The Patent Laws specify that a valid patent cannot be obtained if the subject matter set forth and claimed in the patent was described in a publication more than one year before the date of filing the application for the Isbell Patent (35 U.S.C. 102 (b)).

A publication capable of negativing novelty can be anything that is distributed to any part of the public without any injunction or secrecy. Rosenwasser v. Spieth, 129 U.S. 47. However, actual distribution need not occur. Exposure of the subject matter is enough to constitute a publication. Anything that is printed and made accessible to any part of the public is a printed publication. Interchemical Corp. v. Sinclair & Carroll Co., 50 F.Supp 881, DC NY, re'd on other grounds, 144 F.2d 842, rev'd on other grounds, 325 U.S. 327.

A publication has been held to be accessible to the public when it is available in a library. Truman v. Carvill Mfg. Co., 87 Fed 470. While it has been held that the mere existence of a printed thing is not a printed

publication, its deposit in a library is. John Crossley & Sons v. Hogg, 83 Fed 488.

To defeat issuance of a valid patent a publication must fully describe the invention as to enable any person skilled in the art to which it relates to practice the invention. Seymour v. Osborne, 78 U.S. 516. And it must exhibit a substantial representation of the patented invention in the exact terms of the patent and it is sufficient if the same concept is found in both. Also, it is not necessary to provide information known to those skilled in the art. Cohn v. United States Corset Co., 93 U.S. 366; Willamette-Hyster Co. v. Pacific, 122 F.2d 492.

A printed publication published by the inventor has the same effect as though it had been published by a stranger and when published prior to the statutory limit before the filing of his application will defeat the patent. Marconi Wireless Telegraph Co. v. United States, 320 U.S. 1; King Ventilating Co. v. St. James Ventilating Co., 17 F.2d 615, DC Minn.

1. Quarterly Engineering Report No.2 Discloses The Isbell Patent Structure Sufficiently For One Skilled In The Art To Construct The Antenna Set Forth In The Patent.

Under the patent laws (35 U.S.C. 102 (b)), an anticipatory prior publication must contain a sufficient dis-

closure to enable any person skilled in the art to which the invention pertains to practice the invention.

During direct examination, Defendant's expert witness, Dr. Richard Yang, gave uncontroverted testimony that the disclosure of Quarterly Engineering Report No.2, Dx A-3(b), is sufficient in all respects to permit a skilled antenna designer to construct a log-periodic antenna from the written description and drawing on pages 2 and 3 thereof. (R505-6):

> "Q. As an antenna design engineer, and based upon your previous experience in antenna design work, do you have an opinion of whether an antenna engineer skilled in the art would be able to construct a log-periodic antenna from the written description and pictorial respresentation on page 3?
>
> A. Yes, I believe so.
>
> * * * * *
>
> A. Yes, I think you can, yes. Very much so."

As shown in Chart 1, the disclosure of Quarterly Engineering Report No.2, Dx A-3(b), illustrates the antenna with a line drawing of the same type as set forth in Figure 1 of the Isbell patent. The Report No.2 further includes the formulae for dipole lengths and spacings and the angle between the lines upon which the ends of the dipoles fall so that an antenna can be made using the information provided in the drawing of the report.

It should also be observed that counsel for Plaintiff indicated at page 13 of Dx F-3 of the materials filed on behalf of Isbell in the interference proceeding involving the Isbell patent that Dr. Mayes (the same Dr. Mayes who appeared as a witness for Plaintiff during the trial) was of the opinion that the information of Report No.2, Dx A-3(b), was sufficient for a skilled antenna design engineer to make the antenna of the Isbell patent and that no further information would be required.

> "Dr. Mayes, '* * *as an expert in the art and presently Associate Head of the Antenna Laboratory of the University of Illinois Electrical Department, testified that the description embodied in the drawing on page 3 * * * with the description on page 2, was sufficient to enable anyone having design experience to construct the log-periodic dipole antenna and to operate it * * *."

2. Quarterly Engineering Report No.2 Was Published And Available As A Library Reference, And Otherwise, More Than One Year Before The Isbell Application Date.

The application which culminated in issuance of the Isbell patent here in suit was filed in the United States Patent Office on May 5, 1960. Accordingly, a publication of the invention which occured prior to May 5, 1959 would give rise to a statutory bar which would prevent the issuance of a valid patent to Isbell.

Such occurences do arise and it is an inescapable conclusion that the Patent Office cannot know of such publications unless they are in some way brought to the attention of the Patent Office. If the Patent Office is not made aware of such publications, a patent may issue but it issues only due to ignorance of the fact that a statutory bar exists and, accordingly, the examiner and the Patent Office act without complete knowledge of pertinent facts. Such is the case involving the patent here in suit.

Miss Marjorie Johnson testified that she was an employee of the University of Illinois from June 1958 to March 1962 (R194) in the Electrical Engineering Department as Technical Editor and Librarian of the Local Library (203) and that her office and duties included the responsibility for the preparation, printing and distribution of publications and reports of the Antenna Laboratory (R195). For that reason, she was aware of all phases of the preparation and distribution of such materials.

Miss Johnson stated that reports which were delivered to her office as Technical Editor and Librarian of the Local Library would become available as library references when they were delivered to her office from the printer (R205), and that they were available at that time in the same sense that any other reports in the library were available to anyone interested in such materials (R216):

"Q. And you previously indicated that when materials were delivered from the printer to your office, they were available for distribution on the date they were delivered to your office?

A. Yes.

Q. With the extra copies of this material that you had printed, and I specifically refer you to Quarterly Report No.2, would it have been available in your Office for distribution upon request on the date it was delivered in your office?

A. Yes.

* * * * *

Q. Would you say then, Miss Johnson, that Quarterly Engineering Report No.2 was available in your office on April 30th, 1959 to the same extent as any other publication or report was available in your office either as a library reference or as an extra copy?

A. To my knowledge, yes.

Q. So that, to this extent, you would not distinguish that availability of this Report No.2 from any other similar report then in your office?

A. No."

Miss Johnson also indicated that when reports were delivered to her office from the printer much of the local delivery of the materials would be made by personnel of her office (R199) and that such distribution generally was made at least on a daily basis and sometimes more frequently (R200). Miss Johnson also indicated that reports were distributed in this manner as soon as they were received back from the printer and that persons within the University and

others frequently made requests of her office for such materials and reports (R200-201):

> "Q When did copies of these reports become available for distribution to any of these persons?
>
> A As soon as they arrived back from the printer.
>
> Q Did you frequently receive requests from persons within the University and by others for copies of these reports?
>
> A Yes.
>
> Q And were these requests responded to by delivery of copies of reports to the extent they were available?
>
> A As long as we were fairly sure that it was a responsible party making the request, yes."

It was shown by Miss Johnson's testimony that Quarterly Engineering Report No.2, Dx A-3(b), which fully disclosed the antenna set forth in the Isbell Patent in suit, was available as a library reference on April 30, 1959, more than one year prior to the filing date of the application which culminated in issuance of the patent in suit and that this report was available to the same extent as any other report or material in the local library of the Antenna Laboratory (R238):

> "Q. I show you, Miss Johnson, a document which has been marked for identification as Defendant's Exhibit H-11 and ask you if you can identify that document for us?
>
> A. This is a University of Illinois Receiving Report for 117 copies of Quarterly Engineering Report No.2, contract AF-6079, entitled Research Studies on Problems Relating to ECM Antennas.

Q. And is that the same quarterly report No.2 that you examined earlier, indicated as Defendant's Exhibit A-3b?

A. Yes.

Q. Do you see a handwritten designation on that document?

A. Yes, I do.

Q. Do you recognize the handwriting?

A. Yes, it is my own.

Q. Will you read the designation on the document?

A. It says "Completed 4-30-59."

Q. What does this handwritten designation signify to you?

A. It would signify to me that on that date this report was completed, the printing of if was completed and it was in my hands.

(R240) * * * * *

Q. Now, Miss Johnson, having seen that document, H-11, I again ask you whether in your opinion Quarterly Engineering Report No.2 was available in your office on April 30, 1959 to the same extent as any other publication or report was available in your office, whether as a library reference or as an extra copy?

A. In my opinion, yes.

Q. This report, you wouldn't distinguish it then as to the availability of this report No.2 from any other similar report in your office?

A. No, I wouldn't."

It should be observed that it is a well established principle of law that a typewritten manuscript, or material produced in some form other than printing, is within the meaning of a printed publication intended by the statute (35 U.S.C. 102b). It is equally well established that such a document available in a library as a reference is "publicly" known. Hamilton Laboratories Inc. v Massengil, 111 F2d 584; Gulliksen v Halberg, 75 USPQ 252, (Patent Office Board of Appeals, 1937); Ex parte De Grunigen, 132 USPQ 152, 1961 CD 75, (Patent Office Board of Appeals, 1958); In re Tenney, Frank and Knox, 254 F2d 619; Ex parte Hershberger, 254 F2d 624; Indiana General Corporation v Lockheed Aircraft Corp., 249 FS 537; I.C.E Corp. v Armco Steel Corporation, 250 FS 738; Application of Heritage, 182 F2d 639; Cignarella de Testa, 151 USPQ 464, (Patent Office Board of Appeals, 1965).

IV. THE ANTENNA STRUCTURE AS DISCLOSED AND CLAIMED IN THE ISBELL PATENT IN SUIT WAS OBVIOUS TO ANYONE SKILLED IN THE ART PRIOR TO THE TIME OF THE ISBELL DEVELOPMENT AND THEREFORE DID NOT MEET THE REQUIREMENTS OF 35 U.S.C. 103.

A. The Isbell Development is Merely a Combination of Elements All Known in the Art Prior Thereto And Does Not Rise to the Dignity of Patentable Invention But, At Best, Merely Evidences the Application of Mechanical Skill.

Article 1, Section 8 of the United States Constitution authorizes Congress to reward inventive genius by providing for the issuance of patents. This constitutional provision, however, does not provide for the issuance of patents as a reward for mere mechanical skill alone. Cuno Engineering Corp. v. Automatic Devices Corp., 314 U.S. 84, 61 S.Ct. 842, 94 L.Ed. 1516, (1914); Steffan v. Weber Heating & Sheet Metal Co., 237 F.2d 601, CA 8; John Deere Co. of Kansas City v. Graham, 333 F.2d 529, CA 8, (1964).

Section 103 of Title 35 of the United States Code is quite specific in that a patent may not be obtained, notwithstanding the fact that the invention is not identically disclosed or described as set forth in section 102 of this Title, if:

> "* * * * the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skills in the art to which said subject matter pertains."

Moreover, the standard which determines the presence of patentable invention is decidely more stringent if the subject matter of the patent in question involves merely a combination of old elements found in the prior art. A & P Tea Co. v. Supermarket Corp., 340 U.S. 147, 70 S.Ct. 803, 94 L.Ed 1361, (1950). More exacting standards for determining patentable invention have been applied by courts in recent years than was formerly the case. Caldwell v. Kirk Mfg. Co., 269 F.2d 506, CA 8, (1959). A combination is unpatentable notwithstanding the presence of improvement, if it is, in view of the prior art, an obvious expedient of the skilled worker in the art. In re Stewart, 222 F.2d 747, 42 CCPA 937, (1955). The Court of Appeals for the Eighth Circuit has specifically stated that a device which is new and useful but which falls short of revealing more than mere mechanical skill "has not established its right to a private grant on the public domain." Caldwell v. Kirk Mfg. Co., supra. In a still more recent case, John Deere Co. of Kansas City v. Graham, supra, the Court of Appeals for the Eighth Circuit has stated, with reference to patent claims directed to a combination of old elements, at page :

> "To be patentable, a combination of individually old elements must contribute something new; the elements must cooperate to produce an accumulation which exceeds the sum of its parts. * * * Stated differently, 'The bringing together of old elements in a mechanism involving no new principle, to produce an old result, however, skillfully done, even though the result marks an advance in efficiency and utility, is but an exercise of mechanical skill and not invention."

In determining whether the subject matter of a patent is truly invention or merely the result of mechanical skill, a careful scrutiny of the patent must be made in light of the prior art and former uses of the constituent parts of the patentee's device. Continental Farm Equipment Co. v. Love Tractor Inc., 199 F.2d 202, CA 8, (1959). It has been held further that, in the case of a patent directed to a combination wherein no claims are specifically directed to anyone of the elements per se, a presumption arises that each of the elements is old in the art or is not patentable per se. Pierce v. Aeronautical Communications Equipment Inc., 255 F.2d 458, CA 5, (1958). An "inventor" who simply rearranges or readjusts old elements or uses their equivalents to make a new structure in which each part operates substantially as in the old and with the same result only evidences mechanical skill and not invention. Westinghouse v. Schwarze, 108 F.2d 352, CA 6, (1939). There is no invention involved where a person skilled in the art, and with the teachings of the prior art before him, can produce the structure recited in one or more of the claims. In re Twomey, 218 F.2d 593, 42 CCPA 742, (1954).

Perhaps the distinction between mere mechanical skill and what is considered patentable invention can best be brought into sharp relief by considering the language of the Supreme Court in Atlantic Works v. Brady, 107 U.S. 192, 27 L.Ed 438, 442, (1882), wherein Mr. Justice Bradley spoke for the court:

> "The process of development in manufactures creates a constant demand for new appliances, which the skill of ordinary head workmen and engineers is generally adequate to devise, and which, indeed, are the natural and proper outgrowth of such development. Each step forward prepares the way for the next, and each is usually taken by spontaneous trials and attempts in a hundred different places. To grant a single party a monopoly of every slight advance made, except where the exercise of invention somewhat above ordinary mechanical skill or engineering skill is distinctly shown, is unjust in principle and injurious in its consequences. The design of the patent laws is to reward those who make some substantial discovery or invention which adds to our knowledge and makes a step in the advance of the useful arts. Such inventors are worthy of all favor. It is never the object of those laws to grant a monopoly for every trifling device, every shadow of a shade of an idea which would naturally and spontaneously occur to any skilled mechanic or operator in the ordinary progress of manufacture. Such indiscriminate creation of exclusive privileges tends to obstruct rather than stimulate invention. It creates a class of speculative schemers who make their business to watch the advancing wave improvement, and gather its foam in the form of patented monopolies, which enable them to lay a heavy tax upon the industry of the country without contributing anything to the real advancement of the arts. It embarasses the honest pursuit of business with fears and apprehensions of concealed liens and unknown liabilities to lawsuits and vexatious accountings for profits made in good faith."

This opinion of Mr. Justice Bradley has since become a classic in the law and has been applied as law by many judges subsequently in a long line of cases, including the judiciary of the Eighth Circuit. *cf:* City of St. Louis v. Pendergast, 29 F.2d 188, 191, CA 8, (1928); Tropic-Aire v. Sears, Roebuck & Co., 44 F.2d 580,589, CA 8, (1930).

B. Isbell Was Not The Originator of Frequency Independent Antennas; Nor of That Class Of Frequency Independent Antennas Commonly Referred to as Log-Periodic Antennas; Nor Of an Antenna Array Employing More Than One Linear or Straight Dipole Elements Interconnected by a Transposed Feeder Line.

The record is abundantly clear that the patentee of the patent in suit, Dwight E. Isbell, was not the first to discover or develop frequency independent antennas per se. Mr. Isbell was not the first to develop and reduce to practice that class of frequency independent antennas commonly referred to as "Log-Periodic" antennas. Nor was he the first to derive and apply the mathematical relationships or formulae set forth in the specification of the patent in suit.

Plaintiff's own witness, Dr. Paul E. Mayes, testified on direct that the first class of antennas which were to become known as frequency independent antennas were theorized and developed by Dr. Victor H. Rumsey. Mayes further testified that the second member of the class of frequency independent antennas, commonly referred to as log-periodic antennas, were developed and discovered by Dr. Raymond H. DuHamel. (R157-158). This is corroborated by Dr. Richard Yang called by the Defendant. (R507). It was further shown that in Defendant's Exhibit Dx A-1, an article entitled "LOGARITHMICALLY PERIODIC ANTENNA DESIGNS", by R.H. DuHamel and F.R. Ore, published on or about March 31, 1958, (more

than one year prior to the filing date of the patent here in suit), the mathematical relation $\tau = \frac{R(n+1)}{R_n}$ appears, which is the same as that disclosed in the body of the Specification of the Isbell patent.

By the testimony of Plaintiff's own witness, Mr. Harris, the record is clear that Isbell was not the first to employ multiple dipole elements in an antenna array. Nor was he the first to employ multiple dipole elements of the simple or straight type. The Tel-rex antenna, as shown in Exhibit Dx B-6, employes two straight dipoles. The White patent, DX E-3, shows three straight or rod dipoles in an antenna array. Katzin, DX E-4, and Koomans patents, Dx E-1, are still other examples.

Nor was Isbell the first to employ transposed phasing lines between dipole elements in the antenna array and fed from the front to provide an antenna suitable for use in television reception or otherwise. Mr Winegard testified that he employed transposed phasing or feeder lines in an antenna as far back as 1952 and illustrated in a sketch, Dx L-17, the twin-dipole array on which it was so employed. He further testified that he employed transposed phasing or feeder lines in the "Clipper Antenna" manufactured in 1952.(R422) Transposed phasing lines are also illustrated in the Tel-rex brochure, Dx B-6, bearing a May, 1955 date; also in the Winegard patent 2,700,105, Dx D-1; in the Color'Ceptor an-

tenna, Dx L-15 and Dx C-8; and also on the Channel Master K.O. antenna, Dx J-6 & 6(a) and B-4, and the Kay-Townes Rear Guard, Dx B-3, all on sale and in public use more than one year prior to the filing date of the Isbell Patent application.

One is compelled to ask then, what did Isbell accomplish? A review of the record shows that Isbell merely applied the log-periodic formulae, known in the art and developed by another, to an endfire antenna array having a plurality of dipole elements, also known in the art, to obtain an obvious and expected result in view of DuHamel's prior work, namely, a broadband antenna array exhibiting frequency independent characteristics with reference to operating characteristics over extremely large bandwidths, the extent of which being dependent directly upon the number of dipole elements employed in the array for a given antenna geometry. This can hardly be regarded as involving inventive genius regardless of what standard of determining patentable invention is employed. Each of the elements and design considerations of the Isbell structure were known in the art and are combined to provide a result old in the art with each of such elements operating in the same way known in the art.

C. The Dipole Array as Disclosed and Claimed In The Isbell Patent Was Obvious to Anyone Skilled In the Art In Light Of The Previous Development And Publications Concerning Log-Periodic Antennas By Dr. R.H. DuHamel And Others.

The record is also clear that thin wire approximations were known in the art at the time DuHamel developed his Log-Periodic class of frequency independent antennas and could be used in place of solid sheet teeth dipoles of the structure illustrated in Figure 2 of Exhibit Dx A-1. DuHamel himself considered and described several different variations of his sheet trapezoidal wide-tooth structures. Figures 9 & 10 of Exhibit Dx A-1 show wire outline approximations of the solid planar halves. Another variation is shown in Figure 15 of the same article where "zig-zag" or triangular wire approximations of Figures 2 or Figures 9-10 are employed. Dr. Yang testified that with "zig-zag" or triangular teeth' substituted for the solid sheet dipoles of Figure 2 or the rectangular wire outline approximations of Figures 9-10, there would be no problem in terms of interference in making the respective halves of the DuHamel antenna structure parallel to each other (R510). Collapsing the two halves of the DuHamel structure to a position where they are essentially parallel to each other results in an antenna which is the equivalent of that described and claimed in the Isbell patent here in suit. The DuHamel article, Dx A-1, indicates that such a structure was not only considered by DuHamel but was actually constructed and tested. Table 4 of the article shows several model configurations where the angle between

the planar halves of the antenna were varied from 60° down to as low as 7°. The latter value, for all practical purposes, provides an antenna structure where the planar halves are essentially parallel. (R511-512).

Substituting simple or straight dipoles for the "zig-zag" wire approximations effects the precise structure as disclosed in the Isbell patent in suit. As was so testified to by Dr. Yang (R512). It would be well within the skilled of anyone schooled in the antenna art to use a simpe or straight dipole in lieu of the "zig-zag" or triangular wire dipoles. Isbell himself was well aware of this as can be seen by his reference to investigating "log periodic structures with thin linear elements (zero tooth width)" as a planned task as outlined on page 2 of Quarterly Engineering Report No.1, the initial progress report on Contract AF33(616)-6079 relating to Log Periodic Antenna Structures and identified as Defendant's Exhibit Dx A-3(a).

Further, Dr. Yang demonstrated for the court just how easily and simply the Isbell structure was derivable from the work of DuHamel by the simple expedient of collapsing the various angles to zero. (R512-514). This is not only devoid of any requirement of inventive genius, but can hardly be said to involve any mechanical skill. Any layman completely unschooled and inexperienced in the art of antenna design may nevertheless do this. Moreover, it was shown that this simple derivation of the Isbell structure from the DuHamel trap-

ezoidal tooth structure is illustrated in a number of technical references, such as the Jasik Engineering Handbook at pages 18-11 and 18-13, Dx A-10(a) & 10(b). The observation is noted that the log-periodic dipole antenna array of Figure 18-11 on page 18-13 (the Isbell structure):

> " * * *may be derived from that of Figure 18-9 (on page 18-11) (the DuHamel trapezoidal structure) by letting the tooth width and the angle β approach zero and then folding the two half structures about the horizontal axis so that the angle ψ approaches zero."

The Monser article, Dx A-9, also notes the simple derivation of the log-periodic dipole array (the Isbell structure) from the pyramidal log-periodic structure, again by simply collapsing the angles to zero, and illustrates the basic relationships between the two antennas.

D. The Subject Matter Disclosed in The Isbell Patent Was Obvious To Anyone Skilled In The Art In Light Of The Patented Prior Art References, And Particularly In Light Of The Pertinent Prior Art References Not Cited In Or During The Prosecution.

1. The Patent Office Erred In Issuance Of The Isbell Patent Here In Suit.

While it is recognized that a patent is presumed to be valid, that presumption is weakened when prior art is before the court that was not considered by the Patent Office during prosecution of the application which resulted in the patent. Such is the case here. Certain patented prior art not considered by the Patent Office was more pertinent than some of the art actually cited. One such reference is the patent to White et al, No. 2,105,569 (Dx E-3), which issued on January 18, 1939. Dr. Yang testified that the White patent disclosed an antenna array having a plurality of dipoles of increasing lengths connected to a common feeder which is transposed between adjacent dipole elements (R498). Thus, the White patent shows:

1. An antenna array having at least three dipoles, as in Isbell;

2. An array where the dipole lengths progressively increase from one end to the other, as in Isbell;

3. An array wherein the feeder line is transposed between adjacent driven elements, as in Isbell.

Furthermore, the disclosure of the White patent specifically states on page 2, column 2, lines 14 et seq:

> "The polar diagram is therefore substantially independent of frequency over a substantial range of side band frequencies."

Dr. Yang testified that the antenna shown and described in the White patent could be designed to be fully operative over the low VHF band (Channels 2 through 6) (R504):

> "Q. Dr. Yang, could an antenna engineer design a television antenna according to the White patent that would be operative over the low VHF television band, Channels 2 to 6?
>
> A. Well, I suppose one could, yes, * * *."

The White patent teaching therefore responds to the purported invention as set forth in the Isbell patent in that it includes an antenna array having a plurality of dipole elements interconnected by a transposed feeder line and where the dipole lengths vary from one end of the array to the other. The White disclosure expressly states that the antenna structure is, in operation, substantially independent of frequency over a substantial range of side band frequencies. One of the important functional characteristics which Plaintiff attributes to log-periodic antenna structures is its ability to operate substantially independent of frequency over the particular bandwidth of interest. Dr. Yang indicated that the White patent would enable an engineer to design an antenna capable of operating over the low VHF television band, which testimony is not controverted in the record.

Other references were available to the Examiner but were not cited. These references involve the combination of the teaching of one patent disclosure with that of another. In determining whether an invention has been made, references may be combined for the purpose of showing that it did not amount to invention to combine features of the prior art patents in the manner accomplished by the subsequent inventor.

It should be observed that the mere aggregation of a number of old parts or elements which, in the aggregation, perform or produce no new or different function or operation than theretofore performed or produced by them, is not patentable invention. Lincoln Engineering Co. v. Stewart-Warner Corp., 3030 U.S. 545, 549; Toledo Pressed Steel Co. v. Standard Parts, Inc., 307 U.S. 350; Cuno Engineering Corp. v. Automatic Devices Corp., 314 U.S. 84. The conjunction or concert of known elements must contribute something. Only when the whole is some way exceeds the sum of its parts is the accumulation of old devices of any significance. In the present case Isbell, is of course, using dipole elements which are shown in the art to be known at the time his purported invention was made (White Patent Dx E-3); he is using transposed phasing lines which were shown to exist in the art at the time of his purported invention (White patent, Dx E-3). The antenna disclosed in the Isbell patent is fed from the front also shown in the

art to be known at the time the purported invention was made (Winegard patent, Dx D-1); likewise, he is using dipole elements of varying lengths which is also known in the art prior to the time of the purported invention (White Patent, Dx E-3; Katzin patent, Dx E-4; Winegard patent, Dx D-1) and he provided spacings between the dipole elements which is shown in all of the prior art antenna structures in evidence.

It has been stated that courts should scrutinize combination patent claims with a care proportioned to the difficulty and improbability of finding invention in an assembly of old elements. The function of the patent is to add to the sum of useful knowledge. Patents cannot be sustained, when on the contrary, their effect is to substract from former resources freely available to skilled artisans. Great Atlantic & Pacific Tea Co. v. Supermarket Equipment Corp., 340 U.S. 147 (1950).

It is not necessary in a combination of such references that the structure of one reference be substituted bodily in that of the reference with which it is combined. In re Billingsly, 279 F.2d 689. Rather, the question is whether what the applicant has done would be obvious from the references in combination (35 U.S.C. 103). To render invalid a patented combination claim or to establish anticipation of a combination claim, it is not necessary that all of the

elements in the combination be found in a single earlier patent or in a single device previously in general use. It is enough if the evidence taken as a whole discloses that all of the claimed elements are found in different prior patents in the art or in different devices previously in general use, provided no new functional relationship arises from the combination. Fairchild v. Poe, 259 F.2d 329. There is no new result shown for the combination set forth in the Isbell patent. It performs the same function in the same way as one skilled in the art would expect, i.e., it receives signals and converts the signal from the air into a useable form to be transmitted to the receiver -- the television set.

The Katzin patent No. 2,192,532 (Dx E-4) in combination with the teachings of the Kooman Patent No. 1,964,189 (Dx E-1), which was not cited during the prosecution of the Isbell application, provides an antenna array having:

1. A plurality of coplanar and parallel dipoles, as in Isbell;
2. The dipole elements being of progressively increasing lengths, as in Isbell;
3. The dipole elements being connected to a common feeder line, as in Isbell;
4. The feeder line being transposed between adjacent dipole elements, as in Isbell.

Dr. Mayes suggested that the Katzin patent and the Kooman patent (Exhibits E-1 and E-4) were directed to dif-

ferent kinds of arrays, one being a broadside array and the other being an endfire array (referring to the mode of operation of the antenna rather than structure) and gave this as the only reason for not being able to combine the teachings of the two patents. However, on cross-examination, Dr. Mayes testified that prior to 1959 it was known how to make the Koomans antenna structure (which was characterized as being of the broadside type) into an endfire of the type shown in Katzin. That is, he testified that it was wholly within the knowledge of one skilled in the art to determine what was needed to be done to provide this type (endfire) of operation (R666):

> "Q. Dr. Mayes, was it well-known before 1959 that if the doublets on Koomans patent were spaced distinctly less than a half wave apart the principal radiation would not be perpendicular to the array plane but would be parallel to that plane?
>
> A. Yes."

The only reason given by Dr. Mayes on direct examination for being unable to combine the teachings of the two patents is thus effectively negated by his further testimony on cross-examination.

The teaching of the Schwartz patent No. 2,817,085 (Dx E-7) in combination with the teaching of the Koomans patent (specifically, the transposed feeder lines of the Koomans patent), neither of these patents having been cited by the Examiner during the prosecution of the Isbell application, shows an antenna of the type having:

1. A plurality of dipole elements, as in Isbell;

2. With the dipole elements increasing in lengths from one end of the antenna to the other, as in Isbell;

3. And the feeder line being transposed between adjacent dipole elements, as in Isbell.

It is quite significant that on rebuttal, Dr. Mayes, testified as to the differences in the Schwartz patent and the Isbell patent(R657):

> "A. The Schwartz antenna uses hairpin or fat dipoles in contrast to the simple linear dipoles which are disclosed in Isbell. The transmission line sections between adjacent dipoles have lengths which exceed the spacing between adjacent dipoles, whereas the Isbell disclosure is directed toward transmission line sections between adjacent dipoles equal to the spacing. The impedance of the transmission line sections between adjacent dipoles is not necessarily the same, and in fact the preferred arrangement is described as being different impedance for different transmission line sections, whereas the Isbell teaching is a uniform transmission line of constant impedance connecting all dipoles in the array."

With the exception of employing hairpin dipoles, all but ten of the Winegard accused antennas (10B200, 10B300, 10B400, B-105, B-335, B-445, B-555, B-550, B-660 & B-770) comprising two model series, possess the same differences as to the Isbell patent as does the Schwartz patent. Specifically, all but the foregoing two model series, the accused Winegard antennas employ feeder lines between adjacent dipole elements which exceed the spacings between the dipoles and wherein the impedance of the feeder line is different than

a feeder line of substantially the same length as the spacing between the adjacent dipole elements. Moreover, in the accused Winegard models 10B1010, 10B1020, 10B1030, 10B1040, 10B1050, 10B1120, 10B1130 and 10B1140, a different type of feeder line is utilized between the front (shortest) two dipole elements than is employed between the remaining dipole elements and which are of different impedances.

Dr. Mayes further noted a difference between the Schwartz and Isbell structures wherein the Schwartz structure employes hairpin, or fat, dipoles and the Isbell structure employes straight or linear dipoles. Dr. Yang testified that there are a wide variety of dipoles. He stated a definition of a dipole an antenna with which he agrees, namely from DX A-13 (R490):

> "A. 'Dipole antenna. Anyone of a class of antennas producing the radiation pattern approximating that of an elementary electric dipole.'
>
> Q. Dr. Yang, do you agree with that definition?
>
> A. Yes, I do."

Dr. Yang was asked to sketch various dipole configurations which would be encompassed in this definition (R491), and completed a sketch for illustrative purposes (Dx L-19a) accompanied by the following description (R491-492):

> "A. Well, to begin you have so-called linear dipoles and using a straight wire * * * There's many, many varieties. You have a bi-conical type. * * * sheet, triangular sheet, * * * tri-fan. * * * So and so forth, including maybe a folded type.

Q. * * * Are you saying that the folded dipole that you have sketched operated basically in the same manner as a linear dipole or a bi-conical or a fan?

A. Near the resonance frequency for which dipoles are meant to operate the radiation characteristics would be the same. However, the impedance characteristics would be somewhat different."

And, further, on cross-examination, Dr. Yang was asked (R548):

"Q. Radiation patterns are not the only criterion of a successful antenna, are they, Dr. Yang?

A. Well, impedance is another, but usually when you design an antenna you always watch the radiation pattern first. You can always match impedance some other way without involving radiation. * * *"

The Winegard patent No. 2,700,105 (Dx D-1), which was not cited by the Examiner during prosecution of the Isbell application, shows that it was known in the art before the purported Isbell invention to provide an antenna array having a plurality of dipole elements of differing lengths interconnected by transposed phasing lines and fed from the front in an endfire array (or backfire array as stated by Plaintiff's witnesses). The Winegard patent, Dx D-1, in combination with the teaching of the Katzin patent teaches the provision of an antenna array having:

1. A plurality of substantially coplanar and parallel dipole elements, as in Isbell;

2. The dipole elements being of progressively increasing lengths, as in Isbell;

3. The dipole elements being connected to a commone feeder line, as in Isbell;

4. The feeder line being transposed between adjacent dipole elements, as in Isbell; and

5. The array being fed from the front, as in Isbell.

It is interesting to note that no reference is made by Plaintiff's on re-direct or rebuttal as to the Winegard patent, Dx D-1, in relation to any of the other references discussed by Mr. Cook or in evidence at the trial. The only reason given by Dr. Mayes in support of his opinion that the Koomans patent teaching and transposed phasing lines shown therein could not be combined with the Katzin patent, Dx E-4, is that Koomans showed a broadside array and Katzin an endfire array, the two being incompatible. The Winegard patent, Dx D-1, teaches an endfire array, the same as Katzin. Dr. Mayes also noted that the feed system of other references was complex and not the simple transposed phasing line of Isbell. The Winegard patent shows the same simple transposed phasing line of the Isbell antenna structure.

Dr. Mayes testified that other references cited by Defendant did not show the front feed of Isbell and could not teach this characteristic of the Isbell structure. The Winegard patent is fed from the front to provide an endfire array, the same as Isbell. All of the elements of the Isbell patent are found in the combination of the teaching

of the Katzin patent and the combination of elements of the Isbell antenna do not perform any different function when put together in the manner shown in the patent, for use in the reception of television signals in the low VHF band.

It is also interesting to note with reference to the Schwartz patent, Dx E-7, that the specifications states in conclusory manner, the same as represented by Plaintiff during the trial as to the functional characteristics of a log-periodic antenna, that:

> " * * * an antenna * * provided according to the present invention * * * possesses high gain and high front-to-back ratio as well as other desirable characteristics which are exhibited throughout a wideband of frequencies such as the VHF television band." (Column 12, line 9 et seq.)

These are the same criteria that Plaintiff outlined as desirable characteristics of a log-periodic antenna, with no additional specific details as to what kind of performance might be expected by a showing of test data or the like. Accordingly, the criteria as set forth by Plaintiff are fully met by an antenna according to the teachings of the Schwartz patent, the Winegard patent, the White patent, as well as others in the art at the time the purported invention of Isbell was made.

E. The Subject Matter Set Forth In The Isbell Patent Was Obvious To Anyone Skilled In The Art In Light Of The Prior Art Antenna Structures On Sale And In Public Use Prior To The Time Of The Alleged Isbell Invention.

Completely apart from the patented and other prior art references, the structure as disclosed in the Isbell patent here in suit is obvious to anyone skilled in the antenna art in light of the various antennas on sale and in public use more than one year prior to the filing date of the Isbell Patent Application. This is particularly so in reference to the Channel Master K.O. antenna, Dx J-6 & 6(a). By Plaintiff's own admissions, in its answers to the interrogatories by Winegard Company and in its Pretrial Memorandum, the Channel Master K.O. antenna is said to probably be the "closest" to the structure described and claimed in the Isbell patent in suit. . .as well Plaintiff might. It is submitted that the Channel Master K.O. antenna is not only the "closest" to the subject matter of the Isbell patent but clearly anticipates the Isbell devlopment in all respects. Plaintiff has taken the posture that the Channel Master K.O. antenna does not anticipate the subject matter of the Isbell patent because folded dipoles are employed in the K.O. antenna instead of the simple or straight dipoles used by Isbell and that there is a "fundamental" difference in operation between an antenna composed of folded dipoles and straight or simple dipoles. We are not enlighted as to what this difference

in operation is by any of the evidence offered by the Plaintiff during the trial. A review of the record shows that this alleged "fundamental" difference still remains a mere bald assertion on the part of Plaintiff without evidentiary support or foundation. On the contrary, the clear preponderence of the evidence as adduced at the trial is that folded dipoles are the functional equivalent of straight dipoles in all respects, except that of characteristic impedance, within the range of frequencies under consideration, i.e., the low VHF television band (Channels 2 to 6).

Dr. Yang specifically testified that, with the exception of a difference in impedance characteristics, a folded dipole operates basically in the same manner as a linear dipole. Near the resonance frequency for which the dipoles are meant to operate, the radiation characteristics should be the same (R492). He further testified that given an antenna araray employing folded dipoles and operative over the low VHF television band (Channels 2 through 6), simple dipoles could readily be substituted for the folded dipoles and the antenna would operate basically in the same way as far as the radiation pattern is concerned (R515). His testimony on the equivalency between folded and straight dipoles over a range of frequencies encompassing a 2:1 bandwidth (adequate to cover the low VHF televsion band), was reaffirmed on cross-examination. Dr. Yang observed that while radiation patterns are not the only criterion of a successful antenna, nevertheless, in the design of antenna, you always watch the radiation pattern first, and that you can always match impedance some

other way without involving radiation (R548).

Mr. Winegard also testified at length concerning the equivalency between folded and straight dipoles for use in an antenna intended for reception of signals on the low VHF band. Mr. Winegard observed that as long as you keep the same number of parasitics and the same spacings, folded and straight dipoles work almost identically. Pickup, directivity, front-to-back ratio, and gain are the same. Only the impedance match deteriorates a little toward the high end of the band (R442).

The testimony of Dr. Yang and Mr. Winegard concerning the functional equivalency between folded and straight dipoles within a bandwith of not greater than 2:1 stands in the record without serious contradiction. It is of course to be noted that, on rebuttal, Dr. Mayes was asked if he had an opinion as to the effect of the substitution of straight dipoles for folded dipoles used in the K.O. antenna. His answer was to the effect that the starting point for an antenna designer would have been to start with broadband elements (e.g., folded dipoles) and then combine those elements in an array to achieve an even broader bandwidth and, further, that the subsitution of linear dipoles would have appeared to be a step in the wrong direction because the bandwidth of the linear dipole is considerably less than the bandwidth of the folded dipole. The best that can be said concerning this

opinion is that Dr. Mayes is either flatly wrong or has made an incorrect assumption. We cannot say. Moreover, it is to be emphasized that it is just that -- an opinion. An opinion that is made without reference to any test data or other factual evidence upon which to base or support it. The record shows the contrary to be the case. The Tel-rex antenna as exemplified by Dx B-6, shows a television antenna offered for sale by at least May, 1955, which is the same time period as for the K.O. antenna, which uses straight linear dipoles in antennna array designed for coverage of the VHF television band. Thus, we have an antenna array which embodies elements and design parameters of exactly what Dr. Mayes says one skilled in the antenna art at that time would not do. In addition, Mr. Winegard himself testified that he not only considered the substitution between folded, T-match and straight dipoles, but had in fact constructed the basic antenna structure as disclosed in the Winegard patent 2,700,105, Dx D-1, with various types of dipole elements, including folded and straight dipoles without substantial effect therebetween (R442).

Whatever persuasiveness Dr. Mayes' rebuttal testimony might have had otherwise concerning a possibility in the deterioration of performance when substituting straight for folded dipoles, it is effectively negated by the actual tests conducted by Mr. Shelledy on the Channel Master K.O. antenna identified as Defendant's Exhibit Dx J-6 & 6(a). Mr. Shel-

ledy testified that tests relating to gain, directivity (polar charts), bandwidth response and impedance (VSWR) characteristics were conducted on the antenna in the unmodified condition, i.e., with the folded dipoles, and also the same tests with one half of each of the folded dipoles removed to form straight or linear dipoles. No other antenna parameter was changed (R265-271). The results of the tests are in evidence as Dx K-1, K-1(a) 1 through 6, and K-1(b) 1 through 6. The test results show clearly and conclusively that, with the exception of the expected differences in impedance characteristics, the operation of the antenna in either condition is substantially the same. Specifically, there is no significant change in gain, bandwidth response, directivity or front-to-back ratio of the K.O. antenna regardless of whether folded or straight dipoles are utilized. What little change there is on gain may be attributed to the effect of the difference in impedance characteristics in the two conditions. However, an optimum impedance match may always be effected in other ways, as observed by Dr. Yang.

Where then it must be asked is the deterioration in performance that Dr. Mayes testified would result because of the substitution? Where then is the increased sensitivity to frequency said to result? The answer is, of course, that there is none and it is Dr. Yang and Mr. Winegard who are entirely correct in their assessment that straight dipoles may be substituted for folded dipoles in an antenna

Auto Equipment Co. v. Heckethorn Mfg. Co., 141 USPQ 549, (1964), at page 556:

> " * * * anticipation belongs with novelty. To be patentable, a device must posses novelty as well as invention and utility. Novelty does not exist if the patented device has been anticipated by a prior device, whether patented or not. In order to have anticipation, it is necessary that all of the elements of the patented device, or their equivalents, be found in a single prior device where the elements do substantially the same work in substantially the same way. (Citations omitted) * * * In other words, a device lacks novelty if there is, or has been, a substantially identical prior device."

It might be added that this conclusion of anticipation is even further compelled in light of the structure of the Winegard antennas charged to infringe. As pointed out previously,the design parameters of the Channel Master K.O. antenna are substantially closer to the dictates of the Isbell patent than any of the accused Winegard antennas. As laid down in the Supreme Court case of Miller v. Eagle Mfg. Co., 151 U.S. 186, 14 S.Ct. 310, 38 L.Ed 121 (1894):

> "that which infringes if later anticipates if earlier."

This has, of course, become a well-established axiom in the patent law and has been applied repeatedly in a long line of cases. The rule is recognized as has been applied in cases originating in the Eighth Circuit as well. cf: Shakespeare v. Perrine, 91 F.2d 199, CA 8, (1937); Valley Shoe Corp. v. Tober-Saifer Shoe Co., 25 F.Supp 860, DC Mo., (1939). And,

as stated in the case of Baldwin-Lima-Hamilton Corp. v. Hi-Way Equipment Co., 250 F.Supp 574, DC Tex., (1965), at page 581:

> "A patent claim cannot, like a 'nose of wax' be twisted one way to avoid anticipation and another way to find infringement." White v. Dunbar, 119 U.S. 47, 7 S.Ct. 72, 30 L.Ed 303, (1866); Perino Inc. v. Hudson-Ross, Inc., 179 F.2d 386, CA 7, (1950)."

V. CLAIMS 3, 9, 10, 14 AND 15 ARE INVALID.

A. Claim 9 Is Invalid As Having No Basis In The Isbell Patent Disclosure

The Isbell patent in suit generally relates to an antenna array having a plurality of driven elements where the length and spacing of the elements vary according to a specific mathematical relationship. Claim 9 of the Isbell patent requires dipole lengths and spacings to increase "logarithmically". There is no teaching in the Isbell patent that suggests a logarithmic relationship between dipole lengths and spacings or that this relationship was contemplated. On the contrary, Isbell specifically indicated during the course of prosecution of the application that this was not what he had invented (R 274). During the prosecution of his application Isbell made the following representation (Dx F-2, page 8, Brief on Behalf of Isbell):

> "The lengths (dipole) shown and described by the applicant Isbell are well-recognized in the art and are fully described in the application text. While, indeed, the party Kravis, et al. has shown dipoles which have different lengths and which are spaced along a feeder it must be emphasized that there is no teaching in the Kravis, et al. application of any other spacing than a logarithmic spacing. This certainly is not that which is claimed by the applicant Isbell. It is not the invention claimed in the interference count."

And further on page 10 of the same document Isbell stated:

> "There is no identity between the substantially constant multiplier to determine the length and/or spacing and the alleged logarithmic function proposed. Thus, it is believed that the proposed count 2 cannot be applied properly to the Isbell disclosure."

In this manner Isbell specifically indicated that whatever his discovery involved it did not involve a teaching of logarithmic spacing between dipole elements or of a logarithmic length relationship of the dipole elements.

There is no teaching in the Isbell patent which in any way sets forth how to make an antenna array where the dipole lengths and spacings are varied logarithmically. There is nothing in the patent drawings to suggest it; there is nothing in the written description of the Isbell antenna to suggest it; there is nothing in any of the claims originally filed in the application to suggest it -- the disclosure is completely devoid of significance with regard to any antenna where dipole lengths and spacings vary in any manner other than according to the strict formulae set forth in the patent, which is represented by Isbell as not being a logarithmic relationship.

B. Claims 14 And 15 Are Invalid As Having No Basis In The Disclosure.

Claims 14 and 15 of the Isbell patent contain reference to the term "cell" in defining one of the design parameters which purportedly should be used to make a periodic antenna structure of the patent. However, there is no support in the written description of the invention or in the drawings which in any way teaches one skilled in the antenna field the meaning of the term "cell" as employed in claims 14 and 15. There is no teaching anywhere in the patent that would show one how to derive or define the "cell" relationship within the design parameters of the Isbell patent.

The claim language further is indefinite in that it allows conflicting interpretations for the cell relationship and there is nothing in the written description or drawings of the patent which would teach one skilled in the art what the proper interpretation might be. Plaintiff's own witness, Mr. Harris, described it in different ways. For example, Mr. Harris defined cell at one time as follows (R 89):

> Q: You mentioned this unit of the cell aspect. Where is the cell described in the Isbell patent.
>
> A: The cell of the Isbell patent is described -- I will describe the cell here from the drawing. The cell consists of a transmission line and the dipole in the Isbell antenna.

However, at a later point in the proceedings, Mr. Harris described the cell as obtained by (R 123):

> " * * * taking the square root of the sum of the squares of the spacing and half the dipole length. * * * "

Mr. Harris then indicates (R 123) that the "diagonal" is the measurement of the cell. If the diagonal is the measurement of the cell then the length of the transmission line and the dipole (as defined earlier by Mr. Harris) cannot be the definition of the cell. Accordingly, plaintiff's own witness is unable to provide a single definition for the term "cell" and, even after he was asked the specific question on direct examination as to where the term " * * * cell (is) described in the Isbell patent" he was unable to point to anything in the patent which would help him with the definition. He was not able to indicate anything in the patent itself because nothing exists in the document to support any definition of the term.

C. Claims 9, 14 And 15 Are Invalid In That They Involve New Matter In The Application And Were Introduced For The First Time More Than One Year After A Publication Disclosing The Subject Matter Of The Claims.

Patent claim 9 was first introduced into the Isbell application by an amendment filed in the Patent Office on July 14, 1961, substantially more than one year after the publication of Quarterly Engineering Report No. 2 (Dx A-3b). Additionally, the "logarithmic" concept introduced in the claim appears for the first time in this application by introduction in this claim and for this reason involves new matter introduced to the application. The Patent Office erred in the allowance of this claim in the application in that there is no support for it in the application as originally filed and that it involves a new concept introduced to the application for the first time in this claim. The Patent Office did not have before it information relative to the publication of a full disclosure of the Isbell antenna in 1959. Lacking the information the Patent Office, of course, acted in ignorance of the fact. The Court has before it in this case evidence of the fact of publication in 1959 and, accordingly, a statutory bar arose which prevented the allowance of any claim including the new "logarithmic" concept set forth in patent claim 9. In Muncie Gear Works, Inc. v. Outboard Marine Mfg. Co., 315 U.S. 759, 86 LEd 1171, (1942), a similar situation was considered by the Supreme Court. The Muncie Gear case involve a fact situation where claims were first admitted to

a case more than the statutory period after public use and sale of the subject matter defined in the claims occured. The court in Muncie stated:

> "The claims in question are invalid if there was public use, or sale of the device which they are claimed to cover, more than two years (now one year by statutory change) before the first disclosure thereof to the Patent Office * * * ".

The Court held that the first disclosure to the Patent Office was the controlling date and not the application date. Accordingly, the date patent claim 9 was first introduced by amendment to the Isbell application was more than one year after publication of Quarterly Engineering Report No. 2 fully disclosing the Isbell antenna and claim 9 must be invalid in view of 35 U.S.C. 102 (b).

Patent claims 14 and 15 were first introduced into the application by an amendment filed in the Patent Office on May 13, 1965.

The amendment of May 13, 1965 introduced for the first time application claims 15, 16 and 17, each of which included language relating to the "cell" design parameter for antennas which Isbell is purported to have invented. In the Office Action of June 15, 1965 (Dx F-1, page 42) application claim 15 was rejected:

> " * * * as based on new matter. The cell concept where the dipole length and spacing may be individually varied to yield a

> diagonal constant scale factor is new to this application. This disclosure teaches a dipole length wherein each dipole decreases in length and spacing by a constant scale factor."

The curious aspect of this rejection is the fact that the very same concept (i.e., cell concept) was set forth in application claims 16 and 17 and the examiner, for an unexplained reason, did not observe that fact and did not act with regard to these claims.

In response to the rejection of application claim 15 applicant Isbell cancelled this claim by an amendment filed in the Patent Office on June 22, 1965. By this action Isbell acceeded to the rejection made by the examiner as to the new matter in application claim 15.

The application finally was passed to issue with application claims 16 and 17 being renumbered and now appearing as claims 14 and 15 in the patent as issued. It is submitted that the cancellation of application claim 15 by Isbell to procure allowance of the application and issuance of the patent was acknowledgement of the fact that the "cell concept" was indeed new in the application as introduced for the first time in application claims 15, 16 and 17 and the examiners error in not recognizing the very same concept in application claims 16 and 17 (now patent claims 14 and 15) should be corrected and patent claims 14 and 15 held to be invalid as involving new matter not finding support in the application as originally filed in the Patent Office and

matter which was introduced to the application for the first time substantially more than one year after the 1959 publication fully disclosing the Isbell antenna.

A well established rule of construction of patent claims is that a claim, or claims, must be read and interpreted with reference to claims that have been cancelled or rejected, and the claims allowed cannot by construction be read to cover what was thus eliminated from the patent. Koolvent Metal Awning Corporation of America v. Kool-Vent Metal Awning Corporation of Missouri, 138 FS 95; Shepard v. Carrigan, 116 U.S. 593; Sutter v. Robinson, 119 U.S. 530; Weber Electric Co. v. E. H. Freeman Electric Co., 256 U.S. 668; I.T.S. Rubber Co. v. Essex Rubber Co., 272 U.S. 429, 443.

D. Claims 3 & 10 Are Invalid For Failure to Include An Essential Element As A Positive Limitation Thereby Overclaiming The Purported Invention.

Both Claim 3 and Claim 10 of the Isbell patent in suit fail to recite as a positive limitation that the spacings between the various dipoles must vary in accordance with a constant scale factor τ as set forth in the specification of the patent. Claim 10 merely recites that the spacings between the various dipole elements generally decrease from one end of the feeder to the other, with the greatest spacing being between the longest dipole elements. Claim 3 recites no limitation whatever with respect to the spacings between the various dipole elements. However, it was repeatedly represented and emphasized to the Patent Office during the prosecution of the Isbell patent application and also the interference proceeding No. 92150 involving the Kravis et al application that the Isbell invention related to an antenna array wherein both the length and spacing between dipoles were dependent upon a constant scale factor τ as set forth in the body of the application. For example, see page 20 of the File Wrapper History, Dx F-1. The Patent Office was informed that "unless both of these conditions are met the antenna does not have the remarkable wide band paths, the high gain and the directivity exhibited by the antennas of the (Isbell) invention." (page 21 of the File Wrapper History, Dx F-1).

Further, it is to be noted that Isbell expressly represented to the Patent Office during prosecution of the patent application that "the progressive variation in dipole length and spacing * * * is essential in applicant's invention." (emphasis added) (page 23 of the File Wrapper History, Dx F-1).

If the progressive variation in spacings according to the defined scaling factor is an essential element or requirement of the purported invention by Isbell, and Plaintiff can hardly argue otherwise in view of the foregoing express representations made to the Patent Office to induce issuance of the patent in suit, then failure to recite such essential element in any of the claims of the issued patent renders those claims invalid and unenforceable since they overclaim the purported invention. As stated in the case of Koehring Co. v. National Automatic Tool Co. Inc., 257 F.Supp 282, DC Ind., (1966), at page 287:

> "It is the claim which measures the grant to the patentee, and it must particularly point out and distinctly claim an identifiable discovery or invention; an ambiguous claim which overclaims the invention by omitting an essential element described in the specifications (or not described at all) is invalid. Graver Tank & Mfg. Co. v. Linde Air Products Co., 336 U.S. 271, 69 S.Ct. 535, 93 L.Ed 672."

Defendant is aware of the fact that during the trial it was shown with respect to Claim 3 of the patent in suit that, if the dipole lengths are to varied according to a

constant scale factor with the ends of the dipoles falling on a V-shaped line forming an angle α at its vertex, then the spacings between the dipoles inherently vary according to the same constant scale factor. This does not, however, prevent the application of the above rule with respect to invalidating a claim for overclaiming the purported invention through the omission of an essential element or requirement. Section 112 of Title 35 of the United States Code includes a provision which specifically requires:

> "The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention. * * *"

Thus, the statutory provision places the burden on the prospective patentee to include all essential elements or requirements as positive limitations but, in this case, has failed to do so. The defect cannot be cured by resorting to separate mathematical analysis not readily apparent to everyone reading the claim and which is not set forth in the body of the patent specification. The claim is therefore defective on its face.

VI. THE ISBELL PATENT TEACHING IS DIRECTED TO A VERY NARROW STRUCTURAL CONCEPT WHICH CANNOT BE BROADENED OR OTHERWISE MODIFIED IN VIEW OF THE EXPRESS REPRESENTATIONS MADE TO THE PATENT OFFICE

A. The Nature And Scope Of The Isbell Purported Invention As Embodied In The Patent Claims.

In determining any question relating to infringement, it is necessary to determine the nature and scope of the alleged invention in light of the prior art at the time of the development of the subject matter disclosed and claimed in the patent. As previously pointed out:

1. Isbell was not the originator of frequency independent antennas;

2. Isbell was not the originator of that class of antennas commonly referred to as "Log-Periodic" antennas;

3. Isbell did not develop the mathematical formulae to be applied to dipole length and spacing to obtain the geometrical progression in the dimensions thereof;

4. Isbell was not the first to use a plurality of dipole elements in an antenna array;

5. Isbell was not the first to employ linear dipoles in an antenna array;

6. Isbell was not the first to use a transposed feeder line between dipole elements;

7. Isbell was not the first to use a transposed feeder line with the antenna being fed from the front for endfire or backfire operation;

8. Isbell was not the first to use "stagger-tuning" for a multiple dipole element array across a given bandwidth so as to result in the lengths of the dipole elements varying progressively according to a substantially constant scale factor.

B. The Isbell Patent Discloses A Specific Antenna Array Where The Dipole Lengths And Spacings Between Dipoles Are Determined By Specific Design Parameters.

It often has been observed that a patentee is his own lexicographer and the selection of words and meanings of terms are his to make as long as the meanings do not completely depart from otherwise recognized usage. In view of the lack of precision of words it is difficult to exactly define a physical entity with words. Words have variations in meanings whereas physical entities are defined by a specific structure. Accordingly, claim language which is used in a patent to define a physical structure cannot be considered apart from the patent in which it appears nor apart from representations as to what the claim language is intended to mean. This is all a part of the definition of terms and in a real sense language has meaning only in relation to the object to which the language relates and in view of representations made as to what specific terms mean.

The doctrine of file wrapper estoppel arose as an equitable premise to prevent a patentee from representing that certain claims or certain language in the claims was intended to mean one thing when trying to procure allowance of the patent and then representing that he is not bound by those definitions when he later is trying to find infringement of an accused structure.

It has often been held that solicitor's arguments may be considered to determine whether the applicant-patentee has limited a claim of a patent by definition of terms in the course of arguing for allowance of a patent. Stiegele v. J. M. Import-Export Co., 312 F2d 588, CA 2 (1963); Bishop & Babcock v. Western Auto Supply Co., 105 F2d 886, CA 6 (1939). In arguments before the Patent Office, the appraisal by an inventor of the significance of a particular element in his invention has great weight in determining whether the element, omitted in an alleged infringing device, is not an important element of the device alleged to be infringed. Moder Products v. Drachenberg, 152 F2d 203, CA 6 (1943).

While arguments in a file wrapper cannot be used to expand the scope of claims, they can be used to affirm a construction, possible by the wording of the claims, in accordance with the intentions of the inventor and the Patent Office. Cutter Laboratories, Inc. v. Lyophile-Cryochem Corporation, 179 F2d 80, CA 9 (1949).

Isbell clearly represented to the Patent Office that both the length of the dipole elements and the spacings between the dipole elements must vary according to a common, constant scale factor. Isbell also represented, and it is

clearly set out in the written description of the patent, that the common, constant scale factor must be less than unity.

The Isbell patent defines the dipole lengths and spacings as follows:

> 'The lengths of the dipoles and the spacing between dipoles are relates 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, * * * " (Col. 1, lines 50ff)

In arguments made to the Patent Office to represent why the Isbell antenna was not anticipated by the Katzin patent cited to support the rejection of the claims, Isbell stated (Dx F-1, page 19):

> " * * * Applicant's antenna comprises a plurality of dipoles of varying length and spacing between successive dipoles, both the length and spacing of these dipoles being dependent on a constant scale factor τ as defined in the application."

Isbell further stated, beginning at the bottom of page 20 of DX F-1 that:

> " * * * there is certainly no teaching or suggestion in the Katzin patent of an arrangement in which <u>both</u> the length of successive dipoles <u>and</u> the spacing between said dipoles vary in a manner <u>such that the ratio of the lengths of adjacent dipoles is a constant which is also equal to the ratio of the spacings between adjacent dipoles</u>. 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. Katzin does

> not show an antenna in which both the spacing and the length vary progressively and certainly does not teach that the scale factor in the spacing and the length should be the same in both cases."

There was no uncertainty in the mind of Isbell that the scale factors for both length and spacing must be the same when he was attempting to persuade the Patent Office that the Katzin reference did not apply to the Isbell disclosure. While an applicant may exercise liberty in the use of terms and definitions of terms, when he does provide a definition for language in the claims which restricts the meaning of the language he cannot later deny that the language is not applicable in interpreting what the claims mean. The arguments of counsel on behalf of applicant must be considered to determine the proper scope of the claim. To hold otherwise would be to permit an applicant to make any representation to the Patent Office to distinguish over prior art references which may be cited and then completely ignore those representations later when seeking to charge infringement of structures that would be excluded by the express representations made by applicant.

It should be observed also that at no time after the above representations were made to the Patent Office did applicant expressly indicate that they did not accurately reflect the inventive concept of applicant. Thus, the

representations made by applicant were carried throughout the course of prosecution of the application before the Patent Office.

During the course of interference proceedings involving the Isbell application additional representations were made to define the inventive concept. For example, in Dx F-2, at page 2, Isbell stated:

> "Throughout the Isbell application, in which the claim corresponding to the single interference count originated, the antenna dipoles are stated to be spaced apart from each other and to have lengths which vary with respect to each other in such fashion that the lengths of adjacent dipoles are related by a constant scale factor or multiplier, and the spacing between adjacent pairs of dipoles are similarly related by a constant scale factor or multiplier. * * * "

Further in Dx F-2 in the Brief on Behalf of Isbell, at page 7, Isbell discusses differences between the Isbell and Kravis structures and notes that:

> "There is not a single word of description in the Kravis, et al. application which sets out any relationship at all of any dipole lenghts compared to one another in such a way that the lengths vary by a common scale factor as required by Count 1."

On page 15 of the same brief Isbell states:

> " * * * Isbell * * * provides a carefully calculated dipole length and spacing which is determined by a substantially constant scaling factor. This is not disclosed by Kravis, et al. who cannot support the interference count because they do not provide an antenna structure wherein the dipole lengths or spacings with respect to each other are varied by a substantially constant common multiplier."

Thus, the Isbell patent contemplates a very specific kind of antenna array where:

1) dipole element lengths vary according to a constant scale factor;

2) spacings between dipole elements vary according to a constant scale factor;

3) the constant scale factor in each case is less than 1; and

4) the scale factor for dipole lengths is the same as the scale factor for spacings between dipole elements.

Any other conclusion would require that the Court ignore all representations made by Isbell to the Patent Office during the course of prosecution of the application which culminated in issuance of the patent in suit. In The Cincinnati Milling Machine Company v. Turchan, 208 F2d 222, CA 6 (1953), the issue of estoppel by arguments was before the Court. In that case the Court observed:

> "It was vigorously contended below that the Patent Office arguments are merely preliminary negotiations and that file wrapper history to ascertain the meaning of claims is looked upon with disfavor. In Wiegand v. W. Bingham Company, 106 F2d 546, 548, we fully explained that we have not so tightly closed the door to inquiry upon the precise concept of the inventor, measured by his own representations, * * * While conceding that extrinsic aid to construction must be accepted with caution, yet if within the difficult art of claim draftsmanship terms are employed in effort to avoid prior art, which are susceptible of construction, there should be no more reluctance to search for precise meaning than in a private contract."

VII. THE ISBELL PATENT CLAIMS ARE NOT INFRINGED BY ANY OF THE ACCUSED WINEGARD ANTENNAS.

A. Claims 1 And 2 Require That Dipole Lengths And Spacings Vary In Accordance With The Formulae Given In The Claim And Where The Scale Factor Is Less Than Unity.

Claim 2 of the Isbell patent is dependent upon claim 1 which expressly sets forth the formulae defining the manner in which dipole lengths and spacings must vary. It is further noted in claim 1 that the scale factor "tau" for length of the dipoles "is a constant having a value less than 1, * * * ". The scale factor for the spacing ratios is stated to have "the same significance previously assigned, * * * ", the conclusion being that it is a constant having a value less than 1 and that it is the same as the constant for the length scale factor.

Moreover, reading the claims of the patent in suit in light of its disclosure it will be seen that for an antenna array to fall within the purview of the alleged invention the array must include a plurality of dipole elements wherein the longest dipole elements is approximately 0.47 wavelengths long at the lower limit (in this case at 54 megacycles) and the shortest element is about 0.38 wavelength long at the upper limit (in this case 88 megacycles). (Col. 3, lines 5-9, Isbell). Three-eighths wavelength at 88 megacycles is approximately 50 inches. This means that each of the accused Winegard antennas must

include a dipole element with a length of 50 inches or less as part of the array. Only a few of the accused antennas include an active dipole element of 50 inches or less.

None of the accused antenna structures have dipole lengths increasing by a constant scale factor (Px 32-44) (Dx G-2 - 15, excluding G-6). For example, antenna models 10 B 200, 10 B 300 and 10 B 400, shown on Dx G-2, have dipole lengths factors of 0.74, 0.77 and 0.81. Not only are these length scale factors not constant as required by claim 1 but they are not within the range of 0.8 to 0.95 as set forth in column 2, line 71 of the patent.

In addition to the above differences, the spacing between elements is constant. Accordingly, the scale factor for spacing is 1.00. While the scale factor of 1.00 is indeed a constant it is not "less than 1" as required by claim 1 of the patent.

As to all other accused antenna models, the length ratios vary much the same as specifically noted above in the 10 B 200, 10 B 300 and 10 B 400 antenna models and, accordingly, they do not meet the "constant scale factor" requirement of claim 1 of the patent. The most significant departure being in antenna model B-105 where the length ratios are 0.68 and 0.74 -- neither of these ratios being anywhere near the 0.8 to 0.95 range specified in the patent, and the ratios not being constant.

In all other accused antenna models the spacing between dipole elements is either uniform or increasing toward the front of the antenna. Those which have uniform spacing cannot, by any reading of the language of the claim, have a spacing scale factor which is "less than 1". On those antenna models where the spacing increases toward the front of the antenna the spacing factors vary from 1.00 to 1.38 (models 10 B 1010, 10 B 1020, 10 B 1120, 10 B 1130 and 10 B 1140; Dx G-3, 4, 7, 8 and 9, respectively). In these antenna models the spacing scale factor not only does not respond to the requirement that it be "less than 1" but it is not constant as specifically required by the claim.

In addition to the above differences between the accused antenna models and the language of claim 1, the dipole length ratios and spacing ratios are not equal to each other but are different in each instance. Accordingly, they do not respond to this specific limitation of claim 1 of the patent.

Even with regard to antenna model CT-100 which Plaintiff specifically described at the trial since it is the only accused antenna model where the spacing between elements decreases toward the front, the specific limitations of claim 1 cannot be met. The dipole length ratios vary from 0.78 to 0.93 and cannot be a constant; the spacing ratios vary from 0.85 to 1.00 and cannot be a constant or be less than 1, as required by claim 1. In addition to these differences the dipole length and

spacing ratios are not equal to each other but vary in a random manner. Moreover, while the spacings between elements may vary in the CT-100 antenna model between certain of the dipole elements, it is emphasized that the lengths of the feeder line interconnecting the dipole elements remains constant regardless of the spacing therebetween, namely, 19 inches (R 459-460). That the lengths of the feeder line between dipole elements are the controlling factor rather than the spacings is evident from a review of the test results placed in evidence by Plaintiff (Px 67 and 67a). These test data purport to show the difference in gain characteristics of the Winegard CT-80 antenna model between that where the 19 inch zig-zag feeder line is used and that where a straight feeder line is used of a length approximating that of the physical spacing between the dipole elements. A deterioration in gain of approximately 1 decibel is shown between the two conditions. Mr. Harris stated that this variation of 1 decibel meant to him that the zig-zag feeder line had no material affect on antenna performance. (R 633) Such a statement either is frivilous or, at best, uninformed. Mr. Winegard pointed out that a 1 db detioration from a total of only 3db gain for the antenna in the unmodified condition can hardly be considered as an insignificant change (R 699-700). This represents one-third of the entire gain for the antenna. Mr. Winegard testified that the Winegard Company may work for six months to get another

decibel gain out of an antenna. Moreover, Mr. Winegard disputed the test results in several particulars. Specifically, Mr. Winegard indicated that the tests conducted by the Winegard Company show that at the low end of the low VHF band, Channels 2 and 3, the gain drops to zero decibels with a straight feeder line on the CT-100 (R 699). This represents a 100% loss of the antenna gain. Therefore, a greater change is impossible.

B. Claims 3, 4 And 5 Require That The Ends Of The Dipoles Fall On A V-Shaped Line Forming An Angle At Its Vertex With The Dipole Lengths Varying In Accordance With The Formula Of Claim 1.

All of the differences noted between the length scale factor and the accused antenna models in the discussion of claim 1, above, apply equally well to the limitation of claims 3, 4 and 5, since the formula is identical to that in claim 1.

While claims 3, 4 and 5 do not specifically recite the spacing variation of claim 1 it is identical with the requirement of claim 1 since the claims recite that "the ends of said dipoles (fall) on a V-shaped line forming an angle α at its vertex, * * * ". As demonstrated by Mr. Winegard on rebuttal (R 701-703) and in his preparation of the chart (Dx M-2) (see chart 2), an antenna made in accordance with the design parameters set forth in claim 3 of the patent would result in a spacing scale factor between dipole elements which is identical to the scale factor for dipole lengths. Mr. Winegard testified that after making an antenna with the design parameters set forth in the language of claim 3 (R 703-703):

> A: " * * * my conclusion was that the spacing would automatically come out to the same scale factor because the ratio between each dipole, the front edge of each dipole as I have shown here, would scale out the same as the length. So even though the spacing wasn't quoted in the patent literally, it is obviously inherent in that claim * * *"

Dr. Yang's definition of a log-periodic antenna follows the same concept as described above in connection with Mr. Winegard's testimony. Dr. Yang illustrated his theory with a triangle drawing (Dx L-25) and testified (R 521) that his definition of a log periodic antenna would include a structure having related areas in a basic triangular configuration, as in Isbell, where if a scale factor of 0.80 is used (for example) to define the decreasing length ratio of dipole elements than the ratio of the areas from each dipole to the vertex of the triangle will be 0.80 of the area adjacent to it. With this definition the spacing between dipole elements must inherently also equal that ratio; the lengths along the side of the triangle from the apex to each of the dipole tips must also equal that ratio. Accordingly, in Dr. Yang's definition of log-periodic antenna and in view of Mr. Winegard's illustration (Dx M-2) all scale factors (dipole length, spacing, etc.) must all be the same, must be constant and must vary according to the same ratio.

None of the accused antenna models have a structure where the ends of the dipoles fall on a V-shaped line and where the dipole lengths vary according to a constant scale factor. The length scale factors of the accused antenna models vary as noted in the discussion of claim 1, above, and none of the accused structures have a scale factor that is constant as required by the language of claim 3.

Further, none of the antennas have a configuration where the spacing scale factor (inherent in claims 3, 4 and 5) is identical to the length scale factor.

C. Claim 9 Requires That Dipole Lengths And Spacings Vary Logarithmically From One End Of the Feeder To The Other.

The record is completely devoid of a showing that any of the design parameters of the accused antennas vary logarithmically.

Mr. Harris prepared line drawings of the accused antenna models and included dimensions thereon which are representative of the physical dimensions of the accused antennas which he indicated he studied. Mr. Harris' data is substantially the same as noted above in discussion of claim 1, with only minor variations, (Px 32-44, inclusive). Mr. Harris did not and could not testify that any of the dipole lengths or spacings between dipole elements varied logarithmically. There is no indication anywhere in the record by any of Plaintiff's witnesses that either dipole lengths or spacings vary in a logarithmic relation. Accordingly, there is no basis for consideration ~~for consideration~~ of this claim in light of the accused structures.

D. Claim 10 Requires That Dipole Lengths Vary In Accordance With A Substantially Constant Scale Factor And That Spacing Between Dipoles Generally Decrease From One End To The Other With The Greatest Spacing Between The Longest Dipoles Of The Array.

Claim 10 requires that the "adjacent dipole elements of different pairs (differ) in length with respect to each other by a substantially constant scale factor, * * * ". This characteristic is not found in any of the evidence of record in this case with respect to the accused antennas. As shown in Mr. Harris' analysis of the accused antennas (Px 32-44) the length ratios of the dipole elements of the antennas do not vary by a substantially constant scale factor -- rather the variation is related to the television channel frequency assignments made by the Federal Communications Commission and not to an arbitrary scale factor.

Claim 10 also requires that "the selective spacings between adjacent dipoles (is) generally decreasing from one end of the feeder to the other with the greatest spacing between the longest dipoles." None of the accused antennas respond to this claim language and, in fact, in antenna models 10 B 1010, 10 B 1020, 10 B 1120, 10 B 1130 and 10 B 1140 the between elements spacing actually increases toward the front of the antenna rather than decreasing. This is diametrically opposed to the concept proposed by Isbell and, incredibly, this was ignored by the witness Harris in his testimony as a significant factor.

Accordingly, the accused antennas omit one or more essential elements of the claim as it appears in the patent and it often has been held that a combination patent, such as that involved here, is not infringed by an article which omits a material element of the claimed combination. Minnesota Mining and Manufacturing Co. v. Permacel-LePage's, 222 FSupp 540, 544 ND Ill. (1963).

E. Claims 11 And 12 Are Substantially The Same As Claim 10 Except That The Spacing Varies Also By A Substantially Constant Scale Factor With The Greatest Spacing Between The Longest Dipoles.

Claim 12 is dependent upon claim 11 which requires that both the dipole lengths and the spacings between dipole elements vary by a substantially constant scale factor. As stated by Dr. Yang, if the Isbell antenna is a log-periodic antenna, then the scale factors for both length and spcaing must vary in the same way and must, inherently, be the same. Additionally, there can be no significant variation from this constant scale factor before departure from the log-periodic frequency independent concept as stated by Dr. Yang (R 533). Accordingly, the language of claims 11 and 12 cannot include any of the accused antenna structures.

The data prepared by Mr. Harris in his study of the accused antennas clearly show that the dipole lengths do not vary by a substantially constant scale factor, as noted in the discussion of claim 1, above. It also can

be determined from Mr. Harris' data that the spacing between dipole elements of the accused antennas either are constant or increasing toward the front of the antennas, except for antenna model CT-100 where the antenna spacing is constant between some elements (that is uniform) and varied between others. However, even the CT-100 antenna model does not involve the language of claims 11 and 12 in that the spacing and length scale factors both vary; neither are constant and neither are equal to the other.

F. Claim 13 Is Similar To Claim 10 Except That In Addition It Specifically Relates To An Antenna Array Where The Length Scale Factor Be In The Range Of 0.8 to 0.95.

Claim 13 specifically recites that the dipole lengths of an antenna array differ "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, * * * ".

Of the antennas accused as infringing by Plaintiff, only antenna model CT-100 includes spacings that differ along the array. All of the remaining antenna models accused as infringing have either uniform spacing between the dipole elements or spacing that increases toward the front rather than decreases toward the front as required by the language of claim 13. In addition none of the accused antenna models have dipole lengths differing by a sub-

stantially constant scale factor and some models specifically include length ratios which are clearly outside the range specifically set forth in claim 13. For example, antenna models 10 B 200, 10 B 300 and 10 B 400 include length ratios between adjacent dipole elements of 0.74, 0.77 and 0.81. Two of these ratios are clearly outside the exact range specified in the claim and the patentees selection of the language to include in the claim should, as in private contracts, be construed against him especially where it is unambiguous and allowing of no latitude of interpretation.

G. Claims 14 And 15, To The Extent They May Be Understood, Require Dipole Lengths To Decrease According To A Substantially Constant Scale Factor And The "Cells" To Decrease By A Substantially Constant Scale Factor.

Claims 14 and 15 specifically require the dipole lengths to decrease from one end of the antenna to the other by a substantially constant scale factor. As noted herein, this is not a characteristic of any of the accused antennas (Px 32-44). In addition, however, claims 14 and 15 require that the "cells" of the antenna also decrease by a substantially constant scale factor. The cell is defined in claims 14 and 15 with the following language:

> "each dipole and the feeder between it and the adjacent dipole constituting a cell,".

The cell concept was introduced to the application for the first time substantially more than one year after publications occured disclosing the antenna described in the Isbell patent. Plaintiff attempted to show during the trial that the cell concept was inherent in the original disclosure of the Isbell application but when Plaintiff's witness was asked in direct examination where in the patent he found a definition of cell concept he was unable to point to any showing in the patent that would help him to define it and relied instead on the drawings that he had prepared of the accused antennas. Furthermore, Mr. Harris defined the cell concept in two different ways in his testimony, one definition being inconsistent with the other. One definition of the cell given by Mr. Harris is that it consisted "of a transmission line and the dipole in the Isbell antenna." (R 89). However, he later defined a cell as being defined by "taking the square root of the sum of the squares of the spacing and half the dipole length." This language cannot be found anywhere in the patent disclosure or in the file history of the Isbell patent. It is completely a definition supplied by Mr. Harris without reference to the patent and having no basis in the patent (R 123).

Applying the definitions supplied by Mr. Harris to the CT-100 antenna one would arrive at different answers for the cell dimension. As stated by Mr. Winegard, the length of the transmission line between elements in the

CT-100 antenna model is 19 inches in all cases. Accordingly, the first definition of the cell would include the 19 inch length of transmission line and one-half the length of the adjacent dipole. The second definition, however, would require a mathmatical computation that completely ignores the length of the transmission line between elements.

As stated by Mr. Winegard in a summary of his analysis of the design parameters of the Isbell patent, to the extent they can be understood, the dipole length and spacing have a fixed relationship to the cell dimension in any manner defined by Mr. Harris and that if you varied two of the design parameters by a constant scale factor, other variables must vary as a function of the two selected, (R 703):

> Q: Mr. Winegard, from your study of the Isbell patent and the design parameters that are set forth therein, and as an expert in the design of antennas, if I were to give you a situation where in meeting of the design parameters of the Isbell patent the ratio of the length of the dipoles was decreased by a constant scale factor and a ratio of what we have heard characterized as cell dimensions was decreased by a constant scale factor, what must happen to any other design parameter?
>
> A: They will all have to decrease automatically by the same scale factor.

Q: In your opinion, when any two design parameters are given in this patent in accordance with the Isbell design parameters, what must happen to the other design parameters?

A: They will automatically fall into the same scale factor.

Thus, if the dipole lengths are decreasing by a constant scale factor and the cell dimension is decreasing by a constant scale factor, the spacing between dipole elements must also decrease by a constant scale factor. It is an inescapable mathmatical conclusion -- there can be no other result. Accordingly, the accused antennas do not respond to this language of claims 14 and 15 since the spacings between dipole elements are uniform or increasing toward the front and a variation as required by the language of claims 14 and 15 cannot occur.

Regarding the issue of infringement generally it is interesting to note that no specific showing has been made relating any of the accused antenna structures to any patent claim. The only record regarding this issue is the conclusory statement of opinion of Mr. Harris that the accused antennas are log-periodic, frequency independent antennas, (R 133):

> Q: Now, based on your experience, Mr. Harris, as a television antenna design engineer and your experience in the design, construction and operation of a log-periodic frequency independent antennas, and your study of the various Winegard antennas which you have studied, do you have an opinion concerning the type and class of these antennas?
>
> A: Yes, I have an opinion.
>
> Q: What is your opinion?
>
> A: My opinion is that these Winegard antennas, as depicted, in Exhibits 32 through 44, are log-periodic frequency antennas.

Later Mr. Harris corrected his answer:

> A: Log-periodic frequency independent antennas, and the log-periodic dipole range. (R 135)

On cross-examination, Mr. Harris was asked the basis of his opinion concerning the Winegard antennas, (R 149):

> Q: Then, you are basing your opinion on the Winegard antenna *from* your studies?
>
> A: Yes.
>
> Q: What was the extent of your study?
>
> A: The extent of my study was the analysis of the Winegard antenna based upon the generalized theory of log-periodic antennas, and

> considering the excitation of elements, the way the elements are fed, spacing, and all the parameters that are involved with the antenna.

There is no testimony either on direct or cross examination showing that Mr. Harris attempted to extend the bandwidth of any Winegard antenna by adding elements to determine whether it would or would not operate as a frequency independent antenna over any bandwidth and that it could be extended indefinitely using the same Winegard geometry. Thus, Mr. Harris was testifying from observation of structure only and speculating as to the frequency independent characteristics of the antennas.

During direct examination of plaintiff's witness, Dr. Paul Mayes, testifying as an expert in the antenna field and specifically with respect to log-periodic antennas, was asked the following, (R 168):

> Q: Dr. Mayes, was it possible to predict up to 1959 whether a given geometry would serve successfully as a repeating unit in log-periodic antennas?
>
> A: No.
>
> Q: Is it possible today?
>
> A: Not with any certainty. There are, however, guide lines available today which make it much easier to do today than it was in 1959.

Thus, we have the curious anomally where one of plaintiff's expert witnesses (Dr. Mayes) says that even today one cannot predict with certainty (without testing) whether a given antenna geometry will provide log-periodic

frequency independent operation and another of plaintiff's expert witnesses. Mr. Harris says that not only is it possible but that he can accomplish this formidable feat by simply examining the antenna in question in light of the "generalized theory of log-periodic antennas." Dr. Yang agreed with Dr. Mayes that it would be difficult to predict such operation with certainty.

There is no indication in the record that Dr. Mayes was willing to make a prediction as to whether the Winegard accused antennas were or were not log periodic antennas. All of Dr. Mayes' testimony hinges upon a curious form of syllogistic reasoning with the following elements of "logic":

1. The Isbell antenna is a log-periodic, frequency independent antenna;

2. Log-periodic, frequency independent antennas are suitable for the reception of color TV signals;

3. The Winegard antennas are suitable for the reception of color TV signals.

Dr. Mayes then, presumably, hopes that the Court will conclude from this pattern what he refused to say anywhere in the record or at any time during the trial. The reason Dr. Mayes may have refused to characterize the accused antennas as log-periodic, frequency independent antennas is suggested on an answer given by Dr. Mayes during cross examination where he was asked, (R 185):

Q: I ask you, Dr. Mayes, is it feasible to make a multi-element antenna with varying length inter-connected by transposed phasing lines which would operate over the low VHF band without being constructed with the (log) periodic design parameters?

A: Yes.

Q: * * * if an antenna of the general type disclosed by Isbell were made with constant spacing between the driven elements from one end of the array to the other, isn't it true that if you added more and more elements to the array to extend the band covered by the antenna, you would ultimately reach a condition where the antenna radiation pattern departs from that of an endfire to the extent that undesired side lobes would develop?

A: Yes, this is true, * * *

Dr. Mayes then went on to qualify his answer but with reference to a quote previously read to him from one of his publications. To the extent the above question was involved his answer was "Yes, this is true".

Mr. Harris was asked substantially the same question on cross examination and his answer corresponded with that given by Dr. Mayes to the extent that you could not have a frequency independent antenna with constant spacing between the active dipole elements, (R 144):

Q: * * * Does this suggest to you, Mr. Harris, that an antenna with constant spacing is not a frequency independent antenna but is, in fact, a frequency dependent antenna?

A: Yes, a frequency independence over a narrow band or over a band of frequencies is still not --

Q: We are speaking now of frequency independent antenna in the broad sense?

A: In the broad sense, that's correct.

Q: And you could not have a frequency independent antenna with constant spacing in that sense?

A: You could not take an antenna with constant spacing and make it frequency independent indefinitely.

Thus, Dr. Mayes and Mr. Harris both agree that you cannot have a frequency independent antenna in the sense defined in the Isbell patent if you provide constant spacing between the driven elements of the antenna.

The opinions of both Dr. Mayes and Mr. Harris in characterizing the accused antennas as in some way being involved in the Isbell patent (without reference to any of the claimed subject matter of the patent) was not based upon any testing of the antennas in the form shown in the Isbell patent -- all of the test data introduced into evidence by plaintiff was of testing performed with the parasitic elements on the accused antennas. There is no indication of record of test data without parasitic elements to determine whether the accused antennas in the Isbell antenna form would satisfy the performance characteristics discussed. Dr. Mayes was asked with regard to testing of the CT-80 antenna, R 185):

Q: Were these conducted, these tests conducted on the Winegard antennas as a whole, that is, with the parasitic elements included?

A: Yes.

While Dr. Mayes did indicate the testing had been done on the antennas without parasitics, even during rebuttal these data were not produced.

VIII. THE DOCTRINE OF EQUIVALENTS IS NOT AVAILABLE TO ISBELL TO EXTEND THE SCOPE OF ANY CLAIM TO INCLUDE ANY OF THE ACCUSED STRUCTURES.

During the course of the trial Plaintiff attempted to show that structural modifications of an antenna could be made that still would involve an "equivalent" of the antenna set forth in the Isbell patent. In this manner Plaintiff seeks to invoke the Doctrine of Equivalents to broaden the scope of the claims to cover structures not otherwise includable within the claims of the patent.

This maneuver frequently is attempted where the patentee is faced with unhappy claim language in light of the accused structures and after struggling for several years with claim language with the Patent Office the patentee seeks to have the court make still further substantive changes within the claims to bring into the meaning of the claim language some structure that otherwise could not be considered as an infringement.

While an inventor is allowed considerable latitude in the wording of a claim, Topliff v. Topliff, 145 U.S. 156, the doctrine of equivalents argument is more interesting than persuasive when it is weighed against the explicit language of the claim. Among the tests of equivalency are identity of function and substantial identity by way of performing that function, Graver Tank & Mfg. Co. v. Linde Air Products Co., 336 U.S. 271.

The doctrine, while premised upon the necessity for protection against substitution of one element of an invention, varies in its degree of protection with the degree of invention embodied in the patent for which that protection is sought, Continental Paper Bag Co. v. Eastern Paper Bag Co., 210 U.S. 405. The Court may not enlarge the patent beyond the scope of that which the inventor claimed and the Patent Office allowed. This is true even though the patentee may have been entitled to something more than the words he has chosen will include, West Disinfecting Co. v. United States Paper Mills, 44 F2d 790, modified on other grounds, 44 F2d 803, cert. denied, 283 U.S. 836. In view of the fact that the Isbell patent is not a pioneer patent the doctrine of equivalents cannot extend the language to broaden the express limitations set forth in the claims.

In Parmelee Pharmaceutical Company v. Zink Safety Equipment Company, 285 F2d 465, CA 8 (1961), the Court stated:

> "But the mere presence of equivalency is not in itself enough to warrant invocation of the doctrine nor does it necessarily equate with infringement. * * * The requirements of the statutes must still, and initially, be met; thus, for example, the doctrine cannot be used to expand the confines of a claim. James P. Marsh Corp. v. United States Guage Co., 7 Cir., 129 F2d 161,165-6. * * * the doctrine's proper application is where, because of formalized practice under present statutes, the claiming "burden upon the patentee is so inequitable as to merit some form of extra-ordinary relief".

Plaintiff attempted to set up a premise with which the doctrine of equivalents could be used by introducing testimony during the trial as to performance characteristics of a log-periodic antenna having frequency independent characteristics. These characteristics were: (R 46)

1) good gain characteristics;

2) good impedance match;

3) good directivity (front-to-back ratio);

4) bandwidth.

Mr. Harris testified that a log-periodic antenna is (R 87):

> " * * * an antenna in which the electrical, basic electrical characteristics we discussed, impedance, pattern, remain essentially constant with frequency. * * * We do this by * * * creating a structure which consists of repeating units which we call cells, and in which the cells are similar, but varying in size."

Dr. Mayes testified as to the above performance characteristics and structural aspects of antennas generally and stated (R 185):

> Q: * * * Dr. Mayes, is it feasible to make a multi-element antenna with varying length inter-connected by transposed phasing line which would operate over the low VHF band without being constructed with the (log) periodic design parameters?
>
> A: Yes.
>
> (R 189) Q: Dr. Mayes, given an antenna which is operated over a restricted bandwidth and where its gain, directivity and impedance would not change substantially, according to the definitions that have been given here, this would not necessarily mean that the antenna would be constructed according to the design parameters set forth

in the Isbell patent, is that correct?

A: That's correct.

(R 190) -- Q: Dr. Mayes, could a UHF antenna having a plurality of driven elements connected to a common feeder line, and operated over the UHF band, be characterized as a frequency independent antenna over this UHF band, that is, if the gain, impedance and directivity remain substantially constant over the band?

A: If these factors remain constant over that band it would be frequency independent over that band with respect to those factors at least.

Accordingly, a situation occurs where the performance tests that are suggested by Plaintiff as characteristics of log-periodic antennas are absolutely meaningless as a vehicle to distinguish the log periodic antenna from any other antenna exhibiting the same performance characteristics. Dr. Mayes clearly indicated in his testimony that from the results given you could not tell whether the antenna was log periodic or not log periodic. In addition, he testified that the UHF antenna, which clearly is not indicated as being within the Isbell patent, would equally satisfy the performance tests that have been set up by Plaintiff as a measure of determining whether the antenna is of the type set forth in the Isbell patent.

This testimony obviously was part of an effort to set up the syllogism using test elements for reasoning that would not be restricted to the narrow limits of the patent claims. It fails, however, in that the premise is false and a logical conclusion cannot be reached.

The doctrine of equivalents cannot be used to broaden the meaning of any Isbell claim to include the Winegard structures in that the Isbell antenna contemplates a structure intended to cover a given band with the use of active elements alone whereas the Winegard antennas which are accused as infringing all use parasitic elements to provide coverage over the high VHF TV band. Accordingly, the accused antennas perform in a distinctly different manner from that shown by Isbell and there is no equivalency of structure or operation to provide the result.

If the Isbell claims are intended to cover only antennas where all of the elements are active elements then the claims may not be broadened to the point where they include prior art such as the Channel Master K.O. antenna which was shown to be sold in the United States during 1955 to 1959 as testified to by Messrs. Irwin Karchmer and Al Passer, employees of the Channel Master Corporation (R 372 and 385). As noted earlier in this brief the dipole lengths of the K.O. antenna decrease by a substantially constant scale factor in the same way that the Winegard antennas decrease; the spacings of the K.O. antenna vary by a substantially constant scale factor (spacings of Winegard antennas are constant or increase toward the front); the dipole elements of the K.O. antenna are interconnected by a transposed phasing line in the same way that the Winegard antennas are interconnected; the K.O. antenna is fed from the front

in the same way that the Winegard antennas are fed from the front. The only significant difference then is that the K.O. dipole elements are folded whereas the Winegard dipole elements are of the linear type. However, Dr. Yang and Mr. Winegard testified that the only difference between these elements is in the impedance where one is substituted for the other and that anyone skilled in the art would know how to compensate for this difference. In addition to this testimony Mr. Carey Shelledy produced test data on the tests that he performed (R 264-271; Dx K-1a-1 to 6 and K-1b- 1 to 6). Mr. Winegard testified that these tests indicated to him that whether the K.O. antenna had folded or linear dipoles the performance characteristics showed very little change (R 452-453).

In view of the above structural and performance data noted for the Channel Master K.O. antenna it is submitted that if any claim of the Isbell patent is interpreted in any way to include any Winegard antenna accused as infringing it must also include the K.O. antenna in terms and for that reason the claim must be invalid as including prior art that is known to have been sold substantially more than one year prior to the filing date of the Isbell application and which existed at and before the time that Isbell developed the antenna of the patent in suit.

It also should be observed that Dr. Mayes testified on cross examination that the K.O. antenna of the Channel Master Corporation taught one skilled in the art prior to 1959 how to use more than two driven elements in an antenna array, the driven elements being interconnected by transposed phasing lines with the transmission line connected to the frontmost element for achieving unidirectional operation (R 666). This is all that Isbell can possibly teach for low VHF TV band operation.

It becomes readily apparent that faced with the Channel Master K.O. antenna as prior art, the claims of the Isbell patent cannot be interpreted, by the use of any doctrine, to any meaning which would include any of the accused antennas. To do so would be to give them meaning which would necessarily include the prior art antennas and would necessarily render the claims invalid.

IX. CONCLUSION

The Isbell patent is invalid in that it did not contribute to the sum of knowledge available to those skilled in the art at the time of the Isbell disclosure and it does not meet the test of invention set forth in 35 U.S.C. 103. Each of the elements of the Isbell patent are shown to have been derived from information available prior to 1959 and the combination of elements in the Isbell antenna for use in the low VHF TV band did not contribute anything to the art. The combination of elements did not perform in any different way than would be expected by those skilled in the art.

The Isbell patent is not valid in that the subject matter disclosed and claimed in the patent was fully set forth in a publication (Quarterly Engineering Report No. 2), available to anyone either as a library reference or by personal copy, more than one year prior to the filing date of the application and is barred under 35 U.S.C. 102 (b).

The Isbell patent disclosure is directed to a very narrow structural concept for antennas. The Winegard antennas do not involve the narrow concept of the patent and are not infringing any of the claims of the Isbell patent.

The Court should hold that the Isbell patent claims in issue are invalid and that they are not infringed by any of the accused antenna models.

Respectfully submitted,

Keith J. Kulie
Donald B. Southard
Burmeister & Kulie
135 S. LaSalle Street
Chicago, Illinois

Edward Dailey
National Bank Building
Burlington, Iowa

Attorneys for Defendant

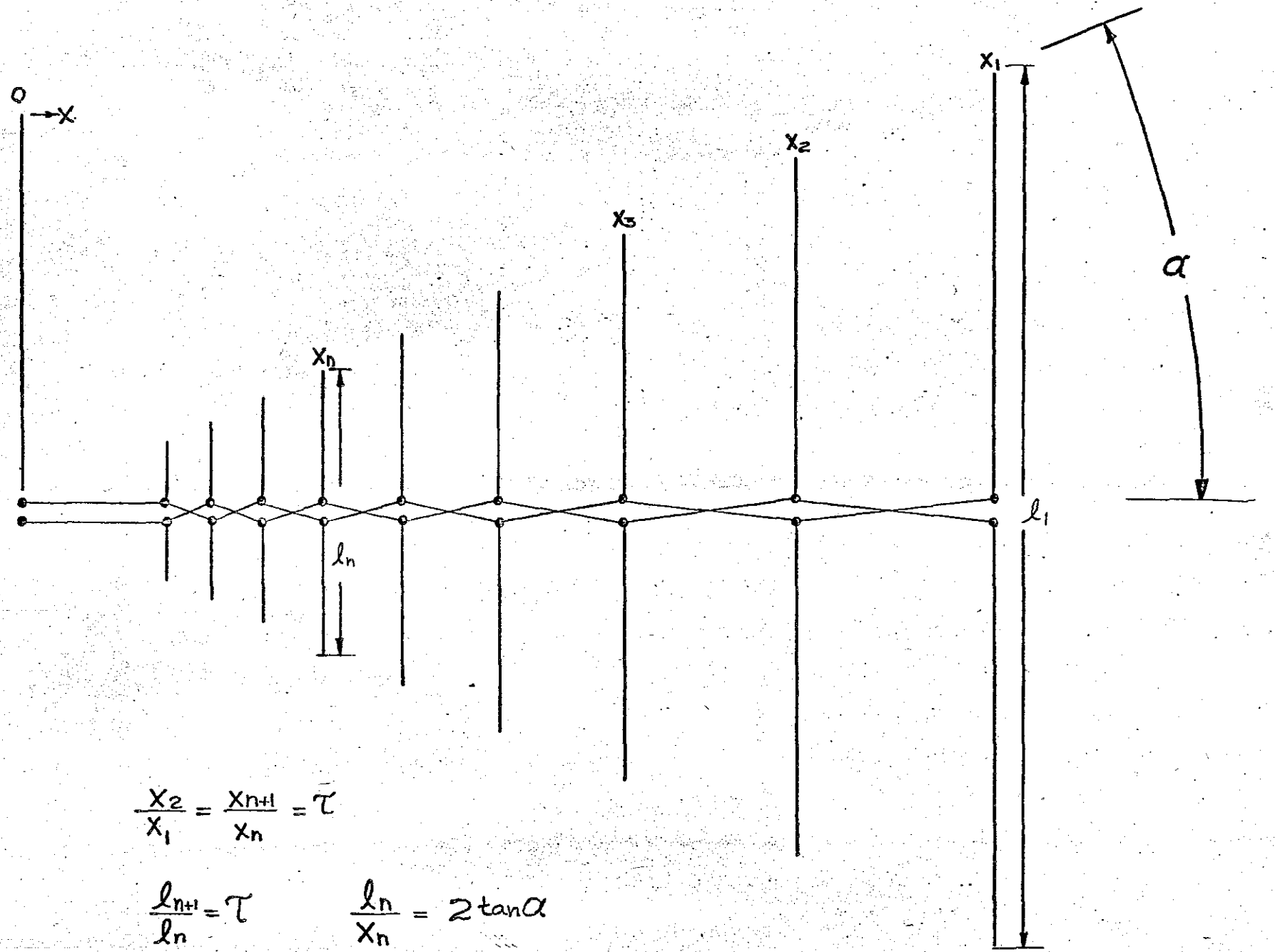
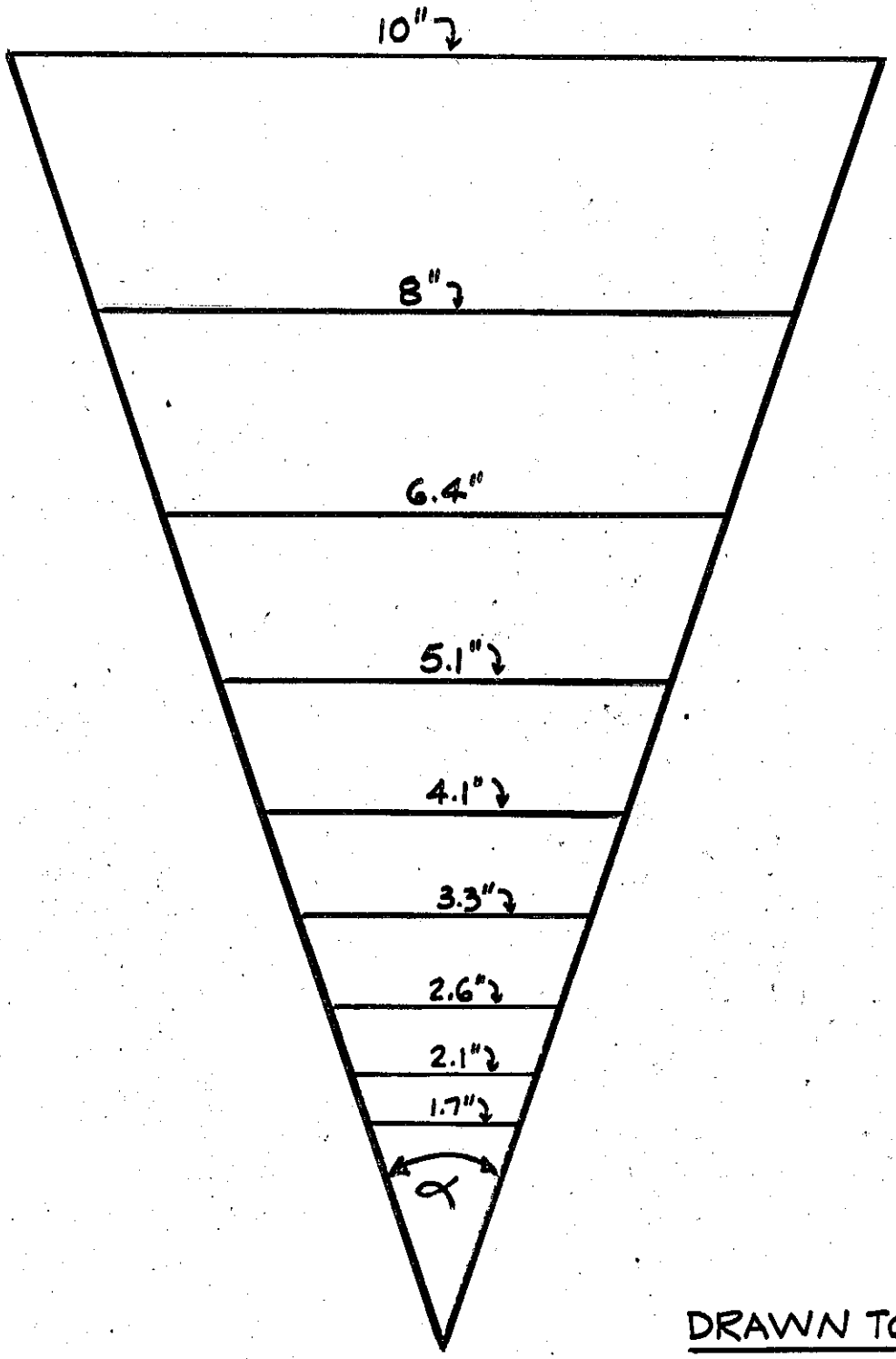


CHART 1

$$\frac{X_2}{X_1} = \frac{X_{n+1}}{X_n} = \tau$$

$$\frac{l_{n+1}}{l_n} = \tau \qquad \frac{l_n}{X_n} = 2\tan\alpha$$

SCALE FACTOR = 0.8



DRAWN TO 1/2 SCALE

CHART 2

IN THE UNITED STATES DISTRICT COURT
FOR THE SOUTHERN DISTRICT OF IOWA
DAVENPORT DIVISION

UNIVERSITY OF ILLINOIS FOUNDATION, Plaintiff, -vs- WINEGARD COMPANY, Defendant.	Civil Action No. 3-695-D

REPLY BRIEF FOR WINEGARD COMPANY

Keith J. Kulie
Donald B. Southard
135 South LaSalle St.
Chicago, Illinois,

Attorneys for Defendant.

Of Counsel:

Edward W. Dailey
Dailey, Dailey, Ruther & Bauer
National Bank Building
Burlington, Iowa

Burmeister & Kulie
135 South LaSalle St.
Chicago, Illinois

April, 1967

IN THE UNITED STATES DISTRICT COURT
FOR THE SOUTHERN DISTRICT OF IOWA
DAVENPORT DIVISION

UNIVERSITY OF ILLINOIS FOUNDATION, Plaintiff, -vs- WINEGARD COMPANY, Defendant.	Civil Action No. 3-695-D

REPLY BRIEF FOR WINEGARD COMPANY

Plaintiff begins with the erroneous representation that the Isbell patent antenna:

> " * * * provides the best solution to date of the problems involved in television reception * * * and particularly those of color television, * * * ".

This naive representation is without foundation in the record. Moreover, Defendant introduced test data of various television antenna structures which were sold prior to 1959 which perform as well as any antenna on the market today, including those intended for use in the reception of color television signals. There is nothing in the record to refute the test data or any related testimony of Defendant's witnesses on this point. Plaintiff did not produce test data to show the performance characteristics of any antenna made in accordance with the strict teachings of the Isbell patent. Accordingly, there is no standard for comparison.

Mr. Winegard testified that the Winegard Company has manufactured and sold the Colorceptor type of antenna since 1954 and produced actual test data to prove that this antenna is very desirable for the reception of color TV signals and that it is sold for this very purpose. Accordingly, since 1954, at least, the "problem" which Plaintiff erroneously sets up has not existed. Plaintiff, of course, is employing the age-old tactic of setting up straw men

which are easily destroyed so that a representation may be made that a (non-existant) problem has been solved. This may be effective in an ex parte proceeding but is not persuasive when presented to those knowledgable in the industry to which the subject matter applies.

There is no showing in the record that Isbell solved <u>any</u> problem for color TV reception. Antennas for use in the reception of color TV signals had been in use long before Isbell's development and many of the same antenna models are still being sold for that very purpose. And, as shown by test data introduced by Defendant, such antennae have performance characteristics that meet <u>every</u> standard of performance which Plaintiff indicates is desirable for such antennas. Accordingly, the Isbell type of antenna is not unique in this sense. If these old antenna structures meet all of Plaintiff's performance requirement tests -- then by Plaintiff's own definition, can there have been a problem?

Taking Plaintiff's representations as made, however, it can be shown that Isbell could not have made an invention:

1) Plaintiff represents that a problem existed in the provision of an antenna for the reception of color TV signals;

2) Plaintiff defines the problem by stating that an antenna suitable for the reception of color TV signals should have certain characteristics:

a) good gain;
b) broad bandwidth (limited to the TV band by Plaintiff's definition);
c) good impedance match;
d) directivity.

Plaintiff then asserts that Isbell solved these problems by providing an antenna structure having desirable performance characteristics and being suitable for the reception of color TV signals. If this is the problem and the solution lies in the provision of antennas that provide these performance characteristics, then the answer has existed since 1954 with the Winegard Colorceptor antenna (DX L-15); the Winegard Interceptor antenna (Patent 2,700,105, DX D-1); the Channel Master K.O. antenna (DX J-6, J-6a); and others. Either the definition of the problem is false, or the problem did not exist. Defendant testified and showed by test data introduced during the trial that the problem as stated by Plaintiff, in fact, did not exist.

Lacking a showing of record as to any real problem we can only guess from the record what Isbell intended to solve. Must we endlessly grope to determine what the subject matter of the invention intended to solve? Shouldn't we look to the patent to determine where the invention resides, if any, and what problems the invention intended to solve? Surely the patent document has some meaning other than merely a license to bring an action in Federal Court.

Further in keeping with the definition of the problem set forth by Plaintiff, we could subscribe to the

theory if there were some showing on the part of Plaintiff that there were many attempts on the part of Defendant to solve the problem -- there is not such showing. If there had been some indication of other attempts and failures by Defendant to provide an antenna suitable for the reception of color TV signals then the definition of the problem might be believable. However, the only showing in the record toward this end is the impressive test data introduced by Defendant on its Colorceptor antenna (DX M-1) showing that the performance characteristics of this antenna model, which has been sold in one form or another since 1954, at least, were <u>better</u> than any other antenna involved in this litigation. Accordingly, the Colorceptor antenna (DX L-15, M-1), by Plaintiff's definition, has:

> " * * * provided the best solution to date of the problems involved in television reception and particularly those of color television reception, which are especially stringent."

Plaintiff naively suggests that the Isbell structure has gained acceptance in the commercial TV antenna industry and erroneously equates this use to Defendant's antenna production.

There is nothing in the record to show any prior production or commercial failures by Defendant of any of its many antenna products. If such were the case, Plaintiff may have made a believable representation. However, because Defendant has always been moderately successful in the antenna field, for whatever reason, he should not now be penalized for this success. If Plaintiff had pursued this point they would have discovered that the Winegard Company was equally successful in as many ways between 1954 and 1960 as it has been from 1960 to present. Accordingly, the naked mention or reference in any way to Defendant's business activity is meaningless.

It often has been held that to show commercial acceptance or to rely on this secondary test of invention in any way tending to show that an invention exists where there otherwise is doubt (as Plaintiff must feel) it must be shown that the commercial acceptance was the result of the use of the structure alone and is not attributable to any other reason. There is a significant absence of testimony

on this point. Perhaps Plaintiff was aware that the position could not be established.

There are many reasons why a company may be successful with a given product in the market. For example, one of the reasons why the Chevrolet automobile has good market acceptance is because they are manufactured by General Motors Corporation. If the same identical car were made by the Winegard Company it would be ridiculous to assume that it would provide serious competition to the Chevrolet. The good will associated with a corporation is a significant factor in the market. A massive and expensive sales and marketing campaign may be made to launch a product in the market or to pick up sales of a lagging product. It can be shown that sales of products are a direct function of the promotional activity associated with the product. One huge contract may contribute significantly to the sales of a product over a short period of time. Product pricing in the market is still another significant factor in the acceptance of a product in the market. Performance of a product still is a further sales factor to be considered.

Plaintiff's record in the present case is significant in that it does not include one word involving the above factors. Accordingly, the mention of Defendant's production activity in any of its antenna lines without consideration of more is absolutely meaningless, naive, and is misleading in that it suggests a fact situation to exist where the

record is absolutely devoid of comment on the issue, presumably deliberately so.

In Clark v Wright, 162 F2d 960 the court observed that " * * * the courts have repeatedly said that success is not a reliable test of invention * * *". This approach is restated in the recent Graham v Deere, 383 U.S. 1, decision of the Supreme Court of the United States where, after referring to the arguments relating tc commercial success, the court stated:

> " These factors do not tip the scales of patentability ".

Thus, while the secondary tests of invention may be logically significant and easier to handle than the technical aspects of the subject matter of the patent, the court was not prepared to substitute them for the result of its own independent assessment that the patent subject matter was just too clear to be unobvious (35 U.S.C. 103) -- no matter how much long felt want, commercial success, or the like might exist. It is equally interesting to note that there is not showing of a long felt want in this case other than a question by counsel for Plaintiff to one witness asking whether in his opinion there was a "need" for an antenna of the type set forth in the Isbell patent (R 324). The "need", if any, referred to by Mr. Turner was for use in connection with Air Force activity and not for color TV use. Accordingly, there again is no showing of record of any problem in the

field of TV antennas, any need for an antenna of any type let alone the type shown by Isbell, or that the Isbell antenna was an answer to any problem or any need. Absent this showing one is inescapably led to the conclusion that if a problem didn't exist, Isbell couldn't have solved it; if a need didn't exist, Isbell could not have satisfied it; if the "long felt want" did not exist, Isbell could not have satisfied it. Where is the showing of the type necessary to support any of the secondary tests of invention. Defendant submits that in this case the only appropriate test of invention to be used is that set forth in 35 U.S.C. 103 and it is further submitted that the Isbell development was indeed obvious when considered in light of the prior art shown to exist. This is particularly true if the invention as defined in any of the claims of the Isbell patent are considered as in any way including any of the accused infringing structures.

In the "Statement of Facts" Plaintiff establishes the basis for the curious syllogism referred to in Defendant's main brief. First, the performance characteristics must be provided as the initial premise, i.e.:

1) gain (first full paragraph, p. 3);
2) directivity (pages 3-4);
3) impedance (pages 5-6); and,
4) broad bandwidth (pages 6-7).

Defendant introduced test data during the trial which clearly showed that various prior art antennas satisfied each of the above performance characteristics in the same way, or better, than the accused antennas. If these characteristics are to be the measuring stick of the invention it then is shown by Plaintiff's own definition that the invention existed in the prior art at least as early as 1954 and certainly before Isbell ever became involved in the development of the antenna of the patent in suit.

The Channel Master K.O. antenna (DX J-6, J-6a) test data (DX K-1a1-6, K-1b1-6) as testified to by both Mr. Shelledy and Mr. Winegard, showed that the K.O. antenna had very good gain characteristics; had the best front to back ratio (directivity) of any antenna involved in this litigation; had a good impedance match across the band and provided a bandwidth suitable to cover channels 2 to 6, the same as the accused antennas. Accordingly,

Plaintiff's performance characteristics are all met with the K.O. antenna which was on sale as early as 1955.

Plaintiff blandly states: "But this K.O. antenna is different -- it has folded dipoles and not linear dipoles." Initially, there is nothing in the Isbell patent that states that one cannot use folded dipoles. Plaintiff has introduced this concept for the first time in this trial. It then is suggested by Plaintiff that no one skilled in the art would know how to substitute linear dipoles to get from one structure to the other -- if you wished to do this. However, Dr. Yang, Mr. Winegard and Mr. Shelledy all testified that anyone skilled in the art would know what modifications would be required to substitute linear for folded dipoles (R492, 515, 442). In fact, test data were introduced during the trial which clearly indicated that there was no significant difference between the use of the K.O. antenna either with folded or linear dipoles (R 265-271). Accordingly, Defendant supports its position with actual test data and Plaintiff employes the unsupported testimony of witnesses on this point.

It also should be observed that all of Plaintiff's repeated references to the performance characteristics of the antenna as being the real measure of the invention are meaningless. The invention stated in this way involves the function of the product. It long has been held that the function of the product cannot be patented. Westinghouse v

Boyden, 170 U.S. 537 (1898). The patent laws provide protection only for structures, compositions of matter, processes, and the like. Accordingly, the function or performance characteristics cannot be subject to protection under the patent laws of the United States. Meaningful reference to the invention must be made to the structure only and accomplishment of the function but with a different structure and by a different mode of operation will not be sufficient to give rise to invention. If a person were able to patent the function of an apparatus, then it readily can be seen that all means of performing the same function would be protected and further development in the field would be precluded. This is not the intent of the patent laws nor is it involved in any way in any statutory expression of the patent laws. Accordingly, Plaintiff's repeated references to performance are not definitive of the invention but only of the function which Plaintiff hopes will be taken as a definition of the invention but which cannot under the patent laws.

Still another prior art antenna that meets all of the requirements noted by Plaintiff as being desirable is the Winegard Colorceptor antenna (DX L-15). Test data (M-1) introduced during the trial clearly show that this antenna has performance characteristics with respect to gain, directivity, impedance match across each channel and across the band that are as good as, or better than, any antenna on the market and it is superior for use

in the reception of color TV signals.

Plaintiff's repeated reference that a problem existed with regard to the reception of TV signals, either black and white or color, is purely imaginary and apparently existed only with Plaintiff since many companies in the industry have been making antennas that satisfied all of the requirements set forth by Plaintiff since the early 1950's. Moreover, these antennas were made without compromise techniques as suggested by Plaintiff. Each manufacturer, including Defendant, continually exerts research, development and production effort to make the best product possible within each price range. The compromises are made in the low price antenna lines to still provide good performance while making a profit on a low price item. This type of compromise, however, is not unique to the antenna industry but exists in every industry, except, possibly those involved in cost-plus contracts. Accordingly, the "compromise" suggestion made by Plaintiff not only is not supported in the record but is without foundation otherwise.

In a conclusory comment in the "Statement of Facts" section of Plaintiff's brief the nature of the Isbell invention is summarized as follows:

> "The antenna of the invention provided a solution to the problem of satisfactory television reception, particularly color television signals, in that
>
> (1) one broadband antenna could be made to cover the entire television broadcasting band,

(2) including UHF channels, if desired,

(3) with a uniformly high gain across the band, thereby eliminating color deterioration problems.

In addition, the antenna requires only

(4) one transmission line to the television set, eliminating impedance matching problems and, in addition,

(5) has unidirectional directivity which can be used to eliminate ghosts and other unwanted signals."

The above summary statement of the invention, of course, is not the subject matter defined in the claims of the patent in suit. It is axiomatic that only the claims of a patent can be infringed and not any functional representation by Plaintiff, or any party, which provides a "capsule" summary of its impression of the inventive concept, if any. However, taking Plaintiff's capsule summary of the invention it is to be noted that each and every element, singly and in combination, was shown at the trial to have existed prior to the time of the Isbell development. Accordingly, if this truly is Plaintiff's position as to the inventive concept, then, by ~~the, but~~ its own definition, an inventive concept could not exist.

Plaintiff more appripriately stated the subject matter of the Isbell development in the Findings of Fact submitted prior to the trial:

> (Finding 26) " * * * the Isbell antenna contains a number of dipole elements arranged in substantially planar, parallel arrangement to form an antenna array. The lengths of the

> dipoles vary from one end of the antenna to the other in accordance with a scale factor, a constant less than one, which is used to establish the length of adjacent elements. Having determined the length of the longest element to correspond with approximately one-half wavelength at the lowest desired frequency of operation, the adjacent shorter dipole is determined by multiplying the length of the longest element by the scale factor. The length of each succeeding dipole is determined in turn by multiplying the length of the preceding dipole by the scale factor. In the preferred theoretically unlimited version, the spacing between adjacent elements also varies in the same manner, being determined by multiplying the longest spacing, i.e., between the longest dipoles, progressively by the scale factor to fix the spacings between the shorter elements." (Emphasis added).

This inventive concept is phrased in a different way at page 8 of Plaintiff's main brief using the "cell" concept as a measure:

> " * * * the Isbell antenna is a true log-periodic antenna * * * in which the 'cell' is a dipole plus a section of transmission line. In order to satisfy the requirement that successive cells in an ideal log-periodic antenna are similar in shape * * * the spacing between adjacent dipoles ideally varies in the same manner as the dipole length."

The above statements of the Isbell disclosure define the subject matter set forth in the Isbell patent. Accordingly, anything which attempts to reach beyond the disclosure of Isbell cannot be the contribution of Isbell. Plaintiff, of course, must attempt by some means to extend the scope of the claims of the Isbell patent to include anything that is not otherwise included, if it hopes at all to achieve its ends in this law suit. This is a common and recognized

task of any patent owner -- otherwise there would be no lawsuit since the accused antennas, by Plaintiff's own statements, are not otherwise within the claims of the Isbell patent.

Of the elements set forth in Plaintiff's summary statement of the invention (brief, page 7) the following were shown to exist in the prior art:

(1) A broadband antenna made to cover the entire television band.

a) The Channel Master K.O. antenna covered the television band; (DX J-6)

b) The Winegard Colorceptor antenna covered the entire television band; (DX L-15)

c) Telrex antenna covered the entire band. (DX B-6)

(2) UHF channels were not widely used during the middle fifties, however, antennas were available to receive signals in this area AND it should be noted that the Winegard Company UHF antenna are not accused here as infringing.

(3) Antenna with uniformly high gain across the entire band.

a) The Channel Master K.O. antenna had uniformly high gain across the entire band; (K-1a 1-6)

b) The Winegard Colorceptor antenna (DX L-15) had uniformly high gain across the entire band with gain increasing with frequency -- a desirable characteristic for good TV signal reception which is <u>not</u> a characteristic of the Isbell patent antenna.

(4) An antenna requiring only one transmission line to the television set, eliminating impedance matching problems.

EVERY ANTENNA DISCUSSED AND INTRODUCED INTO EVIDENCE BY DEFENDANT HAD ONLY ONE TRANSMISSION LINE TO THE SET!

a) Winegard Colorceptor (DX L-15);
b) Channel Master K.O. (DX J6);
c) Winegard Interceptor (DX D-1);
d) Telrex antenna (DX B-6);
e) White patent antenna (DX E-3);
f) Winegard experimental antenna model (DX L-14).

(5) An antenna with unidirectional directivity which can be used to eliminate ghosts and other unwanted signals.

a) The Channel Master K.O. antenna was described as having a very good front to back ratio (directivity);

b) The Winegard Colorceptor antenna was shown to have good directivity characteristics to eliminate unwanted signals.

The conclusion to be derived from the above is that Plaintiff's representation of what the invention might be is necessarily broader than any disclosure set forth in the Isbell patent and cannot be a definition of the concept set forth in the claims of the Isbell patent. As was clearly noted in The Texas Company v Globe Oil and Refining Company, 225 F2d 725 (C.A. 7 1955):

" * * * the scope of the grant is measured by the claim * * * (and) * * * such grant cannot be broader than the invention described in the specifications. * * * "

Plaintiff notes that a departure from the disclosure of the Isbell patent may be realized. There is no reference in the Isbell patent which suggests this. Isbell carefully defines his antenna structure and does not suggest that you may depart from the log-periodic concept and still retain the benefits of unlimited frequency coverage. Moreover, as noted in Defendant's main brief, the log-periodic concept was developed by Rumsey, DuHamel, and others, prior to Isbell. The only thing that Isbell did was to apply the Rumsey and DuHamel work in making another form of log-periodic antenna (the premise of which was clearly suggested by others) but he stayed within the strict teaching of the log-periodic development of others.

If the Isbell patent antenna is modified to a form not literally within the claims or teaching of the Isbell patent will it still be within the patent grant as Plaintiff suggests? This is a curious premise without basis in fact. How far can you modify before you depart from the coverage of the claims? Where does the Isbell patent protection stop? Plaintiff provides no guide lines to determine this, nor does the patent. The patent laws require that a patentee must expressly and distinctly claim his invention. Plaintiff would have this court discard the law and substitute for it some other concept that proposes that the invention be whatever they say it is and let's not bother with claims. This is an Alice In Wonderland approach.

Plaintiff represents that the Isbell development was the first log-periodic dipole array to provide frequency independent operation and that frequency coverage is "determined by the lengths of the shortest and longest dipole elements, respectively, in the group or array." Indeed, among the many definitions of what the Isbell invention may be, if this is the definition, then the accused antennas cannot infringe because the frequency coverage of the Winegard Company antennas is not determined in this manner. The Winegard antennas all require parasitic elements to provide reception in the VHF TV band, channels 2 to 13. It should be observed, however, that there is nothing in the Isbell patent which suggests this mode of operation (of the Winegard Company antennas) as having been contemplated by Isbell. In fact, the teaching of the patent is exactly opposite! Isbell was focusing upon providing an antenna array which would be continuous across the band. That is, if he intended to cover the television band, channels 2 to 13, inclusive, he would cut the longest dipole element to channel 2 and the shortest to channel 13 and use the dipole length and spacing scale factor to determine the remainder of the array. This is the only disclosure in Isbell for making an antenna of any kind. There is no other way to make an antenna and follow the teachings of the Isbell patent. There is no teaching

in Isbell that would show one how to make an antenna of the type accused as infringements in this trial. Plaintiff seeks now, by hindsight, to recover what could not be protected during prosecution of the Isbell patent. It often has been held that a patentee may define his invention in any appropriate way during the time of prosecution of the application and that once he has exhausted his administrative remedies, or alternatively, accepted the final decision of the administrative agency, then he is precluded from defining his invention in a different way.

As a matter of fact, the Isbell patent specification expressly negates the Winegard Company type of antenna structure which is accused as infringing (col. 2, lines 60 ff):

> " * * * 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."

The accused antenna structures are the "parasitic type" noted in the Isbell patent specification and it is apparent from the face of the document that he did not contemplate this antenna structure even though he was, in fact, aware of it at the time the application was filed. There can be no clearer representation than that which is quoted above from the patent that the parasitic type of antenna was diametrically opposed in design concept to the structure contemplated by Isbell and he expressly excluded the "parasitic type" of antenna as not involved in his work.

Plaintiff's Summary of Argument

1. Plaintiff notes that there were no guideposts which led Isbell to his development. This, of course, contradicts the testimony of Plaintiff's witnesses Dr. Mayes and Mr. Harris relating to developments by Rumsey, DuHamel, and others, all before Isbell. This point is covered in Defendant's main brief, however, and will not be re-discussed here.

2. There is no proof of record to affirmatively establish that

> " the accused antennas were designed by Defendant's president after reading Isbell's publications ".

The only statement of record to this point is that Mr. Winegard COULD NOT RECALL when he read the Isbell publications, although he indicated that he did indeed recall having read them at some time, as he reads many other technical articles and publications in the field (R 464). Accordingly, this representation by Plaintiff is absolutely false and unsupported by the record and the reason for presenting it in this manner is not only not understood but is disappointing.

3. Plaintiff's quote from one of Defendant's promotional flyers is interesting. However, Plaintiff, and

this Court, recognized the nature of such statements and there is no testimony otherwise in the record which would prove the point that Plaintiff seeks to make by this representation. In addition, it is to be noted that the quotation refers to the accused antenna models using the "impedance correlators" or zig-zag feeder lines and not to any other of the accused antennas. The overall length of the antenna is reduced because of several design features of the antenna none of which relate to anything set forth in the description of the Isbell patent. The concluding statement of this numbered paragraph is also interesting, even though untrue, to wit:

> "The evidence proves defendant could not have come close to this boast without the Isbell invention."

It would be interesting to have Plaintiff identify <u>any</u> portion either of the Isbell patent or the file history of the Isbell patent which anywhere discusses the zig-zag feeder line of the Chromatel antenna models. Plaintiff has, at best, misunderstood the significance of this advertising reference and has erroneously applied it to some other structural feature of the accused antennas.

The remaining paragraphs of the summary are discussed in other portions of this reply and will not be commented upon here.

Plaintiff's statement that the VHF television band is "considered broadband" does not correspond to testimony introduced during the trial. On page 12 of the brief, Plaintiff notes that the portion of the accused antennas which are operative over the low VHF TV band (channels 2 to 6) are the subject matter of this suit. These channels lie within the frequency band of 54 to 88 megacycles. This is a bandwidth of 54/88 or 1.6 to 1. By any definition given during the trial, this was not considered a frequency independent antenna. Dr. Yang clearly testified that anything less than 2 to 1 bandwidth was not considered a frequency independent antenna. Various definition were given other than Dr. Yang's which characterized such ranges as being in the nature of 10 to 1 up to 1,000 to 1 and higher. Accordingly, 1.6 to 1 cannot be considered frequency independent in the meaning of the Isbell patent. However, if it is considered to be such Isbell did not make this contribution to the antenna art since very effective antennas for the reception of television signals over the entire TV band (channels 2 to 13) were in existence in the early 1950's. Accordingly, if this is Plaintiff's definition then it is an inexcapable conclusion that Isbell did not develop an antenna to satisfy this requirement. There were many other structures that met this requirement prior to Isbell's antenna development.

On page 13 of Plaintiff's brief, an attempt is made to further simplify the earlier summary statement of the Isbell invention by stating that the basic structure (as defined in the patent claims) includes:

> " * * * a co-planar array consisting of a number of dipoles arranged in side by side relationship in a plane. Each of the dipoles is connected by a two conductor, common cross-feeder, the conductors of which cross over each other between connections to successive dipoles."

The record is replete with references to antenna arrays or structures having all of the above characteristics, even Plaintiff's witnesses, Dr. Mayes and Mr. Harris, testified that this was in the prior art at the time of the Isbell development. Accordingly, we must look to "something else" to determine what the Isbell invention might be. The above statement is meaningless in determining the inventive concept. Unfortunately, there is no "easy" or "simple" way to resolve the issue of infringement in this law suit, or in any other, as Plaintiff now seeks to do. The infringement issue is complex and requires careful, thoughtful analysis. Plaintiff's easy way out is not the answer.

Plaintiff suggests what we might additionally consider to determine the nature of the Isbell development in the second paragraph following the above quotation where it

it is noted that the other elements which define Isbell's "invention" are:

(1) dipole length and
(2) spacing between the dipoles.

The additional definition, however, is shortened in that it also should have included reference to the fact that the length and spacing scale factors are constant and are equal to each other, as clearly set out in the specification. If the patentee wished to define his invention in any other way he had ample opportunity to do so before the Patent Office. Failing to do so, he now is precluded from seeking protection for anything that he did not or could not define while the application was pending in the Patent Office. To do otherwise would be to have this court re-define the invention, if one exists.

It is suggested on page 14 of Plaintiff's brief that "Mr. Harris selected as a representative infringing antenna the * * *Chromatel 100, * * *". The fact is that the Chromatel 100 antenna model of Defendant's line of antennas is unique in that it is the only antenna model with the spacing characteristics that Plaintiff could in any way show were approaching anything set forth in the Isbell patent. The reason that the Chromatel 100 model doesn't infringe is set forth in detail later in this reply brief. However, Plaintiff's suggestion that it is representative of the accused antennas is an incredible stretch of the imagination, if not a deliberate misrepresentation. No other antenna model has the varying spacing characteristics used on the Chromatel 100 antenna model. No other antenna model has the decreasing spacing characteristic of the Chromatel 100 antenna model. No other antenna model has the spacing reduced toward the front like the Chromatel 100 model. This court, of course, is familiar with the normal usage of the term "representative" and Plaintiff presumably hopes by its inaccurate reference to suggest to this Court that the remaining accused antenna models are similar to the Chromatel 100 when, in fact, they are so different that Plaintiff elected not to discuss them with

the same attention given to the discussion of the Chromatel 100. The reason for this approach? A discussion of the other antenna models would not have provided an effective demonstration since the spacing either does not vary at all or it actually increases toward the front of the antenna. The suggestion, therefore, that the Chromatel 100 antenna is representative of the other accused antenna models is misleading.

In a continued discussion of the dipole length and spacing factors Plaintiff notes (p. 14) that Mr. Harris testified that the fact that the dipole length scale factor varied along the array of the accused antennas and that the spacing factor was constant and therefore it did not vary and was not less than 1 was not really important. This is, of course, interesting but it is the patent we must look to for definition of the invention, if any, and not to Mr. Harris' testimony. There is no indication in the patent, or even in the file history, which states that the dipole length or spacing were not important or that there were differing degrees of importance with respect to each. On the contrary, Isbell clearly sets forth specific design parameters for both length and spacing in the patent and, in addition, Isbell argued before the Patent Office that length and spacing were important and that they should be constant, less than 1 and equal to each other.

Accordingly, if Isbell states that dipole lengths and spacing factors are important and the witness Harris says they are not -- whom do we believe? Was this Isbell's development or Harris'? If Plaintiff had still a different expert witness to present its case, would the definition of the significance of dipole length and spacing scale factors be still different from those above? Is the significance of these factors to be taken from the patent or is it a function of a witnesses testimony?

If we look to the patent, the answer is clear, length and spacing factors are constant, are less than 1 and are equal to each other. Further, there is no distinction in the patent as to the relative importance of each -- the assumption being that they are equally important. If they were not, Isbell would have said they were not.

If we look to the testimony of any witness, first we must learn the witnesses position and then, if it contradicts with the patent disclosure, we would have to ignore the patent disclosure and accept the testimony of the witness as "now explaining what the patentee really had in mind". Surely, a patent document has more significance than to be reinterpreted by each witness with a subjective definition of terms. If the patent document is clear on its face as to the meaning of terms, how can we possibly accept any other meaning given at a later time by a person who is not the patentee?

Plaintiff suggests that the uniform spacing between dipole elements resulted from practical considerations in the manufacture of a commercial product and suggests (as was done during the trial) that it is easier to provide uniform spacing than it is to provide varying spacing. Plaintiff's source of naivete at times seems boundless. A punch press or a drill is not able to distinguish whether it is providing an opening in a piece of metal at 11 inches from another opening, 12 inches from another opening, or any other distance. Once the "set up" is made for any run of antennas it remains unchanged for the effective life of the tool or until completion of the run. The operator of the machine is fully capable of setting the machine up in any manner directed. Accordingly, any set up is equally difficult, or equally easy, depending upon how you wish to define the task -- there is no distinction. Plaintiff's argument can be equated to the statement: It's easier to drive a car than it is to drive a car. Neither this sentence or Plaintiff's statement make any sense.

It also is interesting to note that Plaintiff's reference to Dr. Yang's testimony that the accused antennas were not log-periodic antennas and were not within the teaching of the Isbell patent was supported by

Plaintiff's witnesses when they tesitifed that with the spacing characteristics of the accused antennas (i.e. constant spacing between the dipole elements) a frequency independent antenna array could not be provided. Since, as noted by Plaintiff, the Isbell patent is directed to the provision of a unidirectional frequency independent antenna structure, then, according to Plaintiff's own witnesses, the accused antennas are not of this type. Therefore, Dr. Yang's testimony was corroborated by Plaintiff's witnesses.

In spite of Plaintiff's failure on cross examination of Dr. Yang to elicit testimony that one could vary the log-periodic design principle of the Isbell patent and still follow the teaching of Isbell, the statement is made in the brief that Dr. Yang testified to this! (PB 15, with reference to R 526-7). This is a clear misrepresentation of the actual record and the reason for this statement, and others in the brief, is not clearly appreciated. Plaintiff's position can be presented without erroneous extracts from the record.

Dr. Yang, as noted in Defendant's main brief, testified that one could vary within normal manufacturing tolerances (1%, or the like) and still have log periodic performance but substantial variations from this would not provide this performance. Plaintiff's characterization of

Dr. Yang's testimony, while doubtless necessary to Plaintiff's case, is in error and without foundation in the record.

Plaintiff asserts that, under the doctrine of equivalents, the accused antenna models are infringements of the claims of the Isbell patent even though they are not literally involved in these claims. They then proceed to revert to the syllogistic reasoning which attempts to state the "invention" in broad terms with hypothetical statements as required in such reasoning. As pointed out in Defendant's main brief, the categorical statements setting out the premise for the syllogism are improper and, accordingly, the conclusion is improper. However, it does involve an attempt to find infringement where otherwise none could exist if we refer only to the claims of the patent rather than to Plaintiff's hypothetical statements.

Plaintiff's representation as to the doctrine of file wrapper estoppel does not represent the majority view in this country. Plaintiff states that estoppel arises only when (page 19):

1) a claim in an application has been rejected;

2) the claim is amended or cancelled in response to the rejection;

3) the amendment or cancellation results in allowance of the application.

By this definition arguments made during the course of prosecution in the Patent Office would not be considered. This has been a point of difference between the various circuits. It is submitted that since the inventor presumably knows more about his invention than anyone else, statements that he has made which concern his invention should be of some help in determining what the claims means and in interpreting the claims. The Second Circuit stands alone in refusing to consider the arguments presented in the Patent Office in support of an applicant's position as to claims for which he seeks allowance. The remaining circuits disagree with the Second Circuit for reasons similar to those set forth in Cincinnati Milling

Machine Co. v Turchan, 208 F2d 222, 227, CA 6 1953:

> "While conceding that extrinsic aid to construction may be accepted with caution yet if within the difficult art of claim draftsmanship terms are employed in an effort to avoid prior art, which are susceptible of construction, there should be no more reluctance to search for precise meaning than in a private contract."

It seems clear that an inventor's appraisal of his invention as explained to the Patent Office is probably more valuable and reliable than any statements made during a trial and than the conflicting views of opposing experts.

In New York Asbestos Mfg. Co. v Ambler Asbestos A.C.C. Co., 103 Fed 316, 320, Cir. Ct., E.D. Pa. 1900, aff'd 112 Fed. 1022, CA 3, 1901, the court stated:

> "(We) are bound to notice such statements and admissions as were made by applicant in the course of the proceedings (in the Patent Office) in order to obtain his patent as (having) any bearing upon the scope of invention, and on the question of what are the essential features of the patent asked for and granted. Definitions and admissions made by an applicant in order to avoid the state of the art as adduced by the office are always binding on him."

It also should be observed that file wrapper estoppel may arise as a result of acts in the Patent

Office which do not directly involve amendments to the claims are arguments made by the applicant. One such example involves statements made in an interference proceeding which can be used to create an estoppel. Cardox Corp. v. Armstrong Coalbreak Co., 194 F2d 376, CA 7, 1952, cert. den. 343 U.S. 979, 1952.

Plaintiff in the paragraph entitled "5. Tabular Summary of Infringement" on page 22 of its brief states that all of the accused Winegard antenna models literally infringe claims 14 and 15 of the Isbell patent here in suit. Group V antennas (actually only the Winegard Antenna Model CT-100) is further claimed to literally infringe other claims as well -- i.e., claims 1, 2, 9, 10, 11 and 12. Table 2 on page 23 of Plaintiff's brief purports to set forth the various elements of claims 14 and 15 and a tabulation of the accused Winegard antennas to indicate if they do or do not include corresponding elements.

A review of the record will show that Plaintiff is sadly in error. Claims 14 and 15 require that the dipole lengths decrease in accordance with a "substantially constant scale factor". Recognizing that the accused Winegard antennas do not exhibit such "constant scale factors" for the respective dipole lengths, Plaintiff, in an apparent attempt to obscure as much as possible the obvious deviation present in the Winegard antenna models, resorts to averaging the various computed figures and thereby substantially reduce the apparent non-conformance. Even with the "averaged" figures computed by Plaintiff, however, it can hardly be argued with any conviction that

there is infringement ~~evident~~ -- literal or otherwise. A review of the various deviation figures in the various Winegard antennas, be they the artifically averaged or the actual values, shows conclusively that there is no infringement. The point can be more clearly illustrated by reference to the tabulations set forth in the tables on Appendix I at the back of the present brief. The three-columnar table (A) on the left indentifies the particular exhibit submitted into evidence by Plaintiff, and which identifies one or more Winegard accused antennas along with the deviation figure computed by Plaintiff from the "averaged" length scale factors. The two-columnar table (B) on the right identifies the range of the scale factors as computed by Plaintiff from which the actual maximum deviation may be calculated for comparison with the "averaged" figure. Even with the fictitious "averaged" deviation figures, approximately <u>half</u> of the accused Winegard antennas exhibit percentages above ten percent. The actual deviation figures are seen to be around twice the "averaged" figures, with <u>eight</u> of the Winegard antennas having a deviation in excess of twenty percent. We are not enlightened as to the extent of deviations Plaintiff deems permissible anywhere in the record. We do have testimony on this point by Dr. Yang. On cross-examination, Dr. Yang, was questioned as to the extent of variation permissible in a log-periodic or frequency independent

antenna and, in answer, stated:

> "A. Well, if you say they are within 1 per cent from the formula, I would say probably no significant difference. If you say 5 per cent, maybe. If you say 20 per cent, I have to say no." (R 533).

This stands uncontradicted in the record. Plaintiff nevertheless maintains there is literal infringement of claims 14 and 15 by each of the accused Winegard antennas.

Moreover, in claim 15 a specific limitation requires that the length of the elements decrease from one end of the feeder to the other in accordance with a substantially constant scale factor within a range of 0.85 to 0.95. A review of the above tables show that the accused Winegard antenna models B-105, B-335, 10B200, 10B300, 10B400, 10B1050, 10B1010, 10B1020, 10B1030, 10B1040, CT-40, CT-80, CT-90, 1oB1130, and CT100, all include one or more computed length scale factor figures below a value of 0.80. As a point of interest,by Plaintiff's own computations, the entire computed figures for the Winegard model B-105 are substantially below the limit 0.80. Yet, Plaintiff claims literal infringement by each and every one of the accused Winegard antennas.

In both claims 14 and 15, a "cell" is defined as a dipole and the feeder between it and the adjacent dipole with the dimension of the cell to be "measured from the

point of connection of one dipole and the feeder to the outer end of the next smaller dipole". It is emphasized that this is the extent of the teaching for the term "cell" in the patent in suit. The specification and drawings of the patent in suit are absolutely devoid of any explanation relating to this term. From the language that is present in these two claims, a number of differing interpretations can be seen to be evident. A graphic representation of these various but differing interpretations is set forth on the Chart included on Appendix II at the back of the present brief. Only six of the possible interpretations of the claim language in question are shown diagramatically in Figures A through F, although it is to be understood that there are others still. Since Mr. Harris selected the Winegard model CT-100 (Px 44) for extensive analysis, we deem it appropriate to use the rear two dipoles of this antenna for comparative analysis. It is to be understood however, that the same applies to the other accused Winegard antennas. Only the numerical values for the computations would differ among the various models. As shown on Appendix II, the longest (rear) of the dipoles on CT-100 antenna is 98 inches long, tip-to-tip, and the shorter (second to rear) of the dipoles is 90 inches. The physical spacing between the two dipoles is approximately 7.75 inches and the spacing between the inner

arms of the dipole halves is approximately 2.5 inches. The length of the "zig zag" feeder line is approximately 19 inches.

Figure A represents the interpretation that Plaintiff's Witness, Mr. Harris, placed on the claim language, i.e., the shortest diagonal distance from the inner end of one of the arms of the longest dipole to the outer end of one of the arms of the adjacent shorter dipole. Mr. Harris computed this to be 45.6 inches. We point out, however, that Mr. Harris neglected to take into consideration the 2.5 inch spacing between the inner ends of the respective dipole halves. In actuality, the length of the dipole arm of the shorter dipole is 43.75 inches and not 45 inches. Consequently, the actual figure is not 45.6 inches, but 44.4 inches.

Figure B shows the diagonal distance between an inner end of one of the arms of the longest dipole to the outer end of the arm of the shorter dipole in common with the same feeder line connected to foregoing longer dipole arm. This would seem more logical than the interpretation of Figure A because the claim language specifies that each dipole and the feeder between it and the adjacent dipole constitutes the "cell". The vertical distance in this case is 43.75 inches plus 2.5 inches.

And the computed figure is 46.9 inches (7.75 inches plus 43.75 inches plus 2.5 inches).

It should be noted, however, that there is nothing in the claim language or else where that requires the measured dimension to be that of a diagonal. From the language used, it may as well be the lineal length of the feeder line and the connected dipole arm. Figure C shows the distance or spacing between the dipole element and the length of one of the arms of the shorter dipole to be approximately 51.5 inches (7.75 inches plus 43.75 inches). Figure D shows that the lineal dimension comprising the spacing between the two dipoles together with the length of the arm of the shorter dipole in common with the same feeder line to be approximately 54 inches (7.75 inches plus 2.5 inches plus 43.75 inches).

Furthermore, there is nothing in the claim language, and therefore nowhere in the patent, which teaches that it is the physical spacing between the dipole elements which should be used in the computation of cell dimensions and that the lengths of the feeder lines should be ignored. On the contrary, it is submitted that since the claim language specifies that each dipole and the feeder between it and the adjacent dipole which constitutes a "cell", the more logical view is that it is the length of the feeder

line which is controlling rather than the physical spacing between dipole elements. Figure E shows the lineal distance of the "zig zag" feeder line together with the length of one of the arms of the shorter dipole is approximately 60.25 inches. (19 inches, minus 2.5 inches, plus 43.75 inches) Figure F shows the lineal distance of the feeder line together with the length of the arm of the shorter dipole in common with the same feeder line, to be approximately 62.75 inches. (19 inches plus 43.75 inches).

Thus, we have six different put entirely permissible interpretations of the specific claim language in question, all of which yield entirely different numerical values. What one person may determine is the most logical interpretation may not be shared by someone else. And, there is exactly nothing in the disclosure of the Isbell Patent which in anyway sets forth any guidelines. Who then is to say which interpretation is to be used to the exclusion of the others?

It should be noted that the so-called "cell" concept whatever the method or procedure selected may be applied equally well to antennas which are in the prior art, such as was pointed out for the Channel Master K.O. antenna in Defendant's Main Brief at page 40. Moreover,

although the claim language recites a minimum of three pairs of dipole elements, we preceive no logical basis in the patent or elsewhere for choosing the number three rather than two, or four, or five, or any other number. Reference is made in the patent specification at col. 3, lines 9-12 that three dipoles are needed to provide a suitable front-to-back ratio at the low frequency limit. Plaintiff's own witness, Mr. Harris refutes this. Mr. Harris was asked:

> "Q. Mr. Harris, to your knowledge, would a three element log-periodic antenna have a desirable front-to-back ratio?
>
> A. Over what frequency range?
>
> Q. VHF
>
> A. Over VHF, low VHF? It would not be good. It would be marginal." (R 641)

More likely, three was chosen in an attempt to avoid that rather wide body of prior art antennas which employed twin-driven dipole elements, cross-phased and fed from the front (shortest) dipole element -- e.g., Telrex antenna (Dx B-6); Winegard Power Beam antenna (Dx C-9); Winegard Color 'Ceptor antenna (Dx L-15, C-5), etc. No difference is perceived in the expected operation of an antenna array with three driven elements over that of one with two driven elements in the same way that we expect no operational difference for a flashlight operating on three battery

cells over that operating on two battery cells. Moreover, it was known in the art, and in fact was common practice, to include additional driven elements in an antenna array for added gain, directivity, bandwith or more uniformity of performance across a given band. For example, reference is made to the Channel Master K.O. antenna (Dx J-6 and 6A); Kay-Townes antennas exemplified in the brochure Dx B-3; Trio Royal antenna (Dx B-2). Attention is also directed to the multiple driven element antenna identified in Defendant's exhibit L-14, which both Mr. Wunnenberg and Mr. Winegard testified was constructed and tested in 1956. (R 394-397, 454-456). Moreover, in the instant case, we have the curious anomaly of Defendant Winegard Company being accused of infringement (of claims 14 and 15) without being able to determine just what is being infringed. Not only does Plaintiff claim infringement by the accused Winegard antennas of claims 14 and 15, but takes the posture that there is literal infringement. We can only conclude that infringement, according to Plaintiff's position, is to be determined by what it says infringes. We submit that this is surely not the law.

Plaintiff also claims literal infringement by the Winegard antenna model CT-100 of claims 1, 2, 9, 10, 11 and 12. Claim 1 requires the lengths of the various

dipoles to be governed by the formula $\tau = \frac{L(n+1)}{Ln}$; the spacings to be governed by the formula $\tau = \frac{\Delta S(n+1)}{\Delta Sn}$; and τ being the same in both cases and less than one. In the CT-100 antenna, by Plaintiff's own computations (PX-44), the lengths of the dipoles are seen not to vary according to the above formula but deviates substantially therefrom -- by as much as 17.7%. In addition, the spacings do not vary according to the required formula, but also deviates. As a matter of fact, the spacing between certain of the dipole elements (i.e., elements 3-4 & 4-5, 4-5 & 5-6, and 6-7 & 7-8) not only do not vary according to the required formula, but do not vary at all. That is, they exhibit a spacing scale factor of unity -- directly contrary to the dictates of the claim language. Notwithstanding the foregoing, Plaintiff maintains there is literal infringement. We are at a loss to understand the basis of this position.

The language of claim 9 of the patent here in suit specifies that the dipoles must be of different lengths increasing substantially logarithmically from the connected end of the feeder to the other end. The claim also requires that the spacings between the dipoles increase substantially logarithmically from the connected end of the feeder to the other end. Notwithstanding the specific and positive limitations, there is not one single solitary

word of explanation as to the meaning of the term "logarithmically" to be found in the specification or the drawings of the patent in suit. Nor is there any enlightment to be garnered from a review of the record. Not one of the witnesses, Plaintiff's or Defendant's, testified as to the meaning and possible application of the term "logarithmically". Not one of Plaintiff's witnesses testified that any of the accused Winegard antenna models exhibited lengths of dipoles and spacings between the dipoles which increased "logarithmically". Yet, Plaintiff maintains that the Winegard model CT-100 (Group V) infringes claim 9 of the patent -- and infringes it literally.

Claim 10 includes specific language requiring the adjacent dipole elements of different pairs to differ in length by a substantially constant scale factor and that the spacings between adjacent dipoles to generally decrease from one end of the feeder to the other. As pointed out above, the lengths of the dipole elements in the Winegard antenna model CT-100 do not differ in length by a constant scale factor, but in fact vary between computed values (by Plaintiff's own calculations -- PX-44) of 0.918 to 0.763, or a deviation as much as 17.7%. Moreover, the spacings between one half of the dipole pairs do not vary at all, but have a value of unity. Claim 11 is even more specific in that the spacings are required to differ from

each other by a substantially constant scale factor. Claim 12 is even more specific in that it requires the selected scale factor to be within a range of 0.8 to 0.95. Both the computed values for thelengths and the spacings include figures outside this specified range. Yet, Plaintiff blithely charges literal infringement of claims 10, 11 and 12.

PB 25, 27 - 29

Plaintiff on page 25 of its brief apparently is claiming infringement of claims 1-5 and 10-13 by all of the accused Winegard antennas. It is difficult to ascertain just what Plaintiff is saying from the particular language used. From the reference to certain previous pages of its brief, we infer that infringement is being alleged of the foregoing claims by virtue of the application of the doctrine of equivalents. Table 3 on page 27 of Plaintiff's brief purports to set forth the various elements or limitations in each of the claims and a tabulation with respect to the accused Winegard antennas of whether or not such corresponding elements are to be found therein. The information or representations included in Table 3 of Plaintiff's brief is, at best, confusing in several particulars. For example -- "x" is used to signify that the specific element is present but the symbol "1" used is said to be "value of scale factor." In claim 3, a specific limitation is that "the ends of said dipoles falling on a V-shaped line forming an angle α at its vertex." The symbol "1" is used in the right hand columns under the respective Groups designated for the accused Winegard antennas. However, this symbol is said to indicate "value of scale factor" and we are therefore at a loss to understand the significance. Again, in claim 9 a

limitation requires the spacings between the respective dipoles to increase substantially logarithmically from the connected end to the other end. Yet in the columnar tabulations at the right of Table 3, the symbol "1" is indicated for antenna Groups 1, II, III and IV, -- which is said to mean "value of scale factor". Again, in claim 10, a specific limitation is that the selective spacings between respective dipoles generally decrease from one end of the feeder to the other. The symbol "1" is again employed for Groups I through IV signifying "value of scale factor." We are unable to respond to this aspect of Plaintiff's brief in any meaningful way because the information itself is meaningless.

Concerning Plaintiff's position that the accused antennas are within the inventive concept of claims 1-5 and 10-13, we infer from the language on page 25 of the Plaintiff's brief that reliance is being placed on the opinion of its witness, Mr. Harris, that spacing between dipoles is not important. Reference is made to page 14 of its (Plaintiff's) brief. On PB-14 we are informed:

> "Only a minor effect is manifested by having a spacing scale factor of one because, in the order of importance, in the design of defendant's broadband frequency independent antennas, the element length scale factor was the most important followed by the cell scale factor. The spacing scale factor is the least important," (Citing Harris Testimony on R 132-3)

Mr. Harris did state such an opinion. We would merely point out to the Court that it is simply that -- an opinion -- and nothing more. Nowhere in the specification of the patent are we so informed. Nowhere in the documentary evidence placed of record are we so informed. Nowhere in any of the teachings or writings of Isbell elsewhere (e.g. Px-65) are we so informed. And, we might add, Mr. Harris did not refer to any tests that he or any one else had conducted to lend credence to his statement in any way. As a matter of fact, the record clearly shows the contrary to be the case . . . and by Mr. Harris' own admission. On cross-examination, Mr. Harris was referred to Defendant's exhibit DX A-4(a) entitled "Analysis and Design of Log-Periodic Dipole Antennas" by Dr. Robert L. Carrel prepared at the situs of Plaintiff, The University of Illinois, Electrical Engineering Research Laboratory. Mr. Harris stated that he was familar with the work. Further, he was asked:

> Q. "I refer you specifically to page 163, and may I read it if counsel has no objection:
>
> 'There also exists the possibility of tailoring the directivity characteristic such that the patterns are frequency dependent in a special way. This would require that τ and σ or both be a function of position. * * * In this case σ' should be held constant to achieve a frequency independent input impedence. The above idea was applied to one model in which was fixed at 25

degrees. The spacing between all elements was a constant, one-half inch.'

Does this suggest to you Mr. Harris, that an antenna with constant spacing is not a frequency independent antenna but is, in fact, a frequency dependent antenna?"

His answer was:

"A. Yes, a frequency independence over a narrow band or over a band of frequencies is still not --

Q. We are speaking now of frequency independent antenna in the broad sense?

A. In the broad sense, that's correct." (R 144-5)

Thus, the only documentary evidence of record clearly shows that spacing between respective dipoles in an antenna accordint to the teachings of Isbell is indeed a factor -- and a very significant factor at that. It means the difference, according to the Carrel Report, between obtaining a frequency independent antenna, (the title of the Isbell patent in suit), and a frequency dependent antenna, the exact antithesis of the former which we submit is outside the teachings of the Isbell patent. Mr. Harris on re-direct examination attempted to soften the effect of the above admission concerning the Carrel Report by saying:

"A. * * *The log-periodic dipole array is a configuration which is the true log-periodic antenna and can be made frequency independent to whatever degree a designer desires. However, in the context of the television application, which we have been discussing for the last two days, the band of frequencies of interest are not indefinite, they are specific, and the specific application for the low VHF band, namely,

> from 54 to 88 megacycles represents a bandwidth ratio of approximately 1.6 to 1. When I say an antenna is frequency independent over that bandwidth I mean specifically that the basic electrical characteristics of that antenna remains substantially or essentially constant over that range and that therefore the impedance and the pattern, front to back ratio -- these are the important electrical characteristics we are concerned with in the frequency independent when considered in that text, or context rather." (R 145)

The response is cited at length because the language is rather vague and evasive. We see that Mr. Harris states flatly that the log-periodic dipole array is a "true" log-periodic antenna capable of frequency independent operation over any desired range. However, if we infer his meaning from the above response correctly, he states that, because the bandwidth of the low VHF television band is only 1.6 to 1, a "true" log-periodic antenna is not required. We think the clear import of Mr. Harris' testimony then is that an antenna intended only for coverage of a bandwidth of approximately 1.6 to 1 is not a <u>"broadband" antenna within the meaning and teachings of the Isbell patent</u>. With that we would agree. Both Mr. Turner and Dr. Yang testified that, within the meaning of the Isbell teaching, or just frequency independent antenna generally, a broadband antenna means -- one capable of operating over bandwidths on the order of 10 to 1, or 100 to 1. (R. 313, 326, 496). We submit that it is this meaning that must be applied when reading and interpreting the claims which

specify a "broadband" or "wideband" antenna in the preamble portions thereof.

As to the other elements of claims 1-5 and 10-13 said to be infringed by the accused Winegard antennas identified as Groups I through IV, the same deficiencies are present as previously pointed out with respect to Group V (Winegard antenna model CT-100). Briefly, they may be stated thusly:

1. The lengths of the respective dipoles do not vary according to a substantially constant scale factor less than 1, but deviate therefrom by as much as 20 per cent. (See the table on Appendix I herein)

2. The spacings between the respective dipoles neither vary according to a substantially constant scale factor less than one nor decrease generally from one end of the feeder to the other.

3. The scale factors computed by Plaintiff for the Winegard antennas show values outside the range of 0.8 to 0.95.

With respect to claim 4, a further limitation is recited that the angle formed by the ends of the dipoles falling on a V-shaped line be within a value between 20^{o} to 100^{o}. There is not one single, solitary reference to be found in the record anywhere, either of a documentary nature or by oral testimony of any of the witnesses, which indicates that the ends of the dipoles in any of the accused Winegard antennas fall on a V-shaped line and, if so, what

the value of the included angle might be. Is the Court personally required to measure each of the antennas offered into evidence to determine if the ends of the dipoles in fact fall on a V-shaped line extending from the vertex? And, if found to exist, to determine the value of the angle therebetween? What about the antennas accused to infringe for which there are no physical models available to the Court for inspection and measurement?

As to claim 3, it was demonstrated by Mr. Winegard during the trial (R 700-704, Dx M-2) that if the ends of the dipoles are to fall on a V-shaped line forming an angle at its vertex and if the lengths of the dipoles are to vary according to a constant scale factor, then the spacings between the dipoles must necessarily vary according to the same scale factor. This result is also shown graphically on Chart 2 of Defendant's Main Brief. Since the spacings between the dipoles in the Winegard antennas identified as Groups I through IV are constant, it is not possible to infringe claim 3.

As to claim 9, we reiterate that the patent specification and drawings are completely devoid of any explanation of the meaning of the terminology "increasing substantially logarithmically". We submit to the Court that there can be no infringement if it cannot be

determined what is being infringed. Moreover, the Winegard antennas employ uniform spacings and therefore do not vary logarithmically or in any other fashion.

In claim 10 a specific limitation is that the selective spacings between adjacent dipoles generally decrease from one end of the feeder to the other with the greatest spacing between the longest dipoles. Claim 11 requires the spacings differ by a substantially constant scale factor. In Winegard models 10B1120, 10B1130 and 10B1140 (Dx G-7, 8 and 9), the spacings do not decrease generally and the greatest spacing does not occur between the longest dipoles, but between the shortest dipoles.

We might also point out that with respect to infringement generally that there is a specific requirement in the patent specification that the shortest element (dipole) in antenna array within the Isbell teaching to be approximately 0.38 wavelength long at the upper limit (88 megacycles in this case). It is axiomatic that the claims are to be read in light of the specification. As pointed out in Defendant's main brief, 0.38 wavelength at 88 megacycles is approximately 50 inches. This means that the Isbell teaching requires a dipole element in an antenna array, intended to cover the low VHF television band, which is 50 inches or less. Over half of the accused

Winegard antennas do not meet this limitation.

As pointed out in Defendant's main brief, and as admitted by Plaintiff, the burden of proof on infringement is upon the Plaintiff. We submit that such burden of proof can not be met by merely making an accusation of infringement; by relying on opinion of witness for Plaintiff without any foundation given for making such opinion and which is subsequently contradicted by testimony by that same witness; by simply ignoring terminology in the claim language nowhere explained or defined within the teachings of the patent; nor by employing sumbolic notations in reference to specific claim limitations or elements which are meaningless in indicating whether or not such elements are present in the accused antennas.

Plaintiff presists in it unwarranted, unsupported, and, in Defendant's considered opinion, completely ridiculous contention that the Isbell patent is of obvious utility, as attested to by the sales of such antennas by defendant, citing Plaintiff's exhibit 62. Px 62 is a tabulation in the form of percentages of the accused Winegard antennas as compared to total sales which was compelled by the Court in answer to an interrogatory. Defendant reiterates its position that it has in no way utilized the teachings of the Isbell patent in manufacturing and marketing its antennas. The commercial acceptance of its antennas, both the accused here and those that are not, are due to its marketing and sales efforts and in the good will established in its name.

Not only does Winegard Company not employ the teachings of the Isbell Patent, but we submit that an antenna structure constructed according to the dictates of the Isbell disclosure is in fact unsuited for the purpose of receiving television signals. On direct examination, Dr. Yang was questioned concerning the suitability of designing a television antenna according to the log-periodic principle thusly:

"Q. Dr. Yang, referring to the Isbell patent, as a design engineer, would you consider it desirable to design an antenna for the coverage of television bands using the log-periodic principle?"

His answer was:

"A. This is something of the drawback of the log-periodic antenna. In other words, it gives constant impedance, constant pattern, but does not give you the constant energy capture area or power capture area. In other words, you receive less energy as you go to higher frequency. And, usually, if you are striving for maximum gain or maximum reception power, it is not really desirable to go into the log-periodic antennas as such, because of the drawback just mentioned. "(R 516-7)

And again on cross-examination:

"A. Well, like I mentioned before, I think a log-periodic antenna has the drawback that in your equivalent area the power reduces at high frequency, because we have constant beam, constant impedance, what-not, and this drawback is quite undesirable as far as reception is concerned." (R 536).

There are still other disadvantages that would be involved concerning the use of an antenna constructed in accordance with the Isbell disclosure and intended for operation in the VHF television bands.

Perhaps the point can best be made by reference to the sketches and table as contained in Appendix III at the back of the present brief. The "Antenna A" depicted on the left side of the sheet represents an antenna constructed according to the dictates of the Isbell disclosure. A scale factor of 0.90 was used to determine

the respective lengths of the dipoles and the selective spacings between the dipoles. The Isbell specification at Col. 3, lines 5-9, states that the longest dipole element should be approximately 0.47 wavelength at the lower limit and the shortest element should be about 0.38 wavelength long at the upper limit. An element 0.47 wavelength long at the low end of the VHF television band (54 megacycles) would be approximately 100 inches. This is our starting point. An element 0.38 wavelength long at the upper limit of the VHF television band (216 megacycles) would be about 21 inches. For UHF, the shortest element should be less than 5 inches.

As seen from the line drawing for Antenna A, at least sixteen dipoles are required to cover the VHF television band, starting with a dipole having a length of about 100 inches and ending with one slightly less than 21 inches in length -- when using a scale factor of 0.90. The VHF portion of "Antenna A" is shown in solid black line. For convenience, the UHF portion of the "Antenna A" is shown in solid red line. The lengths of the respective dipoles, the distance from each dipole to the base line (or apex), and the spacing between the dipoles is shown in the table as indicated.

For comparison purposes, the Winegard antenna model CT-40 (Dx G-10, Px 1, 39) is shown at the upper right

of the sheet. For conformity, the VHF dipole driven elements are drawin in solid black line, the UHF portion in solid red line and the parasitics in dotted line. Both the "Antenna A" and the Winegard CT-40 antenna were drawn to scale (As indicated at the lower right hand corner of the sheet) to enable a comparison of the physical sizes.

As will be seen from the sketches, the antenna constructed according to the Isbell disclosure dictates requires 16 dipoles to cover the frequency range while the Winegard CT-40 antenna requires only 4. The axial length of the "Antenna A" between dipole No. 1 and dipole No. 16 will be seen to be approximately 85.2 inches (107.3 inches minus 22.1 inches -- as taken from the column headed "Distance to Base Line "X") -- over seven feet. The Winegard CT-40 antenna has an axial length between the rear dipole element No. 1 to the parasitic element immediately in front of dipole element No. 4 of approximately 19.75 inches (taken from figures included on Px-1) -- approximately $1\frac{1}{2}$ feet.

Thus, "Antenna A", to enable the same operation as the Winegard CT-40 antenna must employ four times the number of dipole driven elements resulting in over four times the axial boom length. (85.2 inches compared to 19.75 inches).

The entire axial boom length for the Winegard CT-40, including the UHF section and parasitics is only 34 inches. Just the VHF portion of Antenna A requires over 2½ times greater boom length. For coverage of UHF also, Antenna A requires a boom length of 102.2 inches and 30 dipole elements -- or over three times the boom length and 2½ times as many dipoles.

The significance of this becomes even more apparent in light of Plaintiff's witness, Mr. Harris, where he stated on rebuttal:

> A. Some of the most important considerations in practical commercial TV antenna designs are dictated by the economics of production. This is a highly competitive field where every penny counts, and I feel that a practical antenna design engineer, if he is worth his salt at all, must take into account these practical considerations of competition, production, costs, -- all the various factors that go into producing this type of antenna." (R 620)

We are told by Mr. Harris that production costs, etc. are so critical that one may well be forced to use constant or uniform spacing between dipole elements rather than variable spacing according to the dictates of the patent specification (R 628). We can but ask -- what about 4 times as many dipoles; what about the additional parasitic reflectors and directors that Mr. Harris says are required; what about the four times or greater boom length? The answer, we think, should be obvious to anyone. For the

foregoing reasons, we submit that the log-periodic antenna is simply not suited for television reception and logic can be stretched only so far in attempting to try and say that it is. The facts show otherwise.

Moreover, As Dr. Yang testified, the log-periodic antenna has the undesirable characteristic of having the energy or power capture area decrease as the frequency increases. This is immediately apparent from the line sketches. Dipole element No. 16 of "Antenna A" is about 20.6 inches while dipole element No. 1 is 100 inches long. Thus dipole element No. 16 is approximately one-fifth the length of dipole element No. 1 and thus provides one-fifth the capture area at the high end of the band (216 megacycles) as compared to the low end of the band (54 megacycles). However, since dipole No. 4 in the Winegard antenna CT-40 is operative at full-wave resonance in the high end of the band, it is some 52 inches in length as compared to only 20 inches for element No. 16 in "Antenna A" . . . thereby providing over two and one-half times greater capture area.

The significant reduction in power capture area in an antenna constructed according to the Isbell disclosure is a distinct disadvantage with respect to reception of television signals, as Dr. Yang so testified. It means

a reduction of gain at the higher frequencies. This is directly contrary to what is required as Mr. Winegard testified for a television antenna. Plaintiff's own witness, Mr. Harris, also recognized this. On rebuttal, Mr. Harris testified thusly:

> "Q. Mr. Harris, you as a television antenna design engineer, what criteria would you select for the design of a television antenna for the reception to color and black and white on Channels 2 through 6.
>
> A. As optimum characteristics, I would specify highest possible front-to-back ratio, good directivity, as constant a uniform impedance characteristic as possible, and a slight rising gain characteristic." (R 618)

Thus, Mr. Harris tells us that a television antenna should have a slightly rising gain characteristic with respect to frequency and yet a log-periodic antenna exhibits just the opposite. Mr. Harris stated that he would have to use directors, reflectors and cut-and-try procedure to offset this undesirable deficiency of the log-periodic antenna (R 619). It is interesting to note that the disclsoure of the Isbell patent informs us at Col. 2, lines 60-64 that:

> "Advantageously, however, the antennas of the invention need <u>no</u> adjusting for their performance over a wide bandwidth, compared to the parasitic types which must be adjusted <u>by cut-and-try procedures</u> for each frequency." (emphasis added)

The patent then says one thing, Mr. Harris says another.

Plaintiff again restates its familiar, but unconvincing, and we might add unsupported position, that the prior art does not anticipate the alleged Isbell invention. On the one hand, Plaintiff freely admits that the most pertinent art was the Channel Master K.O. antenna (Dx - B-4, Dx J-6 and 6a) but asserts it doesn't apply because it used folded dipoles instead of straight dipoles. We submit that there is an unmistakable preponderence of evidence in the record whcih shows the equivalency between folded and straight dipoles as was brought out in Defendant's main brief. To again restate Defendant's position and the full evidencery support therefor would perhaps be unduly burdensome to the Court at this juncture. We refer the Court to Defendant's main brief should there be a need to clarify any point. However, there are several points in Plaintiff's brief which do require response here. Plaintiff states that because of the use of folded dipoles in the K.O. antenna instead of straight dipoles, it does not correspond to the antenna of Isbell nor suggest it. We merely point out to the Court that nowhere in the disclosure of the Isbell patent does it state that only straight dipoles may be used. The patent disclosure and claims merely uses the term "dipole" -- nothing more. A folded dipole is no less a "dipole" than a striaght dipole. Plaintiff's only argument is that there is a difference in characteristic impedance between a folded and straight dipole. As

Dr. Yang pointed out, differences in impedances can always be matched in other ways which do not involve radiation characteristics -- the primary concern of an antenna design engineer (R 548). As a matter of fact, we are never informed in the Isbell patent just what numerical impedance would be obtained from an antenna in accordance therewith.

Plaintiff further contends that prior to Isbell's purported invention, it would have appeared to one skilled in the art as a step in the wrong direction to substitute straight dipoles for the folded dipoles of the K.O. antenna. Plaintiff is simply in error because the record shows otherwise as was pointed out in Defendant's main brief on this point. In addition, we point out that Mr. Winegard as early as 1956 had designed and tested an antenna intended for coverage of the VHF television band which employed multiple straight dipole elements of diminishing lengths toward the front with a feeder transposed between dipole elements (for 180° phase reversal) and fed from the front (shortest) dipole element (Dx L-14). As was pointed out for the Telrex antenna (Dx B-6), two cross fed simple dipoles were employed of differing lengths, cross-phased and fed from the shorter dipole. Mr. Winegard testified that the Telrex antenna was merely a version of the Winegard Interceptor antenna (R 429).

We have another example then of what Plaintiff says would not be done but in fact was -- i.e., substituting simple or straight for more complex dipole structures. The Winegard Interceptor antenna employed compound dipole elements. The Channel Master K.O. antenna employed folded dipole elements.

Plaintiff also takes substantial liberty with the testimony of Mr. Passer on page 382 of the record, or at least misunderstands the import of it. In any event, we do not think it of sufficient importance to warrant a detailed rebuttal. Of more concern is the unwarranted and erroneous assumptions Plaintiff expouses in connection with the K.O. antenna on behalf of the United States Patent Office. Plaintiff states on page 23 of its brief that the K.O. antenna was:

> "* * * known to and obviously considered by the examiner who allowed the Isbell application (R 663, 664), since the reference which defendant now relies on had been cited during the prosecution of a patent application which issued to plaintiff on another antenna (Mayes Reissue Patent No. 25,740, PX-66) * * *"

This can only be considered as the very purest form of hearsay. The testimony of Dr. Mayes on pages 663 and 664 of the record relates to an interview with the examiner prosecuting an application filed in behalf of Dr. Mayes and Robert Carrel in which a brochure relating to the Channel Master K.O. antenna was said to have been discussed. We are not told the date this interview took place. We are

not told the nature of the invention as disclosed in the Mayes et al application, other than it is "similar" to the Isbell patent. A host of other questions are left unanswered. Moreover, we can only speculate as to the many thousands of applications pending in a particular Patent Office Group. We have no idea of how many such applications were being processed by each of the examiners. Nevertheless, the Court is being asked to hold that as a result of this incident relating to a completely different patent application concerning what would have to be a completely different inventive concept, by different inventors, that the examiner "considered" the same reference with respect to the pending Isbell patent application but, notwithstanding the reference was the "closest" to the alleged Isbell invention, decided against citing it as a reference and chose instead to cite less pertinent prior art. What can be stated as an unrefutable fact is that the K.O. antenna was not cited by the Patent Office as a reference in the Isbell application. As else is pure conjecture and nothing more. Moreover, we submit that the cases cited in Plaintiff's brief on page 33 in no way supports its position that a reference cited in one application in some way related to another application by a different inventor applicant but assigned or to be assigned to the same assignee in the future is to be deemed as "known" and "considered" by the Patent Office in connection with that other application.

Plaintiff takes the position that Quarterly Engineering Report No. 2 was not a "publication" within the meaning of 35 U.S.C. 102(b) because it was not "published" more than one year prior to the filing date of the Isbell patent application. Plaintiff states as a matter of fact that the mailing of Report No. 2 occured on May 5, 1959. This is stated at page 33 of its brief; twice on page 34; and again on page 38. Perhaps Plaintiff hopes that by sufficient repetition in its argument it might somehow become an established fact. However, the plain and simple fact is that there is no probative evidence in the mailing of Report No. 2 occured on this or any other date. Plaintiff references Mr. Lawler's testimony on page 681 of the record in support of its assertion. The entire testimony on this point is as follows:

> "A. The concrete results which I was able to find, were, first of all, a postal receipt dated May 5, which, in accordance with the transmittal letters which are in my file, would have, to the best of my knowledge, applied to this particular report."

The entire basis for Plaintiff's assertion concerning the alleged mailing date for Report No. 2, then, is "a" postal receipt which is identified only as "dated May 5". No further identification or reference is made to this document by Lawler or anyone else. We are at a loss to

understand how this supports Plaintiff's contention. It is submitted that Mr. Lawler testified to no particular mailing date and his testimony can only be regarded as conjecture, speculation and without probative value. It was Miss Johnson and her staff which made the actual mailing of the reports, not Mr. Lawler (R 195). In addition, we know as a matter of fact that there were other research projects that were being conducted under the same Air Force Contract AF(616) 6079, as evidenced by the Technical Report No. 36 by R. McPhee, introduced into evidence as Defendant's Exhibit Dx H-3.

In any event, Plaintiff further asserts that the availability of Report No. 2 on or before April 30, 1959 does not operate to make the same a printed publication within the meaning of 35 U.S.C. 102(b). It charges Defendant's argument is fallacious in that "it equates 'printing' with 'publication'". On the contrary, we submit that it is the Plaintiff who is laboring under a misapprehension -- for it is equating "mailing" with "publication". (And even the mailing date of the Report No. 2 cannot be ascertained from the record.) We point out that the actual printing of the Report No. 2 occured well before the April 30, 1959 date as the exhibit H-3 to H-11, inclusive, show. The April 30, 1959 date is the date that the printed copies of Report No. 2 were delivered into the hands of Miss Marjorie Johnson, who as Plaintiff points out, served as

Technical Editor for the University of Illinois Electrical Engineering Department. This is correct. What Plaintiff pointedly ignores is that Miss Johnson also served as the Librarian for Engineering Research Laboratory Local Library (R 202, 203). As such, Miss Johnson testified that they became available as library references as soon as they were delivered back into her hands (R 205). Would Plaintiff require Miss Johnson, upon receiving the copies of Report No. 2, to mail copies of the same to herself as the librarian before the reports became "printed publications"?

Even the definition cited Plaintiff from Black's Law Dictionary states in part that publication is "The act of * * * rendering it accessible to the public scrutiny * * *". We agree. It is the availability to the public that is the key factor. This is amply borne out by case precedent.. In Application of Heritage, 182 F.2d 639, CCPA 1950, it is stated at page 643:

> "Furthermore, it is sound law, in our opinion, that any reference to a disclosure which is available to the public is permissible. The Hamilton Laboratories, Inc., v. Massengil, 6 Cir., 1940, 111 F.2d 584, certiorari denied 311 U.S. 688, 61 S.Ct. 65, L.Ed. 444." (emphasis added)

In the Hamilton Laboratories case, supra, the Court was faced with the question of whether a thesis deposited in a library of a college was to be considered a printed publication

and therefore a bar under 35 U.S.C. 102(b). The court stated at page 585:

> " * * * the Weed thesis is in the prior art and marks a step in the development since it was put on file in the library of the college, available to students there and to other libraries having exchange arrangements with Iowa State. * * * we think intent that the fruits of research be available to the public is determinative of publication under the statute whether the paper be printed or not * * *." (emphasis added)

The case of Indiana General Corp. v. Lockheed Aircraft Corp., 249 F.Supp. 537, 1966 cites the Hamilton Laboratories case thusly at page 541:

> "Hamilton Laboratories v. Massengil (6 Cir., 1940), 111 F.2d 584, cert. den. 311 U.S. 688, is squarely in point for the proposition that Papian's thesis also, even though typewritten and lodged in the Library of Congress is a printed publication within the meaning of 35 U.S.C. 102(b)."

In Ex Parte Hershberger, 254 F.2d 624, 1952, the Board of Appeals of the Patent Office considered the question of whether a single thesis in a College Library was a printed publication where portions could only be copied by express approval of the author and where the thesis could only be read within the confines of the library. Nevertheless, the Board held it was within the meaning of the statutory provision. The Board said:

> "The sole question for our consideration is whether or not the ideas expressed in the thesis, in the form of a complete disclosure of an invention, are incorporated within a

> print-publication to satisfy the patent statute. In our opinion, the thesis with its disclosures is a printed publication within the meaning of the patent statutes. The required extent of duplication of a publication is not set forth in section 4886 R.S. and a single copy of a printed publication available to the general public is sufficient to fall in the category of 'any printed publication.'" (emphasis added)

Further on in the opinion of the Ex parte Hershberger case, the Board states:

> "In Gulliksen v. Halberg v. Edgerton v. Scott, 75 USPQ 252, the majority of the Board of Appeals in considering the availability of a thesis as a printed publication was of the opinion that a typewritten page and a printed page were both 'printed' and that the number of copies was immaterial and that should even one copy of a publication be printed and placed in a library accessible to the public that would be sufficient to satisfy the statute." (emphasis added).

The case of Ex parte De Grunigen, 132 USPQ 152, 1961 CD 75 is illustrative of the point that the date on which a printed publication, such as a thesis, is catalogued by the library is immaterial for it is the date when the library receives the document which determines when it becomes a printed publication under 35 U.S.C. 102(b).

In the instant case, the date when the report was in the hands of the librarian of the local library, Miss Marjorie Johnson, and available as a reference, was April 30, 1959, more than one year prior to the filing date of the Isbell patent application.

Plaintiff contends that the purported Isbell invention was not obvious. In this regard, it sets up three criteria which suggests, if present, indicate the existence of invention. Plaintiff merely states that all of the criteria are satisfied. The first of these is that there is a "serious" problem which exists in the field for which interested parties were searching for a solution. However, we are not aware that any "serious problem" existed in the television antenna field prior to the development of the Isbell structure. (Moreover, we are not aware that Isbell was concerned with television reception for there is certainly no indication or mention of it in the patent). On the contrary, there were many, many different antenna structures available and in public use for the reception of television signals. Some were designed to cover only the low VHF television band (Channels 2-6) and some were designed to cover the entire VHF television band (Channels 2-13) and there were some that covered all channels (2 to 83) in both VHF and UHF bands. (See Defendant's Exhibits B-2, 3, 4, 6 and 7; C-5, 8 and 9; L-15; J-6, 6a, for example). As to the reception of color television signals, Mr. Winegard stated that his company had never made a television antenna that wasn't suitable for color reception (R 441), and further the Channel Master K.O. antenna (Dx B-4, J-6 and 6a) would have been an excellent

antenna for color reception (R 448). The only objection Mr. Winegard stated with reference to the K.O. antenna was its overall large size...(131 inch boom length)... (R 447) . . . and, which we might add, is also one of the objections to a log-periodic type antenna. The best Winegard antenna with reference to color television reception was stated by Mr. Winegard to be the Color 'Ceptor antenna (Dx L-15) (R 434). All this stands unrefuted in the record. Where then is the "serious problem" said by Plaintiff to exist in the field?

Plaintiff also asserts that the second criteria is that the inventor solved the problem. There can hardly be a solution to a problem if there is neither a problem nor an indication by the inventor that a problem exists in the particular area. Finally, Plaintiff claims that the solution was accepted in the industry and widely used therein. Defendant Winegard Company has never adopted any part of the teachings of the purported Isbell invention. We have only the mere accusation that others in the industry are incorporating the Isbell invention in their television antennas. We are not aware of any documentary evidence in the record indicating that any television antenna in the industry incorporates the teachings of the Isbell patent.

Plaintiff on page 40 of its brief states as a matter of fact that the accused Winegard antennas were designed with full knowledge of the invention, citing pages 464 and 465 of the record. A review of testimony on these pages clearly shows Mr. Winegard testified to no such thing and for Plaintiff to indicate otherwise is a flat misrepresentation. No other comment should be necessary.

What is clear from the record is that Defendant Winegard Company was aware of antenna arrays with multiple driven elements with a feeder transposed between driven elements and fed from the front (shortest) driven element because such antennas had been designed by it, or more properly, Mr. Winegard, (see Dx D-1, L-17, C-5, C-8, C-9, L-14) -- to say nothing of the antennas in the prior art manufactured by competiting companies. It should be quite clear that the present antennas manufactured by Winegard Company is the result of its own research and evalutionary developemnt rather than the adoption of any teaching from Isbell, or from any one else for that matter.

In commenting on the "non-obviousness" of the Isbell structure in light of the earlier DuHamel work as exemplified by Dx A-1, Plaintiff contends:

> "Although Dr. Yang indicated that if certain substitutions were made in some of the structures shown in DX A-1, such as be replacing the circular segments shown in the reference with solid trapezoidal sections (R 509), replacing the solid trapezoidal sections with wire outlines thereof (R 510), replacing the trapezoidal outlines with triangular outlines (R 510), collapsing the triangular outlines to thin dipoles (R 511, and collapsing the two halves of the antenna so that they are parallel to each other (R 511), there would result a structure corresponding to the Isbell invention (R 511). While this analysis is interesting in showing the theoretical development and logical relationship among the curious forms of antennas referred to by Dr. Yang, there was no evidence that all these substitutions and modifications would have been apparent to one skilled in the art prior to Isbell's invention. They apparently didn't occur to Dr. Yang, nor did they occur to Prof. DuHamel * * *"

What Plaintiff has obviously overlooked is that <u>each and every one of the above mentioned substitutions</u>, with the exception of one, not only occured to Prof. DuHamel, but the very report, Dx A-1, shows the resultant structures and various test results. Fig. 9 of Dx A-1 shows the substitution of the solid trapezoidal sections with wire outlines. Figure 15 shows the substitution of the wire outlines with the "zig-zag" or triangular outlines. Table 4 shows the angle between the two halves of the antenna were collapsed down to as low as 7 degrees. Only the substitution of the triangular wire outlines by rod dipoles is not specifically mentioned. Can this be said to be invention? Since the above substitutions were made by

DuHamel how can it be said that using rod dipoles in place of solid or wire outlines is "unobvious"?

Concerning the various prior art references relied upon by Defendant, it is interesting to note Plaintiff's comments with respect to the Winegard antenna, as depicted in Defendant Exhibit Dx D-1. Plaintiff argues there is no teaching in the Winegard patent that more than two driven elements could be used to achieve a "wide band effect". Yet the particular Winegard antenna provides coverage of the entire VHF television band (Channels 2-13 -- 54-216 megacycles), not just the low VHF band (Channels 2-6 -- 54-88 megacycles) on which the accused portions of the Winegard antennas are operative -- some five times greater frequency range. To say that the Winegard antenna in question could not be modified to achieve a "wide band" effect already operative over a bandwidth significantly greater than the portions of the presently accused antennas are operative is hardly rational.

Plaintiff on page 44 of its brief asserts that the advertising brochures cited by Defendant "do not disclose antennas in which a plurality of straight dipoles of varying lengths are connected with a transposed feeder which is feed at the short end of the antenna to produce a wide

band operating characteristic." The antenna depicted in Defendant's Exhibit D-6 (Telrex) is passed off on the basis that there is no evidence presented concerning the specific construction. Plaintiff has apparently overlooked the testimony of Mr. Winegard concerning this antenna beginning on page 429 of the record in which he describes the structure in detail. Mr. Winegard provided a sketch of the antenna, identified as Defendant's Exhibit Dx L-18, in which he included specific element dimensions.

Plaintiff urges that there is no new matter involved in Claims 14 and 15. This subject matter was treated at length in Defendant's Main Brief. We deem it unnecessary to reiterate the basis which shows clearly that there was indeed new matter in these claims not originally present in the patent application. We refer the Court to that portion of Defendant's Main Brief in answer to Plaintiff's present assertion.

CONCLUSION

We submit to the Court that Plaintiff has failed utterly in sustaining its burden of proof with respect to infringement. It still remains a bald accusation at this stage of the proceedings with respect to the Winegard antennas in question. Moreover, in view of the evidence of record and the arguments of counsel in the main briefs and the present reply brief, we submit that the Isbell patent is invalid because of a prior publication more than one year before the Isbell application filing date pursuant to 35 U.S.C. 102(b), and because the purported Isbell invention failed to meet the specific requirements set forth in 35 U.S.C. 103 and also 112. We respectfully urge the Court to so hold.

Respectfully submitted,

KEITH J. KULIE
DONALD B. SOUTHARD
135 South LaSalle St.
Chicago, Illinois,

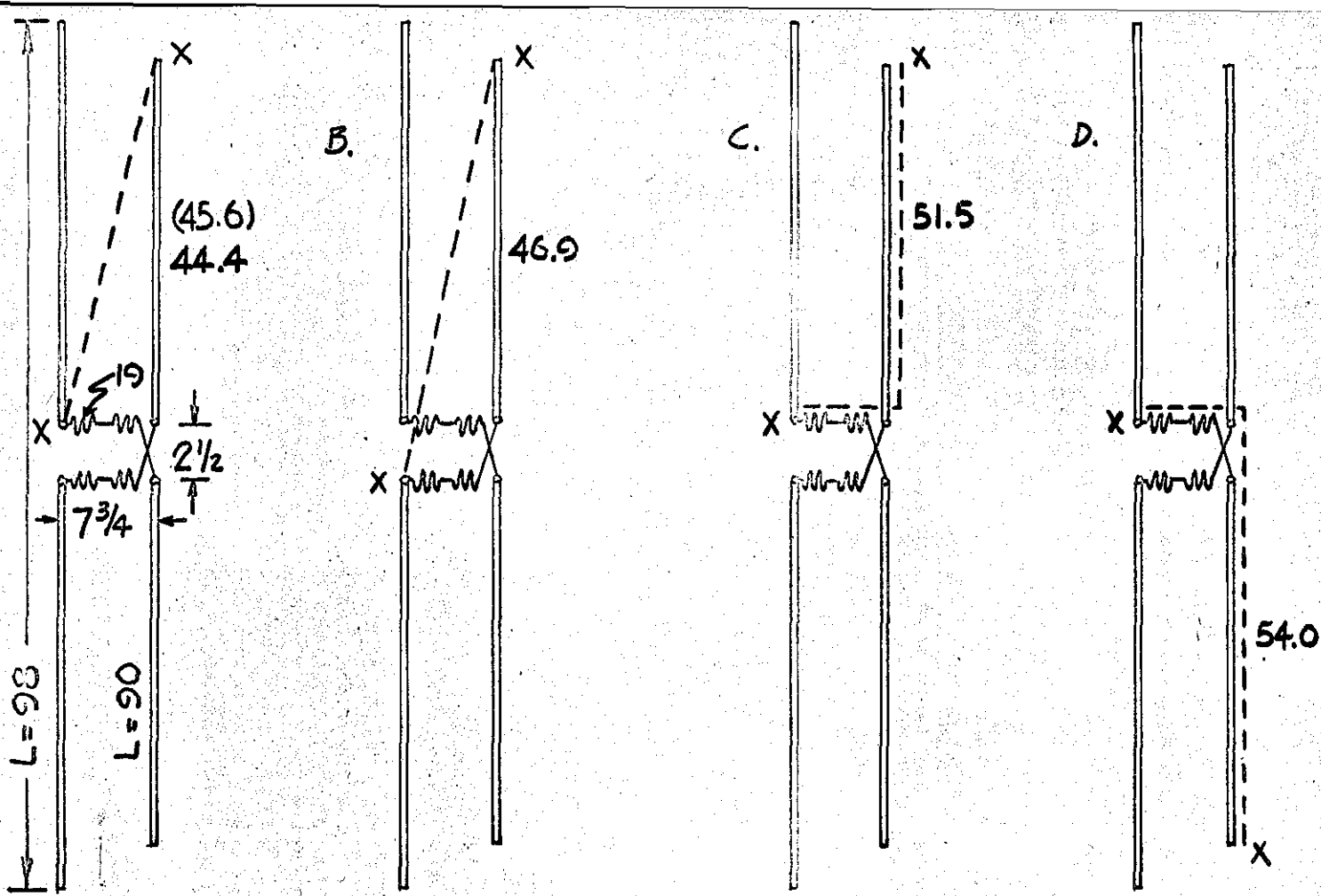
Attorneys for Defendant.

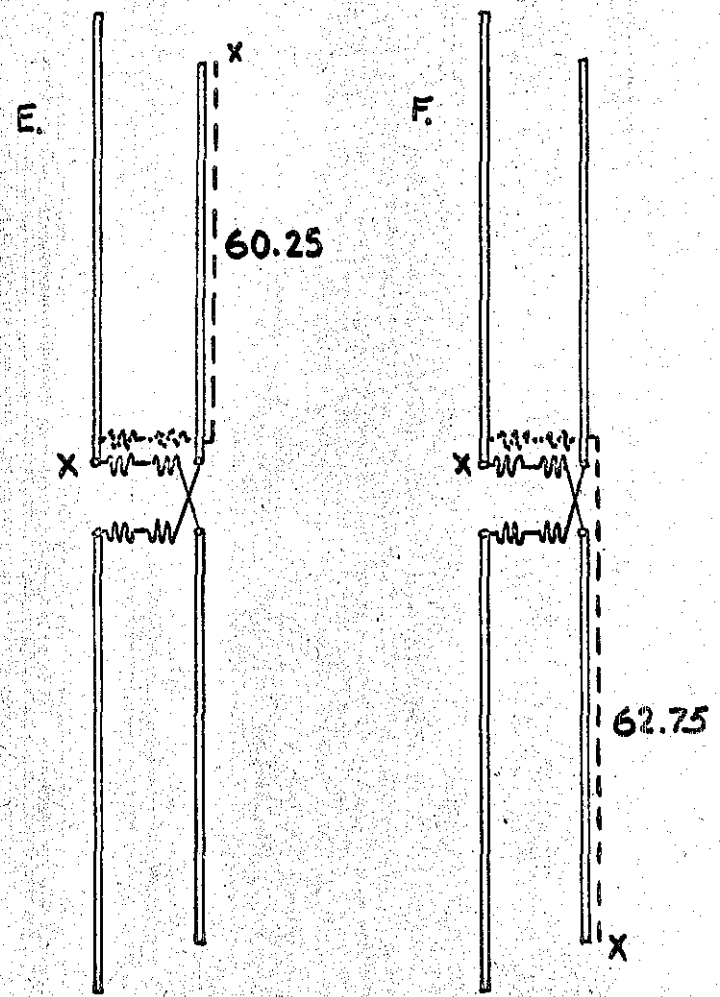
TABLE: A.

Referenced Plaintiff's Exhibit	Accused Winegard Models	Deviation From "Averaged" Length Scale Factor
PX-32	B-445 B-555 B-550 B-660 B-770	5.4%
PX-33	B-105	4%
PX-34	B-335	12.5%
PX-35	10B200 10B300 10B400	4.4%
PX-36	10B1050	17.9%
PX-37	10B1010 10B1020	14.3%
PX-38	10B1030 10B1040	14.3%
PX-39	CT-40	6.5%
PX-40	CT-80 CT-90	14.5%
PX-41	10B1120	1.4%
PX-42	10B1130	11.5%
PX-43	10B1140	6.1%
PX-44	CT-100	14.8%

B.

Range of Computed Scale Factors	Actual Maximum Deviation
0.900 to 0.828	8%
0.736 0.680	7.6%
0.900 to 0.712	20.8%
0.806 to 0.738	8.4%
0.919 to 0.713	22.4%
0.860 to 0.672	21.8%
0.900 to 0.713	20.7%
0.850 to 0.753	11.4%
0.935 to 0.746	20.2%
0.829 to 0.810	2.3%
0.897 to 0.757	15.6%
0.930 to 0.828	11.0%
0.928 to 0.763	17.7%





CLAIMS 14 & 15:

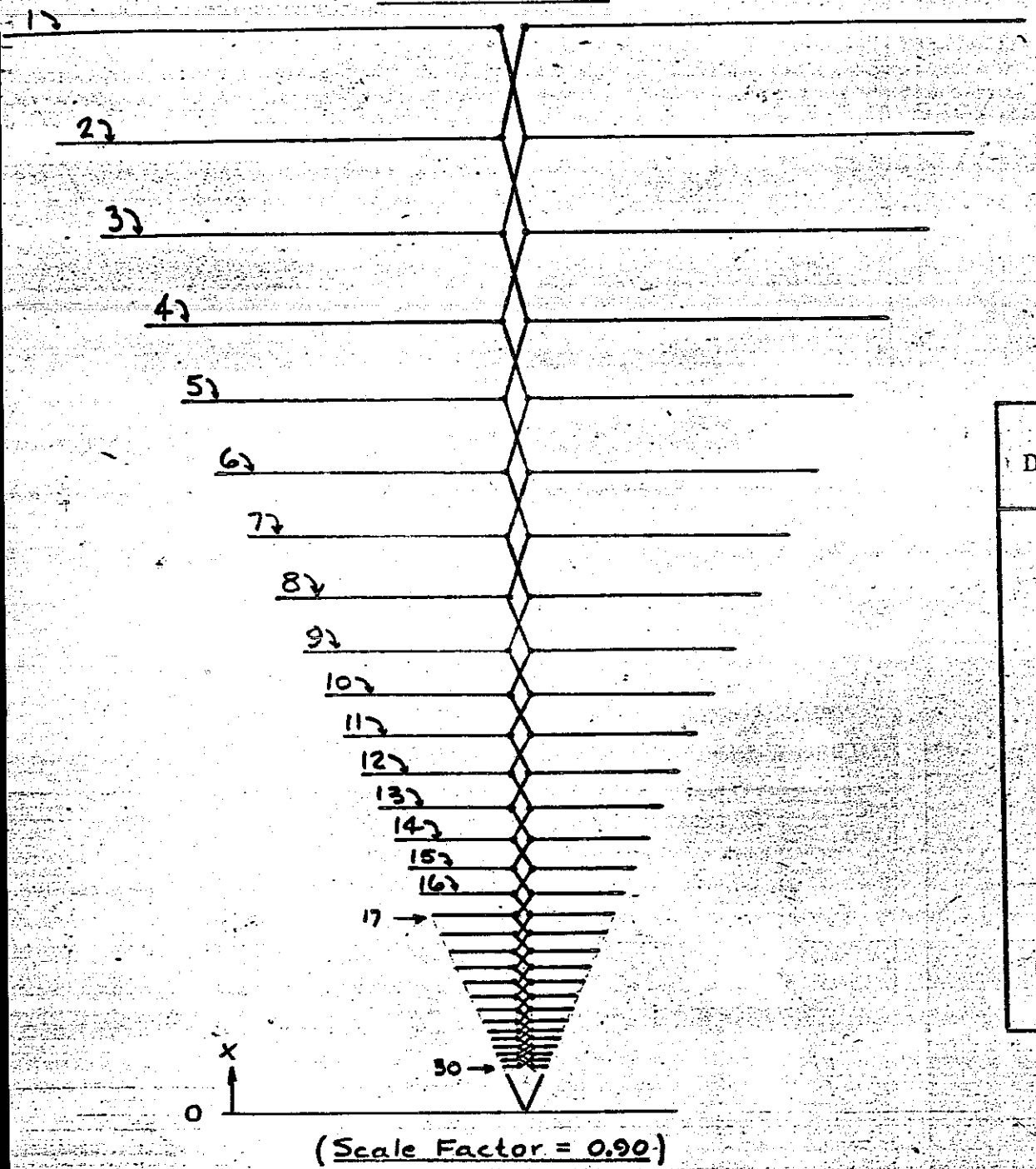
"* * * each dipole and the feeder between it and the adjacent dipole constituting a cell,

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 * * *" (emphasis added)

CHART

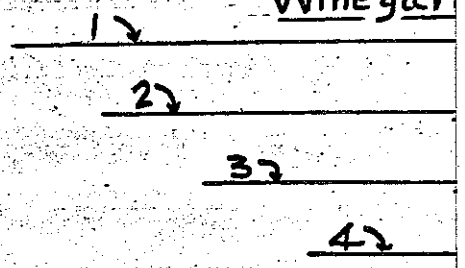
- Appendix II -

Antenna A



(Scale Factor = 0.90)

Winegar



Antenna A

Dipole	Length	Distance To Base Line (X)
1	100"	107.3"
2	90	96.6
3	81	86.9
4	72.9	78.2
5	65.6	70.4
6	59.1	63.4
7	53.2	57.0
8	47.8	51.3
9	43.1	46.2
10	38.8	41.6
11	34.9	37.4
12	31.4	33.7
13	28.3	30.3
14	25.4	27.3
15	22.9	24.5
16	20.6	22.1
30	4.7	5.1

IN THE

United States District Court

FOR THE SOUTHERN DISTRICT OF IOWA,

DAVENPORT DIVISION.

UNIVERSITY OF ILLINOIS FOUNDATION, *Plaintiff,* **vs.** **WINEGARD COMPANY,** *Defendant.*	**Civil Action No. 3-695-D.**

PLAINTIFF'S REPLY BRIEF.

WILLIAM A. MARSHALL,
BASIL P. MANN,
30 West Monroe Street,
Chicago, Illinois 60603,
Area Code 312-346-5750,
Attorneys for Plaintiff.

Of Counsel:
CHARLES J. MERRIAM,
MERRIAM, MARSHALL, SHAPIRO & KLOSE,
30 West Monroe Street,
Chicago, Illinois 60603,

COOK, BLAIR, BALLUFF & NAGLE,
409 Putnam Building,
Davenport, Iowa 52801.

THE GUNTHORP-WARREN PRINTING COMPANY, CHICAGO

TABLE OF CONTENTS

	PAGE
Introduction	1
Specific Rebuttals	5
The Patent in Suit Is Not Invalidated by Quarterly Engineering Report No. 2	5
The Isbell Antenna Structure Was Not Obvious	6
Claims 3, 9, 10, 14 and 15 Are Valid	13
Claim 9	13
Claims 14 and 15 Are Supported by the Disclosure	13
Claims 9, 14 and 15 Did Not Involve New Matter	14
Claims 3 and 10 Are Not Invalid for Failure to Include an Essential Element	15
The Isbell Patent Is Not Directed to a Very Narrow Structural Concept Which Cannot Be Broadened	15
The Isbell Patent Claims Are Infringed by Defendant's Antennas	16
Claims 10, 11 and 12	19
Doctrine of Equivalents	21
Conclusion	22

IN THE

United States District Court

FOR THE SOUTHERN DISTRICT OF IOWA,

DAVENPORT DIVISION.

UNIVERSITY OF ILLINOIS FOUNDATION, *Plaintiff,* **vs.** **WINEGARD COMPANY,** *Defendant.*	**Civil Action No. 3-695-D.**

PLAINTIFF'S REPLY BRIEF.

INTRODUCTION.

Although the burden of proving invalidity of the Isbell patent in suit is on the defendant, and the burden of proving infringement is on the plaintiff, these issues have both been considered in the principal briefs and we will only supplement where needed.

The main thrust of defendant's brief is the typical anguished cry of an infringer who at the "moment of truth" is given a fictitious clarity of vision in the form of 20-20 hindsight. In attacking the validity of the patent, the defendant attempts to apply the nonobviousness test as if a mere mechanical combination was involved. While the operation of mechanical combinations of simple elements, such as gears, levers, nuts, bolts and the like, may be

obvious, the electronic arts as well as the chemical arts, do not permit sure or ready prediction of the manner in which a given element in one combination will function when employed in a different combination of elements. This is particularly true in the field of log-periodic antennas to which the instant invention pertains. Both plaintiff's and defendant's experts testified (R. 168, 451 respectively) that one cannot predict the performance of a given log-periodic antenna from the performance of other species of log-periodic antennas. This unpredictability is also supported by documentary evidence introduced by defendant (DX-A-10b). If one cannot predict the performance characteristics within the class of log-periodic antennas, it is clear that the predictability of results from one class to another is even less.

Accordingly, defendant's argument in support of its position of obviousness is based upon specious reasoning because it would be impossible to take piecemeal selections of antenna components from prior art antennas and combine them to provide the patented structure without employing inventive faculties. There were no directions or instructions in the prior art patents relied upon by defendant which would have taught Isbell the appropriate path to follow in order to invent the frequency independent, undirectional antenna of the log-periodic type which is described and claimed in the patent in suit. If defendant's argument were correct, a panacea would be provided for the design problems in the antenna art because, in accordance with defendant's theory, all of the problems of the industry can be solved by a predictable selection of known components and the combining thereof to solve a particular problem. If this argument is followed to its logical conclusion, it is clear that only a few patents would issue in a given art because thereafter all other devices would utilize the components disclosed in the issued pat-

ents. For all practical purposes, this would have meant that no patentable inventions would have been made in the antenna art after it was discovered that radio waves would be intercepted by the half-wave antennas of Hertz and transmitted by appropriate feed lines and transmission lines to a signal receiver.

It is quite evident that the instant invention was not evident to defendant Winegard's president, who is its principal designer. Prior to his use of the Isbell invention in designing the infringing antennas, his so-called Interceptor or Colortron antenna, DX-L-15, according to his testimony, was sold more than any other type of antenna (R. 433). This antenna was not a frequency independent, unidirectional antenna employing the Isbell invention, but was a so-called "yagi" antenna (DX-C-5). Although all of the antenna art was available to Mr. Winegard, it is interesting to note that the infringing antennas were not designed by him until after he became aware of the Isbell teachings. In accordance with defendant's own admissions, these antennas constitute 40% of its total production.

Defendant also attempts to over-simplify the effect of Quarterly Report No. 2 by taking the position that this was a "publication" which anticipated the subject invention. The proof of whether or not this report constituted a legal publication is a strict one and cannot be based upon conjecture, lay opinion or suppositions. While defendant argues from such tenuous concepts, both plaintiff's and defendant's witnesses made it clear that circulation of the report could have taken place only when the report was mailed. The uncontradicted evidence, in the form of a mailing receipt (PX-58), shows that the report was mailed on May 5 which is after the critical date of May 3. Therefore there was no publication prior to the critical date.

The infringement issue is likewise over-simplified by the defendant. It cannot deny that all of the antennas in issue literally infringe Claims 14 and 15. Instead it attempts to excuse its infringement of these claims by asserting that these claims are invalid (as being based on new matter) and that invalid claims can't be infringed. A "new matter" defense requires that defendant substitute its opinion for the expertise of the Patent Office, whose examiners are daily resolving this problem and who decided there is no new matter in the Isbell patent. The testimony of plaintiff's expert witness, Mr. Harris, is not ambiguous concerning the discussion of the "cell" concept. It is only defendant's apparently deliberate misunderstanding which permits it to assume an ostrich-like position and hope that this implausible argument will eliminate the spectre of infringement.

The Chromatel CT-100 antenna (PX-44) literally infringes all of the other claims which are charged to infringe. These claims are also infringed by the other Winegard antennas (PX-32-43) because they all employ the substance of the Isbell invention. The minor variations from the idealized structure of the Isbell invention do not seriously affect the electrical characteristics of the infringing antennas or prevent their functioning as frequency independent, unidirectional antennas over the desired range of frequencies in accordance with the teachings of the Isbell patent.

Defendant's antennas which embody the Isbell invention are commercially important to defendant, and it should not be permitted to employ the fruits of Isbell's invention without appropriate compensation for the use of this patentable contribution to the antenna industry.

Defendant's position, as argued in its brief, is rebutted not only by plaintiff's main brief, but by reference to the following specific comments on defendant's brief which further point out lack of support for its argument.

SPECIFIC REBUTTALS.

The headings and the numbering of sections in the following discussion follow generally those used in defendant's brief.

III. THE PATENT IN SUIT IS NOT INVALIDATED BY QUARTERLY ENGINEERING REPORT NO. 2.

Defendant devotes a substantial portion (DB-5-12a)* of its brief to an attempt to show that Quarterly Engineering Report No. 2 was published prior to May 5, 1960. (In this connection, it should be noted that the Isbell patent application was filed on May 3, 1960, not May 5, 1960, as stated (DB-8) by defendant. Accordingly, a printed reference would need a publication date prior to May 3, 1959, to be effective as a statutory bar.)

This topic is covered (PB-33-38) in our main brief, and further extended discussion is not necessary. We should point out, however, that although defendant, in connection with the testimony of Miss Johnson, continually refers to a "local library" (e.g., DB-9), the collection of materials called the "local library" in the Electrical Engineering Department did not have the status of a library within the University organization (R. 675-676). Rather, the "library" was merely a small unofficial reading room in which was maintained a collection of the reports produced by the Electrical Engineering Department. Further, there is no evidence that it was the policy of the Electrical Engineering Department to consider its reports available to the public as soon as received from the printer, or that

* "PB" refers to Plaintiff's Brief after Trial.
"DB" refers to Brief for Winegard Co.

such reports were ever actually distributed to the public on the day of printing. As Miss Johnson herself indicated, whether a particular report would have been given to anyone requesting it depended on the responsibility of the person making the request (R. 201). As long as some conditions were attached to distribution of these reports to the public, in the absence of actual proof that distribution occurred, whether distribution *might* have occurred remains conjectural, as indicated by Miss Johnson's answers (R. 216, 240). No actual distribution of Quarterly Engineering Report No. 2 prior to May 3, 1965 has been shown by any of the evidence adduced at the trial. The validity of the patent therefore remains unimpaired by the existence of Quarterly Engineering Report No. 2.

We have no quarrel with the broad principles of law given in the cases cited by defendant relating to printed publications. Under the actual circumstances of this case, however, they have no application. There is obviously a difference between the *deposit* of a copy of a publication in a library or *actual* distribution to the public (positive acts indicating an intent to publish the work in question) and the mere receipt of printed materials from the printer, prior to the taking of any step directed to circulating these copies to the public or otherwise indicating their availability. In the absence of a positive act, publication of Quarterly Engineering Report No. 2 did not occur prior to May 5, 1959, at which time it was distributed to those on the distribution list.

IV. THE ISBELL ANTENNA STRUCTURE WAS NOT OBVIOUS.

Defendant takes the position (DB-18) that since certain isolated features of the Isbell antenna were known (albeit in different combinations with other elements) prior to Isbell's work, Isbell's antenna does not constitute a patent-

able invention. Defendant argues that because Isbell was not the first to develop a frequency independent antenna of any type, because his antenna was not the first log-periodic antenna of any type, and further because Isbell did not invent straight dipoles, nor was his the first antenna of any type to use a transposed feeder, he could not have made a patentable invention.

The defect in defendant's argument is the total absence of any teaching or suggestion in the art as to how these elements should be combined to achieve Isbell's results. The fact remains that Isbell was the first to employ straight dipoles in a log-periodic array, in which the dipoles had varying lengths according to a substantially constant scale factor and in which a transposed feeder was used to connect the dipoles. The requirement that the dipole lengths must vary in accordance with a substantially constant scale factor creates an inherent limitation that the array must contain at least 3 dipoles, since this number is required to establish that the scale factor remains essentially constant between adjacent dipoles. None of the art cited by defendant in which only 2 dipoles are used (e.g., DX-B-6 and D-1) is pertinent. Certainly, no reference using only two dipoles can suggest a substantially constant scale factor. Similarly the references in which 3 or more straight dipoles are shown (e.g., Katzin, DX-E-4, Koomans, DX-E-1, and White, DX-E-3), either do not teach or suggest the use of a transposed feeder or the use of dipoles which vary in length in accordance with a substantially constant scale factor.

Defendant establishes to its own satisfaction that no individual feature, lifted from its context in the Isbell antenna, is novel and then proceeds to ask ". . . then, what did Isbell accomplish?" (DB-19), and answers this question by saying that ". . . Isbell merely applied the log-periodic formulae . . . to an end fire antenna array having a plurality of dipole elements . . . to obtain an obvious and expected

result . . .". Any support for this remarkable conclusion is entirely lacking, and not unexpectedly so, since, even defendant's expert, Dr. Yang, agreed (PB-42) that it was impossible to predict which log-periodic structures would make successful antennas. Defendant's characterization of Isbell's invention as involving an "obvious" application of a known principle stands revealed as wishful thinking.

On pages 20-22 of its brief, defendant attempts to show that because there is a logical theoretical connection between Isbell's construction and that disclosed by DuHamel (DX-A-1), Isbell's invention was obvious. There is, however, nothing in defendant's brief, just as there was nothing in defendant's presentation in court, to show that the modifications of DuHamel's disclosure, which were described by defendant's witness, Dr. Yang, were anything other than hindsight in the light of after-acquired knowledge. There was not even an attempt to show that what Dr. Yang claims to be obvious today, would have been obvious in 1959. Certainly it wasn't obvious at the time to DuHamel, on whose work defendant bases its argument (PB-41, 42).

In support of its incredible contention that the derivation of Isbell's antenna from DuHamel's work was so simple and obvious that "any layman completely unschooled and inexperienced in the art of antenna design may nevertheless do this" (DB-21) defendant clearly shows that its argument is based on hindsight by relying (DB-22) on Jasik's handbook, DX-A-10a and 10b, and the Monser article (DX-A-9). Both the Jasik and Monser references, however, were published *after* Isbell's invention became known. Hindsight is remarkably sure and infallible. Foresight, however, is the basis for a patentable invention.

On pages 23-33 of its brief, defendant discusses the prior art.

The White patent (DX-E-3) relied on by defendant (DB-

23-24) is discussed on pages 40 and 41 of our main brief. As was there indicated, the White patent discloses a narrow band-width antenna which is fed in the center through an impedance network. Even Dr. Yang was unwilling to state unequivocally that White's antenna could be increased in bandwidth sufficient to cover channels 2-6 (R. 504), or that the feed impedances could be eliminated (R. 501). There is no teaching in the patent of how this might be done, and even if we assume that Dr. Yang's qualified prediction that it could be done is true, there is still no evidence to show that these modifications would involve only knowledge available to the art in 1959 rather than today.

Defendant's allegation that Dr. Yang's testimony (DB-24) concerning the White patent was not controverted is clearly wrong. On pages 650-651 of the record, Dr. Mayes testified that the White patent does not show, nor would one skilled in the art know, how to change the feed of the antenna to the shortest of the 3 dipoles or how to increase its bandwidth, without in effect abandoning the entire White invention.

On pages 25-27 of its brief, defendant argues that since the individual elements of Isbell's antenna, i.e., the dipoles and a crossed feedline, were known individually, and since the antenna produces no new result in that it merely "receives signals and converts the signal from the air into a usable form", it could not be a patentable invention. This is nothing more than a statement that all combinations are obvious and unpatentable, and is thus clearly without any weight.

To state defendant's position in such extreme form, is to expose the fallacy in the reasoning. Isbell's invention lay, not in devising a new element to be used in antennas, but rather in combining elements in an unobvious way to

produce an antenna which, while admittedly "only" capable of receiving signals, nevertheless represented the best solution (R. 315-317, 617, 618) to the many problems which had long faced antenna designers. Isbell's solution represented an unobvious step in the art, as even defendant's expert has admitted (R. 541).

In its argument that the prior art suggests Isbell's invention, defendant combines certain references and selectively lifts from each a portion of the disclosure, while conveniently neglecting other portions of the same reference. Thus, for example, defendant combines the teachings of Katzin (DX-E-4) and Koomans (DX-E-1), to produce an antenna array having, among other things, "dipole elements . . . of progressively increasing lengths" (DB-27). Admittedly, Katzin shows dipoles of different lengths; Koomans, however, shows dipoles all of the same length. What is the basis for selecting the different lengths of Katzin rather than the identical lengths of Koomans in combining the two structures? Katzin teaches loose coupling as essential (PB-43; R. 652-653), while Koomans shows direct coupling of the dipoles to the feeder. What is the basis for ignoring Katzin and using the direct coupling shown in Koomans? Koomans shows dipoles having a spacing of $\frac{1}{2}$ wavelength, an arrangement which produces an array having broadside radiation (R. 659). There is no basis for ignoring this teaching of Koomans and instead employing the spacing of Katzin.

All of the references cited by defendant fall into the same category. There is no rational basis for selecting only those portions of each disclosure which defendant now knows are necessary to assemble an antenna corresponding to Isbell's invention, while omitting those portions of each reference which would not permit this result. One skilled in the art who considered the same references in

1959, however, without knowledge of Isbell's invention, would not have the same basis for deciding what to keep and what to discard from each of the individual references and how the portions which were to be kept should be combined in order to achieve an operable result. This, in short, is the defect which runs through all of defendant's argument that Isbell's invention was obvious.

On pages 30 and 31 of its brief, defendant presumably supports its argument that all dipole elements, whether of the straight, folded, hairpin, conical, or any other type are essentially interchangeable. Considering straight and folded dipoles, however, Dr. Yang admitted (R. 547) that the impedance of these dipoles was not the same, but that "you can always match impedance some other way" (R. 548). In effect, therefore, Dr. Yang stated that although the substitution of one dipole for another dipole of a different type might bring about a deterioration in performance, there might be ways of overcoming this deterioration by modification of the antenna. This constitutes what might be called the "patchwork" theory of antenna design, in which a deterioration of one aspect of an antenna's performance is permitted in order to obtain improvement in some other desired characteristic, with the expectation that the deterioration would be rectified in some other manner. Of course, the rectification of one defect might involve a deterioration in still another property of the antenna which would again need to be rectified, and so on. This "patchwork" type of design was precisely what Isbell did not use. His antenna represented an optimum combination of desirable properties, without any need for overcoming deficiencies. There was no deficiency which had to be patched up, as Dr. Yang suggests, by the use of other expedients.

On pages 34-42 of its brief, defendant argues that the

KO antenna (DX-5-6) employing folded dipoles would have suggested Isbell's construction using straight dipoles. In particular, defendant argues that a folded dipole operates basically in the same manner as a linear dipole "with the exception of a difference in impedance characteristics" (DB-35), and that any deterioration of performance stemming from impedance mismatch could be rectified in some other manner, i.e., by use of the "patchwork" design method. A simple answer to this argument is that if defendant wishes to employ folded dipoles in its antenna and to overcome the deficiencies in some other manner, plaintiff will not accuse such structures of infringement.

On pages 36-38 of its brief, defendant is shockingly inaccurate in treating Dr. Mayes' testimony (R. 661-662) concerning the obviousness of substituting straight dipoles for folded dipoles in the KO structure. Defendant attributes to Dr. Mayes statements which he never made (e.g., "Where then . . . is the deterioration that Dr. Mayes testified would result because of the substitution?"; DB-38), and then announces that Dr. Mayes' testimony is "effectively negated by the actual tests conducted by Mr. Shelledy" (DB-37). The truth of the matter is that Dr. Mayes did not testify concerning the actual effect of substituting straight dipoles for folded dipoles in the KO antenna, but rather how such a substitution would have appeared to one skilled in the art in 1959. The fact is, of course, that one skilled in the art having the opinion which Dr. Mayes gave would have been wrong, which at least in part may account for the failure of the art to see the invention. The fact that such a substitution of straight dipoles for folded dipoles could be made successfully in the KO antenna is immaterial. It was never made (R. 382) even though it was advantageous to do so. This failure to make an obviously desirable change in the KO antenna and the disappearance of the KO antenna (R.

383) in 1959 from the commercial market, amply demonstrate the truth of Professor Mayes' opinion regarding the unobviousness of the substitution. This opinion was also shared by the Patent Office, which knew about the KO antenna when it issued the Isbell patent (PB-32, 33).

V. CLAIMS 3, 9, 10, 14 and 15 ARE VALID.

Claim 9.

Defendant alleges (DB-43) that claim 9 is invalid because there is no teaching in the Isbell patent of a logarithmic relationship. Although plaintiff argued during the prosecution in the Patent Office that Claim 9 did not properly define Isbell's invention, the Patent Office decided, however, that the arrangement in which dipole lengths, for example, vary by a substantially constant scale factor is in itself a logarithmic relationship. In fact, the "log" in "log-periodic" is an abbreviation for "logarithmic." The Patent Office held that Isbell was entitled to the language of Claim 9. We abide by the Patent Office's decision on this point.

Claims 14 and 15 Are Supported by the Disclosure.

In an amazing display of verbal gymnastics (DB-45, 46), defendant argues that because Mr. Harris referred to the diagonal measurement of a cell, his testimony that the cell itself consisted of a dipole plus an adjacent section of a transmission line, cannot be true. This is tantamount to saying that a square cannot be a closed figure having four sides of equal length forming right angles, because squares can be measured by the length of a diagonal. Nowhere did Mr. Harris testify, as defendant alleges (DB-46), that a cell is "obtained" by taking the square root of the sum of the squares of the spacing and half the dipole length. His testimony was that a cell con-

sists of a dipole plus a section of transmission line and that a "cell measurement" (R. 123) is the length of the diagonal from the feeder to an outer end of the dipole, which can be calculated by using the well-known Pythagorean theorem of geometry. Defendant's distortions cannot change the facts.

Claims 9, 14, and 15 Did Not Involve New Matter.

Defendant's assertions (DB 47-49) that claims 9, 14 and 15 of the Isbell patent are invalid as incorporating new matter are best answered by referring to the fact that each of these claims was specifically considered by the Patent Office on this basis and found acceptable. Claim 9, in fact, was suggested by the Patent Office as an interference count and was obviously considered to be supported by Isbell's disclosure. Application claims 16 and 17 (corresponding to Claims 14 and 15 of the patent) obviously were examined by the Examiner for absence of new matter, since all three claims were examined at the same time and claim 15 was specifically rejected on this ground, while claims 16 and 17 were allowed.

Defendant's contention (DB-49) that the Examiner "for an unexplained reason did not observe that fact and did not act with regard to these claims [16 and 17]" is pure unsupported conjecture. It strains one's credulity to assume that the Examiner could have failed to note the similarity in claims 15, 16 and 17 and that he, through oversight, neglected to apply the same rejection to claims 16 and 17 which was applied to claim 15. The truth of the matter is that claim 15 differed from claims 16 and 17 in that it omitted the express limitation that the lengths of adjacent dipoles must decrease according to a substantially constant scale factor, while both claims 16 and 17 contained this limitation. The Examiner, therefore, quite

properly distinguished between claim 15 on the one hand and claims 16 and 17 on the other because of this limitation. It was not a case of oversight on the part of the Examiner as defendant alleges.

Claims 3 and 10 Are Not Invalid for Failure to Include an Essential Element.

In another display of tortuous reasoning, defendant alleges (DB 51-53) that claims 3 and 10 are invalid because they do not *expressly* contain certain limitations which defendant (but not the Patent Office) considers essential.

Defendant's argument concerning claim 3 is a curious mass of contradiction. Although defendant admits that the claim language *inherently* defines the spacing of the elements (DB-52, 66), it then argues that the claim is fatally defective (DB-53) "through the omission of an essential element or requirement," i. e., an *express* statement of the spacing. Plaintiff fails to see how a limitation which is inherent in a claim is omitted therefrom. Defendant cites no authority in support of its argument that all limitations in a claim must be positively set forth rather than being inherent in the claim language. There is none.

VI. THE ISBELL PATENT IS NOT DIRECTED TO A VERY NARROW STRUCTURAL CONCEPT WHICH CANNOT BE BROADENED.

On pages 54-60 of its brief, defendant sets forth its version of the doctrine of file wrapper estoppel and argues that plaintiff's representations to the Patent Office estop plaintiff from alleging that the claims of the Isbell patent cover defendant's antennas. The subject was treated at some length in our main brief, in which we showed (PB 19-21) that before a file wrapper estoppel can be invoked,

there must be some amendment of the claims involved, and that no amendment of this type was made in the prosecution of the Isbell patent. The cases cited by defendant do not state that file wrapper estoppel can exist in the absence of amendment, but only that in some cases where an ambiguity is found, it may be permissible to resort to the file wrapper for whatever help it may offer in resolving the ambiguity. There is no such ambiguity in the present case. Plaintiff admits that all of the claims in this case literally state that the length of adjacent dipoles decrease according to a substantially constant scale factor, while either the spacings or the cell lengths also decrease in the same manner. It is also true that in most of defendant's antennas the spacings do not decrease, although the cell dimensions do. As we admitted in our main brief (PB-17-19, Table 3), those claims calling for decreasing dipole spacings are not literally infringed (except by antenna CT-100). These antennas, however, nevertheless infringe such claims by the doctrine of equivalents.

In summary, despite defendant's arguments, nothing which was stated on behalf of Isbell during the prosecution of the patent requires that the claims of the Isbell patent be construed in a manner such that defendant's antennas do not infringe.

VII. THE ISBELL PATENT CLAIMS ARE INFRINGED BY DEFENDANT'S ANTENNAS.

Our case establishing infringement of the patent has been adequately set forth in our main brief (PB-11-29). We will at this point treat only a few of the more glaring errors and untruths contained in defendant's brief.

On page 62 of its brief, defendant states that "Only a *few* of the accused antennas include an active dipole element of 50 inches or less." (Emphasis added.) The fact

is that 11 of the 22 accused antennas have such an element, while the shortest element in the other 11 antennas is not more than 53 inches long. In view of the fact that the disclosure of the Isbell patent (Col. 3, l. 8) states that the shortest element is "about" $\frac{3}{8}$ of a wavelength long, it is quite clear that defendant is here applying the same improperly rigid standard to the language of the patent disclosure which characterizes its whole approach to the issue of infringement.

Continuing in the same vein, on page 62 of its brief, defendant argues that the length factors for its antennas, Models 10B200, 10B300 and 10B400, ranging from 0.74 to 0.81, are not constant and are not "within the range of 0.8 to 0.95 specified in the patent", even though the given range is expressly set forth in the patent (PX-31, col. 2, lines 67-72) as only the *preferred* range, and even though most of the claims require only that the constant have a value less than one.

On page 63, defendant gives a further example of its flexible argument in stating at the top of the page that "In all other [than models 10B200, 10B300 and 10B400] accused antenna models, the spacing between dipole elements is either uniform or increasing toward the front of the antenna." Defendant immediately contradicts itself on the same page by admitting that model CT-100 "is the only accused antenna model where the spacing between elements decreases toward the front . . ."

On page 64, defendant attacks Mr. Harris's testimony concerning the effect of the "impedance correlators" in some of defendant's antennas. Obviously without examining plaintiff's exhibit PX-67, defendant alleges that this exhibit shows a 1 db. "deterioration" which is "$\frac{1}{3}$ of the entire gain for the antenna." Defendant compounds its errors in these allegations. In the first place, PX-67 actually

shows that the gain curve for the modified antenna (i.e., without the zigzag feeder line or so-called impedance correlator) is above that for the unmodified antenna, and accordingly, the graph shows an *improvement* in gain rather than a deterioration when the zigzag feeder is eliminated.

Secondly, at no point are the curves shown in PX-67 as much as 1 db. apart. Throughout most of the range, the actual difference is less than ½ db.

Thirdly, a 1 db. variation out of a total of 3 db. would not represent ⅓ of the total gain, but rather only about 20% because of the fact that the db. scale is a logarithmic rather than a linear function.

Fourthly, even if the gain for a particular antenna drops to 0 db. (DB-65) it would not be true that "this represents a 100% loss of antenna gain." A gain of 0 db. indicates only that an antenna has the *same* gain as a dipole. Gain readings below 0 db. are therefore not only possible, but also not uncommon.

It is clear from the evidence that the impedance correlators have no substantial effect on the operation of the antennas, at least in covering Channels 2-6. Defendant's reliance on the "impedance correlators" to show non-infringement is misplaced.

Claims 3, 4 and 5 (DB-66) give an alternative statement of the Isbell antenna construction. An antenna having precisely the preferred form of the Isbell invention, would, in fact, have dipoles whose ends fall precisely on a pair of intersecting lines. To the extent that the literal construction of the Isbell invention is not followed, however, the ends of the dipole elements will not fall on these lines. The variation therefrom, however, will be no greater than the deviation from an average value of scale factor which Mr. Harris discussed in his testimony. Further, even cursory examination of the drawings of defendant's

antennas (e.g., DX-G-2 to G-15) show that this condition is substantially met.

Claims 10, 11, and 12.

No part of defendant's argument on pages 69-80 of its brief, raises any substantial issue not treated in our main brief. We will, accordingly, here continue to point out the errors in defendant's arguments.

On page 69, defendant alleges that the spacing in its antennas 10B 1010, 10B 1020, 10B 1120, 10B 1130 and 10B 1140 *increases* toward the front of the antenna. This is flatly untrue for 10B 1010 and 10B 1020 in which the spacing is constant (PX-37), and true only with respect to the *single* space at the front of antennas 10B 1120, 10B 1130 and 10B 1140, in which uniform spacing is otherwise used. This fact, moreover, was not "incredibly . . . ignored by the witness Harris." Mr. Harris specifically stated (R. 124) that if an element was omitted at the end of one of defendant's antennas, the only effect would be a narrowing of the bandwidth. The remainder of the antenna construction, omitting the shortest element, for example, in antenna 10B 1120, would then correspond fully to the construction in which uniform spacing was employed throughout.

On page 73, defendant continues its specious argument that Mr. Harris contradicted himself in defining a cell. Defendant further alleges that Mr. Harris was unable to point to any disclosure in the patent to help define a cell but "relied instead on the drawings that he prepared on the accused antennas." This is flatly untrue. On page 89 of the record, Mr. Harris specifically referred to the *patent* drawing as showing the use of cells in the construction of the Isbell antenna. A disclosure in the drawings of a patent is just as effective as one in the written description.

The alleged failure (DB-76-77) of plaintiff to apply the

claims specifically to defendant's accused structures, to the extent it ever existed, has been fully met in our main brief (DB-12-29). This is apparently a repetition of the argument made by defendant in its motion for a directed verdict at at the close of plaintiff's case and is presumably based on the fact that we had no "patent expert" read the claim language against the accused structure. This is for the Court to determine, not for a paid advocate.

On pages 77 and 78 of its brief defendant confuses itself. Because Dr. Mayes testified that it would be impossible to predict whether a given type of cell would function as a repeating unit in a log-periodic antenna, defendant concludes Mr. Harris's testimony concerning the operation of defendant's antennas is somehow deficient. The obvious point is, of course, that defendant's structures use precisely the same cell (i.e., a straight dipole plus a section of transmission line) which Mr. Harris knows is effective as a unit in a log-periodic antenna.

On pages 78-80 of its brief, defendant asserts that Dr. Mayes was unwilling to predict whether the Winegard antennas were or were not log-periodic in form, because he was not asked. Such testimony from Dr. Mayes was not needed since the log-periodic nature of defendant's antennas was fully established by the testimony of Mr. Harris. If, however, defendant felt that such testimony was pertinent, it could obviously have posed the question during its cross-examination of Dr. Mayes.

Contrary to the argument set forth on page 78 of its brief, plaintiff did not try to prove that defendant's antennas were covered by the Isbell patent merely because they were capable of receiving color TV signals. Rather, the discussion of the operation of the Winegard antennas was used only to complete the picture of infringement by showing that Winegard's defendants accomplished the

same results as the patented antennas. The fact that they also include the same structure in order to achieve this result was amply demonstrated by the testimony of Mr. Harris plus the exhibits introduced at the trial.

Defendant's argument on pages 79 and 80 that its antennas are not infringements because the bandwidth thereof cannot be extended indefinitely is merely an acknowledgement that it is not using all of the advantages which the Isbell invention inherently possesses. This fact, however, has no significance with respect to the issue of infringement, as we pointed out in our main brief (PB 15).

VIII. DOCTRINE OF EQUIVALENTS.

Defendant's argument (DB 81-88) that plaintiff cannot rely on the doctrine of equivalents is misplaced. The substance of defendant's argument appears to be that Isbell's antenna was not a "pioneer invention" and that if the claims are construed broadly enough to cover defendant's products, they would also encompass the construction of the KO antenna. Each of these arguments is fallacious. Defendant states, without any support and as if it were an established fact, that " . . . the Isbell patent is not a pioneer patent. . . ." Nevertheless, as we have shown, Isbell was the first to use straight dipole elements in a log-periodic array, a construction which no one prior to Isbell had conceived, and a construction which even defendant's expert agreed was unobvious. We cannot think of any further elements which would be necessary in order rightfully to characterize the Isbell patent as a pioneer patent in its field.

Moreover, there is no authority which limits the application of the doctrine of equivalents to pioneering inventions, although it is generally true that a pioneer patent will be afforded a greater range of equivalents than is a narrow patent in a crowded field.

On pages 83 and 84, defendant apparently concludes that the only basis for infringement on which plaintiff relies is a showing that defendant's antennas accomplished the results obtained by Isbell's invention, while ignoring completely the correspondence in the physical construction of the antennas which was testified to at great length by Mr. Harris. Although it is true that a mere demonstration that an antenna achieves the same results as Isbell's invention does not establish the antenna to be an infringement, such a demonstration, together with a showing that the construction of the antenna corresponds substantially, if not exactly, to that claimed, clearly shows that the substance of the invention is being appropriated even if literal infringement does not exist. This is the classic case for the application of the doctrine of equivalents.

Defendant's argument concerning the equivalence between Isbell's antenna and that of the KO antenna is similarly fallacious. As previously shown, Isbell's antenna uses straight dipoles whereas the KO antenna used folded dipoles, and the substitution of straight for folded dipoles was not obvious to those skilled in the art, as demonstrated by the fact that the substitution was never made in spite of the advantages in so doing.

IX. CONCLUSION.

Defendant's allegation that the Isbell antenna did not contribute to the knowledge of the art is flatly contradicted by the testimony of Mr. Turner who testified (R. 324) that despite the need for an antenna having the properties of Isbell's invention among those skilled in the art, no one prior to Isbell made such an antenna, and that immediately after Isbell's invention, his antenna was widely adopted.

Despite defendant's arguments to the contrary, it is

clear that the Isbell antenna was indeed a patentable invention which was, in fact, appropriated by defendant. Defendant's antennas infringe both literally and by application of the doctrine of equivalents.

Respectfully submitted,

WILLIAM A. MARSHALL,
BASIL P. MANN,
30 West Monroe Street,
Chicago, Illinois 60603,
Area Code 312-346-5750,
Attorneys for Plaintiff.

Of Counsel:
CHARLES J. MERRIAM,
MERRIAM, MARSHALL, SHAPIRO & KLOSE,
30 West Monroe Street,
Chicago, Illinois 60603,

COOK, BLAIR, BALLUFF & NAGLE,
409 Putnam Building,
Davenport, Iowa 52801.