In the Matter of

CERTAIN FOAM EARPLUGS

Investigation No. 337-TA-184

REMEDY, PUBLIC INTEREST, AND BONDING

USITC PUBLICATION 1671

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United States International Trade Commission / Washington, DC 20436

UNITED STATES INTERNATIONAL TRADE COMMISSION

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UNITED STATES INTERNATIONAL TRADE COMMISSION
Washington, D.C. 20436

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COMMISSION OPINION ON REMEDY, THE PUBLIC INTEREST, AND BONDING

I. Remedy

A general exclusion order prohibiting the entry of all foam earplugs that infringe claims 1 or 11 of U.S. Letters Patent Re. 29,487 is the appropriate remedy in this investigation. In deciding whether to issue a general exclusion order as opposed to a limited one, the Commission has traditionally emphasized the need to balance complainant's interest in obtaining an adequate remedy against the possible chilling effect on legitimate trade potentially caused by a general exclusion order. 1/

In this investigation, there is evidence that the U.S. Customs Service can easily detect infringing earplugs, thus minimizing the potential impact on legitimate trade. 2/ At the same time, there is evidence that foreign

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1/ Certain Airless Paint Spray Pumps and Components Thereof (hereinafter Spray Pumps), Inv. No. 337-TA-90, USITC Pub. 1199 (Nov. 1981). See also Certain Caulking Guns, Inv. No. 337-TA-139, USITC Pub. 1507 (March 1984); Certain Processes for the Manufacture of Skinless Sausage Casings and Resulting Product, Inv. No. 337-TA-148/169, USITC Pub. 1624 (Dec. 1984).

2/ Comments of the Commission Investigative Attorney Concerning Remedy, Bonding, and the Public Interest, Inv. No. 337-TA-184 at 10; Complainant's Brief on Public Interest, Remedy and Bonding at 17-18.

producers can produce infringing earplugs with minimal investment, 3/ and that one of the settled respondents is doing business with an importer which has offered to send samples of foam earplugs to the United States. 4/ In addition, the available evidence indicates that future imports of foam earplugs are likely to be infringing, since prior art earplugs do not possess the benefits of recovery rate and equilibrium pressure that are critical to the success of the patented earplugs. 5/ In our view, the apparent ease with which foreign manufacturers could produce infringing earplugs for the U.S. market, the likelihood that future imports will be infringing, and the apparent attempt by a respondent to solicit sales in the United States through an importer not named in this investigation warrant issuance of a general exclusion order.

Under Certain Airless Paint Spray Pumps and Components Thereof (Spray Pumps), 6/ the Commission established standards for the issuance of a general exclusion order. 7/ In that investigation the Commission required complainant to prove that there was a widespread pattern of unauthorized use of the patented invention and that business conditions existed from which one might reasonably infer that foreign manufacturers other than respondents might attempt to enter the U.S. market with infringing articles. 8/ Although the

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3/ FF 239, CX-67 at 7-9, 55.
4/ CX-132 at 31-32; CX-142, FF 248.
5/ ID at 103, FF 110, FF 64, 90, and ID at 98. For insertion into the ear canal the wearer is instructed to compress the patented earplug so that its diameter is less than the canal. After insertion, it slowly expands to fill the canal. Recovery rate is important to allow time for insertion. Equilibrium rate is important so that the wearer remains comfortable with the limitation of pressure in his ear.
6/ Inv. No. 337-TA-90, USITC Pub. 1199 (Nov. 1981).
7/ Spray Pumps at 17.
8/ Id. at 18.

evidence in this investigation does not suggest that there was a past widespread pattern of unauthorized use of complainant's earplugs, the available evidence strongly suggests that business conditions exist which will encourage foreign manufacturers other than the respondents to attempt to enter the U.S. market with infringing earplugs. Moreover, one respondent in this investigation has a history of marketing earplugs under different corporate names 9/ and there is evidence that one of the respondents might attempt to evade the impact of a limited exclusion order by selling through a non-party importer. 10/ We find that under the facts of this investigation that is sufficient to warrant the issuance of a general exclusion order.

II. Public Interest

Before issuing an exclusion order, the Commission must consider the impact of the order "upon the public health and welfare, competitive conditions in the United States economy, the production of like or directly competitive articles in the United States, and United States consumers. . . ." 19 U.S.C. § 1337(d). Nothing in the record of this investigation would indicate that public interest considerations should preclude issuance of a general exclusion order.

The continued availability of effective hearing protection devices is important to the health and welfare of U.S. consumers as exposure to excessive noise has been identified as a serious hazard in the workplace. 11/ However, complainant has sufficient capacity to meet projected increased demand for its

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9/ FF 18, 20-21, 166, and 248.
10/ FF 248.
11/ Occupational Noise Exposure; Hearing Conservation Amendment, 46 Fed. Reg. 4079 (Jan. 16, 1981) (Rationale for Amendment).

earplugs during the period which its patent remains in effect. Moreover, there are numerous other hearing protection devices available on the market. 12/ Complainant produces patented earplugs for sale as "E-A-R Plugs" to its own customers and for sale in bulk to the Siebe-North Company. Siebe-North packages the earplugs and sells them under the mark "Deci-Damp." 13/ Due to complainant's supply agreement with Siebe-North, there will be continued competition from that company with regard to the sale of patented earplugs. 14/

Finally, we note that the record raises some concerns about the effectiveness and cleanliness of the foreign-produced earplugs. Poor quality control and unsanitary production and packaging may cause the imported earplugs to be a hazard to the U.S. consumers. 15/

III. Bonding

The bond during the Presidential review period is intended to offset any competitive advantage resulting from the unfair act enjoyed by the persons benefiting from the importation. 16/ Applying this standard, we determine that the bond be set at 325 percent of the entered value of the articles concerned. We arrived at this bond rate by considering the difference in prices for sale of an infringing product and the sale of the domestic product when sold in equivalent quantities. 17/

12/ FF 23-24, 184.
13/ FF 84.
14/ FF 184.
15/ CX-138 at 35-36; CX-139 at 25-26; CX-67 at 14-16; FF 232.
16/ S. Rep. No. 1298, 93rd Cong., 2d Sess. 198 (1974).
17/ ID at 85.

CERTIFICATE OF SERVICE

I, Kenneth R. Mason, hereby certify that the attached Notice of Issuance of Exclusion Order was served upon Stephen L. Sulzer, Esq., and upon the following parties via first class mail, and air mail where necessary on, March 5, 1985.

Kenneth R. Mason, Secretary
U.S. International Trade Commission
701 E Street, N.W.
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Lynn J. Alstadt, Esq.
Buell, Blenko, Ziesenheim and Beck
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Pittsburgh, Pennsylvania 15222

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3217 Broadway
Suite 304
Kansas City, MO 64111

Behalf of Fujiyama Sangyo KK:

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Rita Ku
Nagoya, Aichi Prefecture
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Behalf of Eurosafe AB:

Eurosafe AB
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40 Malmo, Sweden

Behalf of Safety Direct, Inc.:

Safety Direct, Inc.
23 Snider Way
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Behalf of Swift Labs.:

Swift Labs
7415 Varna Avenue
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UNITED STATES INTERNATIONAL TRADE COMMISSION
Washington, D.C. 20436

In the Matter of CERTAIN FOAM EARPLUGS	Investigation No. 337-TA-184

COMMISSION ACTION AND ORDER

Procedural History

On January 19, 1984, a complaint was filed with the Commission by Cabot Corporation which alleged violation of section 337 of the Tariff Act of 1930 (19 U.S.C. § 1337) in the importation and sale of certain foam earplugs by reason of alleged infringement of U.S. Letters Patent No. Re. 29,487 (the '487 patent). The complaint alleged that the proposed respondents' unfair acts and methods of competition had the effect or tendency to destroy or substantially injure an industry, efficiently and economically operated, in the United States. The complainant named as respondents three parties from the Federal Republic of Germany: TECHMED, GmbH (TECHMED), Walter Schleicher (Schleicher), and AM-Produkte, GmbH (AM). Two Swedish respondents were also named: Eurosafe AM (Eurosafe) and Protector AB (Protector). There were three Japanese respondents--Fujiyama Sangyo (Fujiyama), Inoue MTP (Inoue) and S.S. Trading Co (S.S. Trading). Ltd.--and five from the United States--Eastern Safety Equipment Co., Inc. (Eastern Safety), Carleton Management Associates, Inc. (Carleton), Tasco Sales Co.(Tasco), Inc., Safety Direct, Inc.(Safety Direct), and Swift Labs (Swift). Notice of the investigation was published in the Federal Register on February 29, 1984 (49 F.R. 7464-65).

On June 7, 1984, the presiding administrative law judge (ALJ) issued an initial determination (ID) (Order No. 8) terminating the investigation with respect to respondents AM, Schleicher, Eastern Safety, and TECHMED based on settlement agreements. The ID also terminated respondent Tasco based on a copy of the Secretary of State for Rhode Island's Certificate of Revocation of Certificate of Incorporation for Tasco which showed that Tasco was no longer in business and was thus not an existing entity. The Commission decided not to review the ID terminating those respondents. 49 F.R. 31781 (August 8, 1984).

On September 24, 1984, the ALJ issued an ID (Order No. 12) terminating the investigation with respect to respondent S.S. Trading on the basis of a settlement agreement. The Commission decided not to review the ID. 49 F.R. 46317 (November 28, 1984).

On September 6, 1984, the Commission investigative attorney filed a motion for entry of default against respondents Carleton, Eurosafe, Safety Direct, Fujiyama, Protector, and Swift. (Motion No. 184-12). In his motion, the investigative attorney stated that those respondents had not filed responses to the complaint, the notice of investigation, the interrogatories served by Cabot or the investigative attorney, nor had they appeared at the preliminary conference or at the evidentiary hearing. Complainant filed a response on September 12, 1984, joining the investigative attorney's motion for default.

The ALJ granted the motion for default as part of his ID on violation of section 337 issued on November 30, 1984. The ID terminated the investigation with a finding of a violation of section 337 in the importation and sale of certain foam earplugs. Specifically, the ALJ found that a violation of

section 337 exists in the unauthorized importation and sale of certain foam earplugs which infringe claims 1 and 11 of the '437 patent, the tendency of which unfair acts is to destroy or substantially injure an industry, efficiently and economically operated, in the United States. The Commission subsequently decided not to review the ID and notice of the Commission's decision was published in the Federal Register on January 30, 1985. 50 F.R. 4277 (1985).

Action

Having reviewed the submissions received on the questions of remedy, the public interest, and bonding, and the record compiled in this investigation, the Commission has determined that a general exclusion order should be issued against foam earplugs that infringe claims 1 or 11 of U.S. letters Patent Re. 29, 487; that the public interest factors enumerated in section 337(d) do not preclude issuance of this remedy; and that a bond of 325 percent of the entered value of the articles concerned should be imposed during the Presidential review period.

Order

Accordingly, it is hereby ORDERED THAT--

1. Foam earplugs that infringe claim 1 or 11 of U.S. Letters Patent Re. 29,487 are excluded from entry into the United States except under license of the patent owner for the remaining term of the patent.

2. The articles ordered to be excluded from entry into the United States shall be entitled to entry under bond in the amount of 325 percent of the entered value of the subject articles from the day after this order is received by the President pursuant to subsection (j) of section 337 of the Tariff Act of 1930, and until such time as the President notifies the Commission that he approves or disapproves this action, but in any event, not later than 60 days after the date of receipt of this action.

3. The Commission may amend this order in accordance with the procedures described in section 211.57 of the Commission's Rules of Practice and Procedure (19 C.F.R. § 211.57).

4. The Secretary shall serve copies of this Commission Action and Order and the Commission Opinion in support thereof upon each party of record to this investigation and shall publish notice of this Action and Order in the Federal Register.

By order of the Commission.

Kenneth R. Mason
Secretary

Issued: March 4, 1985

PUBLIC VERSION

UNITED STATES INTERNATIONAL TRADE COMMISSION
Washington, D.C.

In the Matter of	)	
	)	
CERTAIN FOAM EARPLUGS	)	Investigation No. 337-TA-184
	)	

INITIAL DETERMINATION

Paul J. Luckern, Administrative Law Judge

Pursuant to the Notice of Investigation in this matter (49 Fed. Reg. 7464-65, February 29, 1984), this is the Administrative Law Judge's Initial Determination under Rule 210.53 of the Rules of Practice and Procedure of this Commission, 19 C.F.R. § 210.53. The Administrative Law Judge hereby determines, after a review of the briefs of the complainant and Commission investigative attorney and of the record developed at the hearing, that there is a violation of Section 337 of the Tariff Act of 1930, as amended,[1/] in the unauthorized importation into the United States, and in the sale of certain foam earplugs by reason of alleged infringement of claims 1 and 11 of U.S. Letters Patent re. 29,487 with the tendency to substantially injure an industry efficiently and economically operated in the United States.

1/ 19 U.S.C. § 1337, hereinafter Section 337.

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The following abbreviations have been used in this Initial Determination:

Tr.	-	Official Reporter's Transcript
ALJ Exh.	-	Administrative Law Judge Exhibit
CX	-	Complainant's Exhibits
SX	-	Commission Investigative Attorney Exhibit
CPX	-	Complainant's Physical Exhibits
(c)	-	Confidential Information Subject to the Protective Order Issued Herein
FF	-	Finding of Fact

PROCEDURAL HISTORY

On January 19, 1984, complainant Cabot Corporation (Cabot), 129 High Street, Boston, Massachusetts, 02110, a Delaware Corporation, filed a complaint with the U.S. International Trade Commission pursuant to Section 337, which as amended, alleged unfair methods of competition and unfair acts in the importation into, and sale in, the United States of certain foam earplugs by reason of alleged infringement of U.S. Letters Patent No. Re. 29,487 (the '487 patent). The complaint further alleged that the effect or tendency of the unfair methods of competition and unfair acts is to destroy or substantially injure an industry, efficiently and economically operated, in the United States. The complaint requested that the Commission, after a full investigation, issue a permanent exclusion order and such other relief as is appropriate based on the facts determined by the investigation and the authority of the Commission.

Having considered the complaint, the Commission ordered, pursuant to subsection (b) of § 337, that an investigation be instituted to determine whether there is a violation of subsection (a) of § 337 in the unlawful importation of certain foam earplugs, or in their sale, by reason of alleged infringement of claims 1, 2, 3, 7, 11, 12, 13 and 14 of the '487 patent, the effect or tendency of which is to destroy or substantially injure an industry, efficiently and economically operated, in the United States. The Notice of Investigation was issued and published in the Federal Register on February 29, 1984 (49 Fed. Reg. 7464-65). Although the Notice of Investigation recited claims 1, 2, 3, 7, 11, 12, 13 and 14 of the '487 patent, counsel for Cabot at the Prehearing Conference on September 4, 1984 limited the claims in issue to claims 1 and 11. (FF 53).

The following parties were named as respondents in the Notice of Investigation:

TECHMED GmbH (TECHMED)
Morkenstrasse 9
2000 Hamburg
Federal Republic of Germany

Walter Schleicher (Schleicher)
Morkenstrasse 9
2000 Hamburg
Federal Republic of Germany

AM-Produkte, GmbH (AM)
Ost-Str. 90
2000 Norderstedt
Federal Republic of Germany

Eastern Safety Equipment Co., Inc. (Eastern Safety)
45-17 Pearson Street
Long Island City, New York 11101

Eurosafe AB (Eurosafe)
Sodra Tullgafan 4 A, S-211
40 Malmo, Sweden

Protector AB (Protector)
Box 4179, S-203
13 Malmo, Sweden

Fujiyama Sangyo (Fujiyama)
Kiraku Bldg.
Shimizu 4
Rita Ku
Nagoya, Aichi Prefecture
Japan

Inoue MIP (Inoue)
2-13-4 Mei Eki Minami
Nakamura Ku
Nagoya Shi
Japan

S.S. Trading Co. Ltd. (S.S. Trading)
13-7 Kanda Cho
Chigusa-Ku
Nagoya, Aichi Prefecture
Japan

Carleton Management Associates, Inc. (Carleton)
Suite 304
3217 Broadway
Kansas City, Missouri 64111

Tasco Sales Co., Inc. (Tasco)
37 Tripps Lane
East Providence, Rhode Island 02915

Safety Direct, Inc. (Safety Direct)
23 Snider Way
Sparks, Nevada 89431

Swift Labs (Swift)
7415 Varna Avenue
North Hollywood, California 91605

Linda L. May was named as the Commission investigative attorney.

Service of the complaint and of the notice of investigation was perfected on all of the respondents, with the exception of Safety Direct. (FF 1).

On February 28, 1984, Chief Administrative Law Judge Donald K. Duvall was designated as the Presiding Officer for this investigation.

While respondents Eastern Safety, TECHMED, Schleicher and AM entered formal appearances, only respondent S.S. Trading filed a response to the complaint and notice of investigation denying exportation of form earplugs to the United States. Both Cabot and the staff attorney served interrogatories on the respondents. Again, only S.S. Trading responded to these discovery requests.

In accordance with Order No. 3, issued March 6, 1984, a Preliminary Conference was held on April 4, 1984. Appearances were made on behalf of Cabot, respondents TECHMED, Schleicher, AM, Eastern Safety, and the Commission investigative staff. No appearances were entered for the remaining respondents.

On April 16, 1984, Cabot filed a motion for default against respondents Carleton, Safety Direct, Eurosafe, Protector and Fujiyama for failing to answer the complaint and notice of investigation and to appear at the April 4, 1984 preliminary conference and to answer interrogatories. The motion was opposed by the Commission investigative attorney. On May 17, 1984, the Administrative Law Judge issued Order No. 6 requiring the non-appearing respondents to show cause by June 5, 1984 why they should not be found in default pursuant to Rule 210.21(d). None of these respondents replied to the order to show cause.

In the spring of 1984, Judge Duvall was relieved as the Administrative Law Judge in this investigation. Administrative Law Judge Paul J. Luckern was designated as the judge for the remainder of the investigation.

On June 7, 1984, the Administrative Law Judge issued an initial determination (Order No. 8) terminating the investigation with respect to respndents AM, Schleicher, Eastern Safety, TECHMED and Tasco. Termination as to respondents AM, Schleicher, Eastern Safety and TECHMED was based upon settlement agreements entered into between Cabot and each of those respondents, pursuant to 19 C.F.R. § 210.51(c). Termination as to respondent Tasco was based on a copy of the Secretary of State for Rhode Island's Certificate of Revocation of Certificate of Incorporation for Tasco which showed that Tasco was no longer in business and was thus not an existing entity. The Commission declined to review the initial determination terminating these respondents. (Notice dated August 2, 1984).

On August 1, 1984, the Administrative Law Judge issued an initial determination (Order No. 9) granting the joint motion to terminate the investigation with respect to respndent Inoue based upon a settlement agreement entered into between Cabot and Inoue. On August 30, 1984, the Commission declined to review the initial determination terminating Inoue.

A prehearing conference was held on September 4, 1984, and a hearing commenced on September 4, 1984 before the Administrative Law Judge to determine whether there is a violation of § 337 as outlined in the Notice of Investigation. Appearances were made by counsel for complainant Cabot. Stephen L. Sulzer, Esq. was the Commission investigative attorney at the hearing. No appearances were made by any of the respondents. The hearing was concluded on September 5, 1984.

Cabot and the Commission investigative attorney waived all objections under Commission Rule 210.31 except on grounds of relevance to use of third party depositions as hearing exhibits without sponsoring witnesses. Also Cabot and the Commission investigative attorney waived all objections to the authenticity of documentary exhibits.

On September 6, 1984, the Commission investigative attorney filed a motion for entry of default against respondents Carleton, Eurosafe, Safety Direct, Fujiyama, Protector, and Swift. (Motion Docket No. 184-12). In his motion, the Commission investigative attorney stated that these respondents have not filed responses to the complaint, the Notice of Investigation, the interrogatories served by Cabot or the Commission investigative attorney, nor did they appear at the April 4, 1984 preliminary conference nor at the

hearing in this investigation on September 4 and 5, 1984. It was pointed out that Carleton, Eurosafe, Safety Direct, Protector, and Fujiyama did not reply to an order to show cause (Order No. 6, issued May 17, 1984) why they should not be held in default. The Commission investigative attorney further represented that Swift had advised Cabot's counsel that Swift would not be participating in the hearing in this case. A letter dated June 6, 1984 to the Commission from Roy R. Schmidt, Swift's President, represented that Swift has no intention now, nor has had in the past, of importing, exporting, manufacturing or having manufactured for it, under its name or any other name, foam earplugs. (FF 17). Complainant filed a response on September 12, 1984, joining in the motion. For reasons set forth in Motion No. 184-12, that motion is granted and CERTIFIED to the Commission together with all papers filed therewith.

On September 18, 1984, Cabot moved pursuant to 19 C.F.R. § 210.24 to supplement the record after hearing by the addition of certain documents and a physical sample. (Motion Docket No. 184-13). The documents comprised an affidavit of Charles S. Shoup, Jr., who is General Manager of Cabot's E-A-R Division, a photocopy of a dispenser box for the Hush Foam Earplugs and a photocopy of papers relating to the purchase of a box of Hush Foam Earplugs. The Commission investigative attorney joined in Cabot's motion to supplement the record by addition of the document and physical sample. He considered the evidence relevant to the economic and patent infringement issues. Motion No. 184-13 is granted.

On September 24, 1984, the Administrative Law Judge issued an Initial Determination (Order No. 12) terminating the investigation with respect to respondent S.S. Trading on the basis of a settlement agreement. On November 20, 1984, the Commission declined to review the initial determination terminating S.S. Trading.

The economic issues have been briefed by Cabot and the Commission investigative attorney and the patent issues have been briefed by Cabot, and related proposed findings of fact submitted by Cabot and the Commission investigative attorney. The matter is now ready for decision.

This Initial Determination is based upon the entire record of this proceeding including the evidentiary record compiled at the final hearing, the exhibits admitted into the record at the final hearing, and the proposed findings of fact and conclusions of law and supporting memoranda filed by Cabot and the Commission investigative attorney. The Administrative Law Judge has also taken into account his observation of the witnesses who appeared before him and their demeanor. Proposed findings not herein adopted, either in the form submitted or in substance, are rejected either as not supported by the evidence or as involving immaterial matters.

The findings of fact include references to supporting evidentiary items in the record. Such references are intended to serve as guides to the testimony and exhibits supporting the findings of fact. They do not necessarily represent complete summaries of the evidence supporting each finding.

FINDINGS OF FACT

The following are the Findings of Fact to the extent they are consistent with the opinion.

I. Jurisdiction

1. Service of the complaint and Notice of Investigation was perfected on all respondents, with the exception of Safety Direct (ALJ Ex-1). Only one of the respondents, S.S. Trading Company, Ltd., filed a response to the complaint.

II. The Parties

2. Cabot is a Delaware corporation having diverse business interests throughout the United States and the world. (Shoup, CX-132, p. 3; SX-40, p. 2). Cabot's corporate offices are located at 125 High Street, Boston, Massachusetts, 02110. (Shoup, CX-132, p. 3). In the early 1900's Cabot was primarily a producer of carbon black, which has a variety of industrial uses. (Shoup, CX-132, p. 3; SX-3, pp. 4-6). Over the years Cabot expanded to become the world's largest producer of carbon black and entered a variety of other fields. (Shoup, CX-132, p. 3; SX-3, p. 7). In addition to its carbon black business, Cabot has a metals group which produces high quality specialty metals, a liquid natural gas distribution division, extensive oil and gas leaseholds and production facilities, natural gas processing plants, facilities for making fumed silica, and a hearing protection, noise control and vibration damping products division. (Shoup, CX-132, p. 3; CX-3, pp. 7, 20-22; SX-4, p. 2). This latter division, called the E-A-R Division, produces the product involved in this investigation. (Shoup, CX-132, p. 3).

3. Cabot's E-A-R Division began as a research group in Cabot's Corporate Research Department in about December 1970. At that time Cabot purchased the Norton Company's corporate research organization, which Norton had operated under the name Norton Research Corporation and which included the E-A-R group. Before the sale, Norton Research Corporation changed its name to National Research Corporation (NRC). Cabot's Corporate Research Department was operated through NRC in Cambridge, Massachusetts, until approximately 1972-1973. (Shoup, CX-132, pp. 3-4).

4. Principal production facilities for the E-A-R Division are located in Indianapolis, Indiana. This division supplies the United States market and exports to customers worldwide. (Shoup, CX-132, pp. 3-5).

5. Respondent Carleton is a Missouri corporation, having a place of business at 3217 Broadway, Suite 304, Kansas City, Missouri, 64111. (Taylor, CX-96, pp. 3-5). Carleton has imported from Respondents Eurosafe and Protector, white foam earplugs (CPX-33) and sold them to retailers and users in the United States under the name "Hush". (Taylor, CX-96, pp. 16, 18; CX-105c; CX-141, p. 1). Carleton is the exclusive distributor of disposable foam earplugs in North America for Protector. (Shoup, CX-96, pp. 4-8; CX-98).

6. A "Dimp" foam earplug was first discovered by one of Cabot's Swedish distributors. Samples of the Dimp have been obtained and tested by Cabot. "Dimp" foam earplug is sold in the United States under the name "Hush." It has been observed that the "Dimp" has been improved since its introduction. Cabot's Swedish distributor informed Cabot that the manufacturer of the "Dimp" foam earplug, Eurosafe, is being financed in

part by Swedish government funds. The business objective of Eurosafe is to market and sell the product in the United States. It is the United States market which has enabled Eurosafe, according to the reports Cabot has received from several sources in Sweden, to attract the government financial backing for the venture. (Shoup, CX-132, p. 33).

7. Cabot has learned of another foam earplug under development in Sweden by the name of "Dempex." This foam earplug is made in Sweden and is of a lower quality than the "Dimp." Cabot's Swedish contacts have told Cabot that efforts are underway to improve this foam earplug as rapidly as possible. (Shoup, CX-132, p. 34).

8. On September 11, 1984, Cabot received a box containing 200 pairs of "Hush" foam earplugs from a regional sales manager who purchased them from B & B Sales, 12521-3 Oxnard Street, North Hollywood, California 91606 on September 5, 1984. On the front panel of the box containing the earplugs is the statement, "Made in Sweden." The samples of "Hush" foam earplugs from this box appear to be the same as the foam earplugs manufactured by Eurosafe in Sweden and sold in Sweden under the name of "Dimp," except they appear to be of improved quality and perhaps slightly small diameter than those which were imported into the United States earlier by Carleton. The individual packages of "Hush" foam earplugs bear the legend, "Carleton Management Associated, Inc., Kansas City, Missouri," but do not indicate that the foam earplugs contained therein were made in Sweden. The box of "Hush" foam earplugs was purchased for $45.60, which is $0.228 per pair. This is approximately ten percent less expensive than the lowest retail price normally charged by distributors for E-A-R plugs in such small quantities. (CX-146; CX-147; CPX-35; CX-148).

9. Respondent Eastern Safety is a New York corporation having a principal place of business at 45-17 Pearson Street, Long Island, New York, 11101. Eastern Safety has imported yellow foam earplugs (CPX-22) from respondent TECHMED and sold them under the names "Sound-Stop" and "Eastern Disposable Foam Ear Plugs" to retailers and users in the United States. Eastern Safety is in the safety products business. (CX-56, pp. 9, 10, 11; CX-64, p. 1). Eastern Safety is a New York safety equipment distributor. (SX-17).

10. Respondent Eurosafe is a Swedish company located in Malmo, Sweden, and having a business address of Sodra Tullgafan 4 A, S-203, 13 Malmo, Sweden. (CX-105, pp. 23, 36). Eurosafe has exported white foam earplugs to respondent Carleton in the United States which have been sold in the United States under the name "Hush". (Ivarsson, CX-89, pp. 1, 2; MacLean, CX-67, p. 14; CX-105). Eurosafe has an estimated production capacity of million pairs of foam earplugs per year. (MacLean, CX-67, pp. 16-17; Ivarsson, CX-89, pp. 2-3).

11. Respondent Fujiyama is a Japanese company which had, and still has, a principal place of business at Kiraku Bldg. 2F 4 Shimizu-cho, Kita Ku, Nagoya, Japan. (CX-123, p. 15). Fujiyama has exported yellow foam earplugs through respondent, S.S. Trading to respondent TECHMED in West Germany. (Nishikawa, CX-123, pp. 15-16, (Ex. 2); Prochaska, CX-90, p. 4). TECHMED re-exported some of these yellow earplugs which it sold under the name "Sound-Stop" to respondents Eastern Safety and Tasco. (Prochaska, CX-90, pp. 5-6; CX-56, p. 27; CX-57).

12. Fujiyama operated out of its director's house. It obtained a Japanese design registration on foam earplugs and purchased foam earplugs from Inoue for resale to resppndent S.S. Trading. (SX-11, 12). Between 1981 and 1982, Fujiyama exported $870,000 worth of foam earplugs through S.S. Trading. (SX-12). It ceased its foam earplug operation at the end of 1981, assigning its registration rights to Inoue in settlement of its account. (SX-11, p. 1; SX-12).

13. Respondent Inoue is a Japanese plastics manufacturer and has a principal place of business at 2-13-4 Mei Eki Minami, Kanamura Ku, Nagoya, Japan. (Nishikawa, CX-123, p. 15 (Ex. 2)). Inoue manufactured the yellow foam earplugs which were imported by respondents Eastern Safety and Tasco, into the United States. (Nishikawa, CX-123, pp. 15-16; Procnaska, CX-90, pp. 5-6). Inoue is a subsidiary of Inoue Rubber KK, the largest tire tube manufacturer for two-wheel vehicles in Japan. (SX-11, p. 2; SX-12). Inoue Rubber reportedly has net assets of $86 million and annual profits of $8.7 million on sales of $347.8 million. (SX-11, p. 2). In early 1981, Inoue began supplying respondent Fujiyama with foam earplugs, but terminated the arrangement because of Fujiyama's payment difficulties. Inoue still has its plug punching equipment, and is prepared to fill substantial orders. (SX-11, p. 1; SX-12).

14. Respondent Protector is a Swedish company with its principal place of business at Sodra Tullgafan, Malmo, Sweden. (CX-98, p. 1). Protector is a sales agent for the white foam earplugs manufactured by respondent Eurosafe. (Ivarsson, CX-89, p. 2). Protector sold and exported the white foam earplugs to respondent Carleton. (Taylor, CX-96, pp. 3, 16). Protector appears to be the alter-ego of Eurosafe. (Shoup, CX-96, pp. 15, 18, 41). It is owned by Bertil Tindberg who also owns Eurosafe. (MacLean, CX-67, p. 18).

15. Respondent Safety Direct is a Nevada corporation having a principal place of business at 23 Snider Way, Sparks, Nevada, 89431. Safety Direct is a manufacturer of earmuff hearing protectors and a distributor of earplugs. Safety Direct packaged foam earplugs imported by Carleton into the United States. Safety Direct also sold some of these foam earplugs to retailers under the name "Silencio". It has not imported foam earplugs into the United States. (Kramer, CX-109, pp. 4, 6-7). Safety Direct provided Carleton with foam earplug warehousing and packaging services from its Sparks, Nevada location. (Taylor, CX-96, p. 5; Kramer, CX-109, pp. 4, 10). In addition, Safety Direct purchased HUSH foam earplugs from Carleton and resells them under the name "Silencio." (Kramer, CX-109, pp. 6-7; CX-112; CX-114-17; CX-120-22; CX-131).

16. Respondent S.S. Trading is a Japanese trading company and has a principal place of business at 13-7 Kanda-cho, Shigusa-Ku, Nagoya, Japan. (Nishikawa, CX-123, p. 16 (Ex. 2)). S.S. Trading supplied the yellow foam earplugs to TECHMED in Germany. Some of those foam earplugs were re-exported to the United States and sold by Eastern Safety under the name "Eastern Disposable Foam Earplugs." (Prochaska, CX-90, p. 3; Goodey, CX-129, pp. 13-14). S.S. Trading engaged in the exportation and sale of pottery, cutlery, and other miscellaneous products, including foam earplugs. (SX-11, 12); SX-13, p. 2). It reportedly has annual sales of $1.2 million. (SX-13, p. 2). On May 1, 1978, respondent TECHMED and S.S. Trading entered a distributorship agreement which provided TECHMED with exclusive rights to distribute foam earplugs in all European countries except Denmark, Sweden, Norway, and Finland. The agreement would terminate on December 31, 1982, unless extended by mutual assent. (SX-9).

17. Respondent Swift is a California corporation having a principal place of business at 7415 Varna Avenue, North Hollywood, California 91605. Swift is a wholesaler of first aid supplies. A Southern California local distributor indicated that he had received foam earplugs from Swift. (Goodey, CX-129, pp. 5-7; CX-130; Kramer, CX-109, p. 19; Taylor, CX-96, p. 41; Notice of Invest.). Peter Taylor, President of Carleton, stated that Swift never purchased foam earplugs from Carleton. (CX-96, p. 41-42). Swift, in a letter dated June 6, 1984, stated it has no intention now, nor has it had in the past of importing, exporting, manufacturing or having manufactured for it, under its name foam earplugs. (ALJ Ex. 2).

18. Respondent Schleicher is an individual and principal shareholder of respondents AM and TECHMED Mr. Schleicher personally handled all sales of the yellow foam earplug from TECHMED to the United States. TECHMED is a paper company at the present time. Mr. Schleicher transferred all of its assets to TECHMED International at the end of 1980 and later he changed the name of this company to AM. (Prochaska, CX-90, pp. 2, 5).

19. Respondent Tasco was dissolved under the laws of the State of Rhode Island on January 1, 1983. (Order No. 8). It was a Rhode Island distributor of foam earplugs. It obtained foam earplugs from TECHMED and offered them at a trade show in 1982. (Shoup, CX-132, p. 31).

20. Respondent AM is a West German company having a place of business at Ost-Str. 90, 2000 Norderstedt, West Germany. (CX-65, p. 1). AM exported samples of yellow foam earplugs (CPX-23) to O.K.I. Supply Company in the United States. (Shoup, CX-132, p. 32). AM is operated by Gisella Schleicher, Walter Schleicher Jr.'s wife. (Shoup, CX-132, pp. 31-32; Prochaska, CX-90, p. 4).

21. Respondent, TECHMED is a West German company and has a principal place of business of Morkenstrasse 9, 2000 Hamburg, West Germany. TECHMED has exported the yellow foam earplugs to the United States which were sold under the names "Sound-Stop" and "Eastern Disposable Foam Ear Plugs" (Prochaska, CX-90, p. 3; CX-63, p. 1; Goodey, CX-129, pp. 13-14). TECHMED is currently operating in Taiwan. (Shoup, CX-132, pp. 29, 31, 32).

III. Product In Issue

22. Cabot produces four types of foam earplugs: a cylindrical foam earplug colored yellow and sold under the mark E-A-R (CPX-2) or colored white and sold under the mark Deci-Damp (CPX-4); yellow E-A-R foam earplugs with a longitudinal hole (CPX-5); and paired yellow E-A-R foam earplugs tethered together by means of a cord. (CPX-6; Gardner, p. 16; CX-133c).

23. The product is issue is an earplug composed of certain polymeric foam materials marketed under the trade names "E-A-R" and "Deci-Damp." The earplug is generally cylindrical, about three-fourth of an inch long and about one-half inch in diameter. The "E-A-R" foam earplugs are yellow and the "Deci-Damp" earplugs are white (Gardner, CX-133, p. 16; CPX-2, 3 and 7). Both foam earplugs are manufactured by Cabot. The yellow foam earplugs are sold exclusively by Cabot. They are packed in cardboard pillow packages which are sold in dispensor boxes containing 200 pairs of foam earplugs. (Gardner, CX-133, p. 16; CPX-2, CPX-3). The Deci-Damp foam earplug is and has been sold exclusively through Siebe-North Company and its predecessors, Siebe Norton Company and Marion Health and Safety Company. (Shoup, CX-132, p. 25; Gardner, CX-133, p. 16; Shoup, Tr. pp. 8-9, 49). CPX-4 is a small bag of Deci-Damp foam earplugs (Gardner, CX-133, p. 16).

24. Both the "E-A-R" foam earplug and the "Deci-Damp" foam earplug are manufactured by Cabot at its production facilities located at 7911 Zionsville Road, Indianapolis, Indiana. (Shoup, Tr. 49; Gardner, CX-133, p. 16).

25. "E-A-R" foam earplugs are also manufactured by Cabot's affiliates: Cabot Canada, Ltd., Mississauga, Canada, and Cabot Safety Ltd. of Poynton, England. However, these earplugs are not sold in the United States. (Shoup, CX-132, p. 15; MacLean, CX-67, pp. 3, 11-12).

26. In addition to the standard foam earplugs, Cabot also produces foam earplugs with holes and paired foam earplugs tethered together by means of a cord. CPX-5 is a sample of the E-A-R foam earplugs with holes. This type of plug is used primarily for hearing testing or use with hearing aids. Hearing tests or augmentation equipment is inserted through the hole. (Gardner, CX-133, pp. 16-17).

27. The E-A-R foam earplugs with cord are made from a pair of standard foam earplugs to which a plastic cord has been attached. The E-A-R foam earplugs with a cord are packaged in pairs, in plastic bags and sold in boxes containing 100 pairs of the earplugs. CPX-6 is a sample of the E-A-R foam earplug with cord. This product has been represented by Cabot as covered by United States Patent 4,193,396 issued March 18, 1980, to Al Wacker and assigned to Cabot (CX-18; Gardner, CX-133, p. 17).

28. The packaging for all of the E-A-R foam earplugs is quite similar. It contains the trademark E-A-R with a damped wave design. It also contains instructions for use and an artist's drawing of an earplug being rolled between a thumb and forefinger. Additionally, the packaging contains blue lettering and a white background. (Gardner, CX-133, p. 17; CPX-3).

29. The standard foam earplug which is sold under the marks E-A-R and Deci-Damp has been represented by Cabot as covered by claims 1-8 and 11-16 of the '487 patent as well as United States Patent 4,193,396. (Gardner, CX-133, p. 17).

30. The standard E-A-R foam earplug was first manufactured in November, 1971. In 1972, foam earplugs came to the attention of Industrial Research Magazine. In the September 21, 1972 issue of Industrial Research Magazine, the E-A-R foam earplug was recognized as a technically advanced product and given the "IR-100" award. The award is given each year by Industrial Research Magazine to the 100 most significant new technical products of that year. The E-A-R foam earplugs are designated as an award winner on page 31 of the New Product Annual. (Gardner, CX-133, pp. 17-18; CX-19).

31. Two types of foam earplugs have been imported into the United States by the respondents. One type of foam earplug is white (CX-24; CPX-29; CPX-33; CPX-34; CPX-35) and the second type of foam earplug is yellow. (CPX-21; CPX-22; CPX-23; CPX-32).

32. The imported white foam earplug is manufactured by respondent Eurosafe, in Malmo, Sweden. This foam earplug is sold in Europe by respondents Eurosafe and Protector, under the name "Dimp." (Taylor, CX-96, p. 18; CPX-24; CPX-29, Ivarsson CX-89, pp. 1-2; MacLean, CX-67, pp. 13-14; CX-74; CX-75).

33. The white foam earplug is imported by respondent Carleton, in bulk quantities. (Kramer, CX-109, pp. 11-12). These foam earplugs are shipped from Carleton to respondent Safety Direct, who packages them either by hand packaging or mechanical packaging. (Taylor, CX-96, p. 5; Kramer, CX-109, pp. 11-13).

34. Safety Direct packages pairs of the imported white foam earplugs in plastic bags and places them in dispenser boxes. (CPX-33; Taylor, CX-96, pp. 6, 18). The boxes are shipped directly from Safety Direct to Carleton's customers. (Kramer, CX-109, p. 24).

35. The "Hush" earplugs are white, generally cylindrical, about three-fourth of an inch long and about one-half inch in diameter. They are packaged in pairs, in clear plastic bags, and are sold in dispenser boxes containing 150 pairs of foam earplugs. On the dispenser box is the name "Hush", instructions for use, and artist's drawings showing an earplug being rolled between a thumb and forefinger, and showing a compressed foam earplug being placed in the ear canal. (Taylor, CX-96; p. 27; CPX-33).

36. Since the termination of the hearing on September 5, 1984, another white foam earplug, made in Sweden, has appeared on the United States market sold by Carleton under the name "Hush". This version was discovered by Cabot on September 5, 1984. It appears to be of improved quality and slightly smaller in diameter. Both the dispenser box and plastic bag for each pair of earplugs are different in appearance. (Shoup, CX-146 to CX-148; CPX-35).

37. Safety Direct has packaged three pairs of the imported white foam earplugs in blister packs and sells them under the same "Silencio". (CPX-34; Kramer, CPX 109, p. 8; CX-112 to CX-117).

38. There are no differences, other than packaging, between the "Dimp," "Hush" and "Silencio" foam earplugs. (Taylor, CX-96, p. 18; Kramer, CX-109, p. 8; CPX-24; CPX-29; CPX-33; CPX-34).

39. The imported yellow foam earplugs were manufactured in Japan by respondent Inoue. (Nishikawa, CX-123, p. 15; Prochaska, CX-90, p. 3).

40. Respondent S.S. Trading exported the yellow foam earplugs to respondent TECHMED in West Germany which sold its foam earplugs under the name "Sound-Stop". (Nishikawa, CX-123, pp. 15-16; Prochaska, CX-90, p. 4).

41. The "Sound-Stop" foam earplugs are generally cylindrical, about three-fourth of an inch long and about one-half inch in diameter. They are packaged in pairs, in clear recloseable plastic bags having a rectangular white front panel which bears the trade name "Sound-Stop", instructions for use, and the name and address of TECHMED. (CPX-31; CPX-32). The Sound-Stop foam earplugs sold in Europe were white or

yellow. (Prochaska, CX-90, p. 3; CPX-31; CPX-32). Only the yellow foam earplugs were found in the United States. (CPX-22; CPX-23; Shoup, CX-132, p. 32; MacLean, CX-67, p. 31).

42. In 1982, TECHMED exported Sound-Stop earplugs to respondent Eastern Safety, who resold them in the United States under the name "Easten Disposable Foam Ear Plugs". (Prochaska, CX-90, p. 3; CX-56; CX-64; Goodey, CX-129, pp. 13-14; SX-17).

43. The "Eastern Disposable Foam Ear Plugs" are yellow, generally cylindrical, about three-fourth of an inch long and about one-half inch in diameter. They are packaged in pairs in clear, recloseable plastic bags and sold in cardboard boxes containing 250 pairs of earplugs. The box is white and bears an approximate 2 inch by 6 inch label which bears the trade name "Eastern Disposable Foam Ear Plugs", instructions for use, the name and address of Eastern Safety, and the words "West Germany". (CPX-22; CX-35; SX-17).

44. TECHMED also exported Sound-Stop earplugs to Respondent, Tasco, who offered them for sale in the United States at the 1982 Shot Show in New Orleans. (Prochaska, CX-90, p. 5; CX-57; Shoup, CX-132, p. 31).

45. TECHMED also shipped the yellow foam earplugs to the United Kingdom where they were sold in blister packs under the name "Hushler". (MacLean, CX-67, p. 29; CX-87, pp. 2-3; CX-88, p. 2; CPX-21).

46. Respondent AM sent samples of the yellow foam earplugs in pairs, packed in plastic eggs, to O.K.I. Supply in the United States. (Shoup, CX-132, p. 32; MacLean, CX-67, p. 31; CPX-23).

47. A white foam earplug has appeared on the market in Sweden under the name "Dempex." The foam earplug is made in Sweden. This earplug is of a lower quality than the "Dimp" but efforts are underway to improve this foam earplug as rapidly as possible. (Shoup, CX-132, p. 34; Ivarsson, CX-89, p. 3; CX-86; MacLean, CX-67; pp. 26-27; CPX-30).

48. A yellow foam earplug having a pink end (CPX-25) or a yellow end (CPX-26) of a different foam material is being sold in Italy and offered for sale elsewhere in Europe under the name "Mufflets" by a company called Amplisilence. (MacLean, CX-67, pp. 19-22; Gardner, Tr. 213; CX-81; CX-81).

49. A brown foam earplug (CPX-27) is being sold in Europe under the name "Sil-Sorb" by a West German company called Gela. (MacLean, CX-67, pp. 23-24; CX-84).

50. A third foreign-made foam earplug has been sold in West Germany by a large safety company named ISP under the name "Oroflex". (MacLean, CX-67, pp. 25-26; CX-85).

51. A fourth foreign-made white foam earplug having an hour-glass shape is being sold in West Germany by ISP under the name "Orexor". (MacLean, CX-67, pp. 24-25; CPX-28).

52. There also was a foam earplug made in East Germany called the "Pneumant Plug." (MacLean, CX-68, pp. 49-50).

53. There was no evidence that the "Dempex," "Amplisilence," "Sil-Sorb," "Oroflex" or "Orexor" foam earplugs have been exported to the United States. (MacLean, CX-68, pp. 52-54).

IV. The '487 Patent

54. The '487 patent titled "Earplugs" issued on December 5, 1971 from application Ser. No. 666,364 filed March 12, 1976. It is assigned to Cabot. The named inventor is Ross Gardner, Jr. It contains 19 claims (CX-4; CX-5; CX-6; CX-7; CX-8; CX-9). Cabot at the prehearing conference on September 4, 1984 limited the claims in issue to claims 1 and 11. (Tr. p. 38).

A. Reissue Claims 1 and 11

55. Reissue claims 1 and 11 in issue in this investigation read:

> 1. An earplug of generally cylindrical shape having a diameter of between 3/8 and 3/4 inch, a length [to] of between 1/2 and 1 inch and composed of a resilient plasticised polymeric foam having a sufficiently high concentration of organic plasticizer therein as to provide said foam with a rate of recovery [of] from 60 percent compression thereof to 40 percent compression thereof of from 1 to 60 seconds and an equilibrium pressure [of] at 40 percent compression thereof of from 0.2 to 1.3 p.s.i.
>
> 11. An earplug having a size and shape adapted to be compressed and inserted into the human ear canal and there allowed to expand and obturate the ear canal, said earplug comprising a resilient plasticized polymeric foam having a sufficiently high concentration of organic plasticizer therein as to provide said foam with a rate of recovery from 60 percent compression thereof to 40 percent compression thereof of from 1 to 60 seconds and an equilibrium pressure at 40 percent compression thereof of from 0.2 to 1.3 p.s.i.

Bracketed material in claim 1 refers to material deleted from claim 1 of original U.S. Letters Patent 3,811,437 ('437 patent). Underlined material in claim 1 refers to material included in claim 1 through the issuance of the '487 patent. Claim 11 originated through the '487 patent (CX-4, Cols. 6, 7, 8).

B. The '487 Specification

56. The specification discloses that many devices are known which are adapted for insertion into the human ear canal in order to suppress or attenuate the transmission of dangerous noise and thus confer a measure of protection to the anatomical hearing apparatus. The simplest earplug is said to be formed of wadded cotton. However, such earplugs are not normally greatly effective as acoustic barriers. In another embodiment, a fibrous material, such as cotton wadding, is impregnated with a compliant waxy substance. Another form of earplug is composed of a shapeless, compliant, "dead soft" mineral-filled waxy substance. These earplugs are stated to be normally deficient due to a lack of sufficient resiliency; thus, when deformed or compressed in order to enter the ear canal such earplugs do not normally recover or expand sufficiently so as to effectively obturate the ear canal. Other known earplugs are said to take the form of molded elastomeric structures, natural rubber being a common material of construction. Included within this class are earplugs having molded therein check valves and other substructures designed to allow normal voice tones to be transmitted therethrough while cancelling or preventing transmission of injurous overpressures. Such molded elastomer earplugs are said to suffer from the fact that their size and shape is preordained and fixed in the molding thereof; and that they must initially be carefully fitted to the wearer in order to provide security, comfort and effective sound attenuation properties. (CX-4, Col. 1, ll. 12-43).

57. The specification discloses that in recent years there have come into extensive usage lightweight earphones or headphones comprising generally a minature speaker having tubular member(s) extending therefrom the tips of which members are adapted for insertion in the external auditory meatus. Said tips are generally comprised of a foamed or unfoamed polymeric material such as neoprene or sponge rubber. In the case of the unfoamed polymeric tip members major deficiencies usually are said to reside in the facts that the tip members (1) tend to slip out of the ear canal, and (2) the relatively non-compliant character of the polymeric material does not lend itself to complete obturation of the ear canal. Thus, bothersome external ambient noise can often by-pass such unfoamed tip members. In the case of sponge rubber tip members the resiliency of the sponge materials is generally excessively rapid and mitigates against actual insertion of the tip member into the ear canal proper. Such tip members are usually worn, therefore, in a manner such as to urge the respective members inwardly against the external auditory meatus which is often found uncomfortable and is not ordinarily efficient in blocking the ear canal. (CX-4, Col. 1, ll 48-69, Col. 2, ll. 1-2).

58. The specification discloses that the invention in issue provides earplugs of generally cylindrical shape and of somewhat larger diameter than that of the human ear canal. Said earplugs are composed of a foamed polymeric material having a rate of recovery from 60 percent compression to 40 percent compression thereof of from 1 to 60 seconds and an equilibrium pressure at 40 percent compression thereof from 0.2 to 1.3 p.s.i. (CX-4, Col. 2, ll. 28-36).

59. FIG. 1 shows an earplug of the invention to be of generally cylindrical shape and to have a diameter somewhat greater than that of the average adult human ear canal. Optimally, the diameter of the earplug is said to be between 9/16 inch and 11/16 inch. The term "cylindrical" was said to include within its scope structures having a relatively shallow truncated cone shape or a substantially spherical shape. (CX-4, Col 2, ll. 50-64).

60. In FIG. 2 several of the earplugs are coaxially bored throughout their lengths with a central corer having a diameter of about 1/8 inch. It is said that the resulting structures are then employed as a covering over a tubular top portion of a lighweight headphone set. (CX-4, col. 5, ll. 43-47).

61. FIG. 3 is said to show an embodiment of the invention having a truncated cone shape. (CX-4, col. 2, ll. 44-46).

62. The specification discloses that at diameter lengths of the earplugs substantially greater than about one inch sufficient material can overhang the external ear so as to be bothersome to the wearer and that desirably the length of the earplug will be between 7/16 and about one inch. (CX-4, col. 2, ll. 65-68, col. 3, ll. 1-2).

63. The specification discloses that in the earplugs of the invention, any flexible polymeric material which can be foamed so as to result in an ultimately formed earplug structure meeting the necessary recovery ratio and pressure criteria constitutes a satisfactory material of construction. Accordingly, polymers of ethylene, propylene, vinyl chloride, vinyl acetate, diisocyante, cellulose acetate or isobutylene can be employed. In particular, vinyl chloride homopolymers and copolymers comprising at least 85 percent by weight of vinyl chloride and up to 15 percent by weight of other monomers are favored. It is said that a vinyl chloride based polymer, and particularly a vinyl chloride homopolymer, can normally be compounded into a plastisol form with a blowing agent and with a high concentration of a suitable organic plasticizer so as to result in stabilized foams having the rate of recovery and pressure characteristics necessary in the composition from which the earplugs of the claimed invention are fabricated. (CX-4, col. 3, ll. 3-37).

64. The specification discloses that the relatively slow recovery rate in returning from 60 percent compression to 40 percent compression of the foamed materials employed in the earplug construction of the invention confers to the user the ability to initially compress or otherwise deform the earplug and provide sufficient time for insertion thereof into the ear canal; that subsequent to said insertion, the compressed or deformed earplug slowly recovers and attempts to regain its original shape; that by so doing, the recovering polymeric material conforms to the structure of the ear canal and establishes substantially complete obturation thereof. (CX-4, col. 3, ll. 38-52).

65. The specification discloses that the pressure and recovery rate criteria of the inventor's foamed polymeric composition define a composition having the further characteristic of relative "deadness", and that while form stable in the sense that the earplug, when deformed, will tend to recover its original shape and size, the slow rate of recovery thereof and the very small overall pressure exerted by the plug surfaces on the constraining ear canal ensure that little sound will be transmitted through the material and into the bony structure of the canal. (CX-4, col. 4, ll. 43-53).

V. Prosecution of the '487 Patent and the Predecessor '437 Patent

66. Inventor Gardner filed application Ser. No. 192,366 on October 26, 1971. In the first Patent Office action on October 16, 1972, the Examiner rejected original claims, 1 through 9 under 35 U.S.C. 102 as anticipated, and under 35 U.S.C. 103 as obvious, over British patent 733,542 to Hultgren. There was also a rejection of an original claim over Hultgren in view of any of Knight U.S. Letters Patent No. 2,717,596, Michael et al. U.S. Letters Patent No. 2,824,558 or Hoffman U.S. Letters Patent No. 3,097,059. Wade U.S. Letters Patent No. 2,262,568 and Thomas U.S. Letters Patent No. 2,538,339 were cited by the Examiner as of interest. (CX-144, p. 22).

67. The Hultgren British patent disclosed improvements relating to ear protectors. The Examiner in his office action on October 16, 1971, noted that Hultgren disclosed use of polymeric polyvinychloride in the protector and the use of varying pore density (foam), i.e., compression rates. It was stated that it would be obvious to design earplugs with the inventor's specifications and such would be within the scope of the British Hultgren patent with mere routine experimentation to optimize results. (CX-144, p. 21; CX-15).

68. In an amendment filed January 15, 1973, it was asserted that the inventor had discovered that the use of certain polymeric foams in the construction of generally cylindrical earplug structures yielded simple overall structures having outstanding benefits of easy insertability, wearer comfort and highly competent sound attenuating characteristics. The foams were said to be those which, when formed into said cylindrical earplug shapes, display certain physical characteristics pertaining to recovery rate and equilibrium pressure under conditions of partial deformation. Adherence to the recited combination of physical criteria, viz. specific rate of recovery of equilibrium pressure, was said to ensure that sufficient time be afforded to the user so that an earplug of the invention may be initially deformed to below the size of the ear canal, then inserted without interference into the canal and, finally, allowed to slowly recover so as to fit itself to the ear canal and create a substantially complete and comfortable obturation thereof. (CX-144, p. 23).

69. In the amendment filed January 15, 1973, it was stated that the text of the Hultgren patent specification very clearly disclosed that the vinyl chloride polymer foams contemplated were strictly those of an "elastic, spongy" nature; i.e., foamed materials which possessed extremely rapid recovery rates; and that in a preferred embodiment, the Hultgren ear protectors were supplied with an axially oriented stem in order to facilitate insertion and withdrawal thereof which was said to be further evidence of the rapid recovery rates of the foams contemplated in the reference. It was stated that Hultgren disclosed that the foamed material forming the body of the ear protector was of open cell construction to provide for equilibration of pressure between the external environment and the portion of the ear chamber obturated by the protector; that quite to the contrary,

the inventor's exemplary vinyl chloride polymer foam earplugs were of a predominantly closed cell structure required to possess the physical combination of slow recovery rate and low equilibrium pressure under conditions of partial deformation. (CX-144, pp. 23-33).

70. In the amendment filed January 15, 1973, and with respect to the Examiner's contention that only routine experimentation would be required to modify the Hultgren ear protectors to the inventor's physical specifications, it was stated that Hultgren did not even mention recovery rate or equilibrium pressure. Moreover, it was pointed out that the successful polyvinylchloride foams employed in the inventor's working examples contained unusually high concentrations of plasticizers and hence the formulation of suitable polymeric foams to meet the physical criteria of the inventor's claimed earplugs required substantially more than "mere routine experimentation." (CX-144, pp. 23-33).

71. In a second Patent Office action dated 4/11/73, which was a final rejection, the Examiner again rejected claimed subject matter under 35 U.S.C. 102 as anticipated, and under 35 U.S.C. 103 as obvious, over the British patent 733,542 to Hultgren. The Examiner's position was that Hultgren disclosed varying the properties of an earplug by controlling the sizes of the pores and density of the material; that "one property" to be effected by varying pore size and density was compression and recovery rates; and that the range of the inventor's claimed language was so large as to fall within the four corners of the Hultgren disclosure. The Examiner further was of the position that it was well within the skill of the art to vary pore size and density to arrive at the desired properties of compression or recovery rates, "as much would be the result of routine experimentation." (CX-144, pp. 35-37).

72. Responding to the Patent Office action dated 4/11/73, in an amendment B filed July 6, 1973, it was stated that the inventor's recited range of compression rates was nowhere near as broad as intimated by the Examiner; that the recited times of recovery were for a limited extent of recovery spanning only 20 percent of the total dimensional recovery available in a 100 percent compressed ware. (CX-144, pp. 38-43).

73. In a Patent Office action dated 7/27/73, the Examiner stated that an amendment B did not overcome his rejection of 4/11/73. A notice of appeal and brief on appeal were thereafter filed. (CX-144, p. 44).

74. In the brief on appeal the inventor's position was that his invention resides in a novel earplug ware possessed of outstanding wearer comfort, easy insertability and good sound barrier properties. In the achievement of these desirable properties, it was stated that the earplug comprised a generally cylindrical shape formed of a foamed polymeric material, the formed shape bearing narrow ranges of certain physical properties relating to (a) recovery rate and (b) equilibrium pressure. The recovery rates required of the earplugs were said to give rise to what can be conveniently called a "time delay" phenomenon whereby the ware can be compressed or otherwise physically worked down to a diameter below that of the ear canal in which it is to be inserted and, as a result, can be readily inserted relatively deeply into the ear canal before substantial recovery of the earplug occurs. This so-called "time delay" feature was said to contribute greatly to the feature of easy insertability of the earplug wares as well as contributing greatly to their effectiveness as sound barriers. Upon partial recovery of the ware,

which recovery is limited by the structure of the ear canal, there was said to be achieved a substantially complete obturation of the canal throughout a substantial length. The recited equilibrium pressure criteria were said to contribute greatly to the feature of wearer comfort by insuring that the earplugs of the invention will not bear excessively on the surfaces of the ear canal. It was said that the overall effectiveness of the earplug wares is due to the combination of the recited physical criteria since, if the recovery rate is excessively rapid while the equilibrium pressure is suitably low, it would not be possible to achieve sufficient insertion of the earplug (coupled with the low exerted pressure) to result in good sound barrier properties; and that if the recovery rate criteria are met while the equilibrium pressure properties are excessive, it was obvious that substantial discomfort to the wearer would be likely to occur, especially because the earplug ware, due to the "time delay" feature, would most likely be inserted rather deeply into the ear canal, thus bringing the pressure exerted thereby to bear upon a relatively large surface thereof.

75. In an action dated January 22, 1984, the Examiner stated that a notice of allowance would be mailed in due course. Claim 1 had been amended by agreement to substantively read:

> An earplug of generally cylindrical shape having a diameter of between 3/8 and 3/4 inch, a length to between 1/2 and 1 inch and composed of a resilient plasticised polymeric foam having a sufficiently high concentration of organic plasticizer therein as to provide said foam with a rate of recovery of 60% compression thereof to 40% compression of from 1 to 60 seconds and an equilibrium pressure of 40% compression thereof of from 0.2 to 1.3 p.s.i.

(CX-144, pp. 63-64).

76. A notice of allowance was mailed on 2/6/74 and the '437 patent issued on May 21, 1974. (CX-144, p. 65).

77. The '437 patent included within the scope of the earplug structures, those structures having a relatively shallow truncated cone shape or a substantially spherical shape. (CX-4, col. 2, ll. 46-51). Also the '437 patent stated that it was another object of the invention to provide earplugs adapted for insertion into the ear canal with substantially complete obduration thereof. (CX-4, col. 2, ll. 5-7).

78. On March 12, 1976, reissue application Ser. No. 666,364 was filed by inventor Gardner which was less than two years after the grant of the '437 patent on May 21, 1974. In an Office action dated October 13, 1976, the Examiner rejected reissue claims 11-19 under 35 U.S.C. as being based on a defective oath. (CX-16).

79. In a supplemental oath filed February 11, 1977, the inventor believed the '437 patent to be partially inoperative by reason of the inventor claiming less than he had a right to claim. Specifically he believed those recitations in claim 1 of '437 patent which teach (1) the generally "cylindrical" shape of the ware, and (2) specific ranges for the diameter and length dimensions of the ware were, in the first instance, were technically incorrect and, in the second instance, both superfluous and unnecessary. (CX-16, pp. 30-35).

80. An amendment A filed 2/11/77 called the Examiner's attention to the following art not of record in the parent case:

U.S. 3,123,069 Laisne (1964)

U.S. 3,618,600 Douglass (1971)

U.S. 3,644,939 Beguin (1972)

U.S. 3,771,521 Kittredge (1973)

U.S. 3,895,627 Leight (1975)

French Patent 1,559,694

Netherlands Patent Application Ser. No. 69 07047

Italian Patent 858,371

(CX-16, p. 28).

81. In a supplementary amendment dated May 4, 1977, it was stated that Laisne U.S. 3,123,069 did not disclose foamed polymers nor did the Laisne ear insert depend upon limited recovery characteristics of the materials of construction as was required by the claims in issue. It was further stated that Douglass U.S. 3,618,600 neither disclosed foam polymeric materials of construction, nor was his two-piece ear stopple ware adapted for actual insertion into the ear canal, as was the claimed earplug (in issue in this investigation). Since the Douglass ear stopple was not adapted for actual insertion into the ear canal, it was said that there existed no need for control of the rate of recovery of the material from which is is constructed and that since the inwardly directed biasing force employed in the Douglass ware to seal the ear stopple against the external auditory meatus was generated by means separate and distinct from the stopple construction, neither of the characteristics of rate of recovery and equilibrium pressure upon recovery of the stopple's rubber material of construction was of any particular significance. (CX-16, pp. 37-50).

82. In the supplementary amendment dated May 4, 1977, it was argued that no element of the Beguin U.S. 3,644,939 earcup type hearing protector was insertable into the ear canal. It was further argued that the Beguin earcup ware depended upon the employment of a separate and distinct biasing means by which the earcup was urged against the head of the wearer in order to establish sealing engagement of the earseal construction thereof to the wearer. In contrast it was said that in the inventor's wares, this sealing engagement was achieved internally, i.e., essentially solely through the recovery characteristics of the polymeric foam material of construction after it had been "compressed and inserted into the ear canal and then allowed to expand and obturate the ear canal." As to the Kittredge U.S. 3,771,521 earplug, it was stated that no mention or suggestion was made in the reference of polymeric foam materials nor was there any mention or suggestion directed to the use of materials of construction having specifically tailored recovery characteristics upon release from compression thereof. (CX-16, pp. 37-50).

83. The statement was made in the supplementary amendment dated May 4, 1977 that the Leight U.S. 3,895,627 ear protector depended upon an external biasing means to urge soft resilient pods, which were affixed to the ends of a resilient head band, into sealing engagement against the openings of the ear canals. There was said to be no mention of foamed polymers in Leight and no hint or suggestion of any criticality attendant the recovery properties of the materials employed for fabrication of the pods. As to the Avot French patent 1,559,694 insertable earplug structure, it was said that since the foam precursor components of the Avot constructure were, in essence, prepackaged, there obviously appeared to be little control over the pressures ultimately exerted by the expanding foam

upon the surface of the ear canal of the wearer. In contrast it was stated in the Gardner claimed structure, the feature of wearer comfort was provided by use of a foam material of construction having an equilibrium pressure at 40 percent compression thereof of 0.2 to e at 40 percent compression thereof of 0.2 to pressure at 40 percent compression thereof of 0.2 to 1.3 p.s.i.'s. (CX-16, pp. 37-50).

84. Regarding Netherlands Patent application Ser. No. 69.07047, in the supplementary amendment dated May 4, 1977, it was stated that while the earplugs of the Dutch application did attack the problem of insertability as did the inventor Gardner's earplug ware, the solution in the Dutch application was entirely distinct and divorced from that of the inventor, that whereas the inventor's wares provided a "time delay" feature by employment of sufficiently high concentration of an organic plastisizer in the resilient polymeric foamed composition of construction, the wares of the Dutch reference employed non-elastic plastic impregnants which were dependent upon heating to body temperature in order that the elastic polymeric foam framed element may be allowed to expand. It was also said that the elastic polymeric foam "frame" elements employed in the Dutch application were inherently required to be of open-cell construction so that they may be impregnated with a non-elastic heat softenable plastic material; and that the Dutch apparatus lacked any contemplation of any specific method or means by which to control and limit the pressure exerted by the partially recovered foam material within the ear canal. An Italian patent 858,371 corresponding to British patent 1,256,412 was said to disclose vinyl chloride based polymeric foam compositions having improved low rebound properties. It was stated that the only specific utility disclosed for said foam compositions is as a material for absorbing mechanical energy

in vibration damping and crash padding applications. Also it was stated that there was no teaching or suggestion as to which one of the myriad of possible formulations in the Italian patent would yield foams having the inventor's critical combination of properties. (CX-16, pp. 37-50).

85. A "Supplementary Amendment II" dated May 24, 1977 added FIG. 3 which was said to be a view of an embodiment of the invention having a truncated cone shape. It was stated that the Examiner had identified the original drawing as being defective since that drawing did not depict the truncated cone embodiment of the invention. Also, as proposed by the Examiner, the phrase "having a size and shape" to describe the earplug in claim 11 was included in claim 11. The Examiner was said to have pointed out that the Italian patent neither disclosed nor suggested wares "having a size and shape adapted to be compressed and inserted into the human ear canal." (CX-16, pp. 66).

86. A notice of allowance was issued on 7/8/77 and the '487 patent issued on Dec. 6, 1977. (CX-4; CX-16).

VI. Events Leading to the Filing of the '437 Patent Application

87. Ross Gardner, Jr., the sole inventor on the '437 and '487 patents in 1960 obtained an associate degree in chemistry from Lincoln Institute which is a part of Northeastern University. Since obtaining that degree, he has taken courses and seminars covering a number of science and technical subjects including chemistry, polymer chemistry, statistics and communications. At the time he obtained his degree, he was employed by National Research Corporation (NRC) at its facility in Cambridge, Massachusetts. He was initially employed as a technician in the analytical

laboratory and then elevated to the title of Junior Chemist and finally Chemist. He went from there to the instrument laboratory. Thereafter, he acted as a coordinator between the two laboratories. While assigned to the laboratories, he utilized the flame photometric, colormetric, emission spectrographic, x-ray emission, and x-ray diffraction equipment and did wet analysis. Thereafter, he worked in the physical chemistry laboratory, mathematics group, metrallurgical group and did further work in the analytical group. His work at NRC included studies in vacuum deposition of metals and the development of rocket propellants. The rocket propellant program utilized various metals, inorganics, monomers and polymers providing coatings on rocket propellants. Still working at NRC, now Norton Research Corporation, he worked in the chemical specialities group. Most of his early work was in the field of synthesis of new materials. Mr. Gardner joined Cabot when it acquired National Research Corporation (NRC) from Norton Company. About the time of the acquisition, Mr. Gardner was appointed Technical Director of the energy absorbing resins program. Some time later, after the acquisition, E-A-R Corporation was created as a wholly owned subsidiary of Cabot. Certain assets of National Research Corporation were transferred to E-A-R Corporation. E-A-R Corporation was later merged into Cabot and is now the E-A-R Division of Cabot. All patent rights then owned by National Research Corporation relating to plastics, composite materials and some instrumentations were included in the sale. (Gardner, CX-133, pp. 1-2).

88. Some time in 1970 or 1971, while Mr. Gardner was working for National Research Corporation, a suggestion was made that this company should produce earplugs made of latex and silicone material. There was no suggestion that such earplugs should be made of a foam (despite the fact that the company was manufacturing foam), or that they should be capable of being inserted into the ear other than in a conventional way (i.e., by being forced into the ear while rubbing against the sides of the ear canal). Mr. Gardner was not involved in this suggestion, but he had heard of it. At that time, National Research Corporation was making sheets of energy absorbing foamed material intended for padding in such things as artificial football field underlayment and other sports equipment. Other material included epoxies and solid polyvinyl chloride sheets. The foamed materials were intended to absorb energy upon impact. The solid polyvinyl chloride sheet was intended for use in impact absorbing, low rebound producing and vibration damping applications. One feature of energy absorbing material is that if force or pressure is applied, its resistence to the force or pressure increases as the rate of application of force or pressure is increased. (Gardner, CX-133, p. 3).

89. In 1970 or 1971, Mr. Gardner's first thought was to produce standard flanged earplugs out of energy absorbing material. He thought that when loud sound (noise) produced a force or pressure upon the earplug the energy absorbing material would resist that force leading to an improved earplug. However, NRC was not set up to allow for an easy molding of such a product. (Gardner, CX-133, p. 3).

90. In March of 1971, NRC made a foam which it was attempting to sell to Motorola for use between stacked circuit boards to absorb shock. It also attempted to sell foam to a division of Monsanto that was producing Astro-Turf surfaces. The foam was intended to be used as an energy absorbing underlayment for the Astro-Turf surfaces. Mr. Gardner was working in NRC's Quality Control and a particularly thick batch of energy absorbing foam material arrived. This foam, thicker than NRC was attempting to sell, appeared "perhaps" adequate to cut out a section to shove into the ear and "see", in fact, if the use of an energy absorbing material as an earplug might have merit. What Mr. Gardner discovered was a mechanical phenomenon which allowed these plugs of foam material to be rolled down allowing ample time to insert the plugs into Mr. Gardner's ears and then recover to give him a comfortable custom fitting foam earplug which cut out noise occurring in the laboratory. Then while taking thickness readings on samples of one of these experimental foams which NRC had produced, Mr. Gardner noticed that thickness readings were very sensitive to pressure and that care must be exercised in taking the reading. He reported that fact in his notebook at page 140. He also noted at page 140 that "It has long been realized the one of the valuable properties of EAR foam and especially EAR C-3002-7 (which was the foam Mr. Gardner was measuring at the time) . . . is its ability to conform to surfaces extremely well while exerting no pressure to speak of." (Gardner, CX-133, p. 4; CX-1).

91. In Mr. Gardner's notebook at page 140 it was also noted that "The lot 010211 Roll 57 natl . . . might make nice earplugs if the proper size cylinders chould be cut-out in volume. Some compressive resistant work will be done to show what the equilibrium pressures involved are. Additionally, a few cylinders will be cut-away and tried as ear plugs." (Gardner, CX-133, p. 5; CX-1).

92. At the time Mr. Gardner recorded notebook page 140 it was not known what size cylinder of foam cut-away from a foam sheet and rolled down between the fingers would be best as earplugs. It was also not known whether cylinders of foam would have good enough noise attenuation properties when placed in the ear when compared to other earplugs available at the time. (Gardner, CX-133, p. 5; CX-1).

93. After recording notebook page 140, Mr. Gardner cut out some earplugs of different diameters from the E-A-R C-3002-7 foam with a borer and he tried different sizes out himself. He compressed the foam cylinders and inserted them into his ears where they expanded and seated against the sides of the ear canals. He felt that of the sizes tried the 5/8" diameter cylinders seated quite nicely and apparently cut out high frequency noise while still allowing him to hear normal conversation. He made some more plugs from the same batch of material and tried them out on some other individuals within the company. No one was particularly impressed. (Gardner, CX-133, p. 5). He had some other foam material made up and experimented with its formulation in order to get materials with different recovery times and different densities. He was attempting to find a formulation that would produce a suitable plug for a person with a average-sized ear canal. Mr. Gardner realized that if the recovery time was too

short there was a danger (particularly with individuals who had small ear canals) that the formulation would expand before it had been fully inserted into the ear; and that if the recovery time was too long individuals would tend to release the earplug before it had expanded sufficiently to stay in place by itself. (Gardner, CX-133, pp. 5-6).

94. The first earplugs Mr. Gardner made were very comfortable. However, in the course of trying different formulations, he realized that plugs made from some of the formulations exerted excessive pressure against the ear canal making the plugs uncomfortable. If the pressure was insufficient there was a danger that the plugs would fall out and/or give too little protection. It then occurred to him that the pressure exerted against the side of the ear canal was an important factor. The matter was complicated by the fact that he wanted to arrive at a formulation that would be satisfactory for all users. Mr. Gardner realized that different densities of material produced different pressures. Denser materials could not be compressed as much as less dense materials. He experimented with different sizes of earplugs for different densities. He investigated the literature to find the average diameter of the human ear canal and the normal variations among ear canal diameters. (Gardner, CX-133, p. 6).

95. Gardner's Record of Invention noted a date of first oral discussion of the invention on June 18, 1981 at NRC and again on June 22 and 23, 1971. First written disclosure was said to be Gardner's notebook 140, p. 25. There was said to be a successful qualitative test or operation on June 18, 1971. The disclosure stated that the earplugs are of roughly cylindrical shape and composed of E-A-R foam material; that the plugs are finger compressed and inserted into the auditory canals; that

by virtue of the relatively slow rate of recovery of the foam material tne plugs thereafter expand to fully conform with the surface of the auditory canal; that this function is normally not achieved with the molded rubber plugs of the prior art; and that the ultimately exerted pressure is 1.5 - 3.5 p.s.i. with sound attenuation occurring at frequencies of 60#2/sec. The Record of Invention was read and understood by another person. (CX-2).

96. A memo from Mr. Gardner dated 10/14/71 related to the recovery rate test and pressure test for his ear plugs. It was said that it had to be closed cell, when having certain rates of recovery coupled with reasonably low pressures exerted upon the ear canal, make ideal ear plugs for protection against excessive noise. E-A-R C-3001-13 (apparent density = 13#/ft.^{3}) "would appear" to be marginally useful being somewhat too fast with respect to recovery and having an equilibrium pressure marginally allowing for comfort of the wearer. Another foam "being just marginally" outside useful parameters "would be" 25-152A (a 4#/ft.^{3}) foam of similar composition to C-3001-13). This foam has too slow a rate of recovery and too little pressure exerted against the ear canal to assure assure complete and permanent closure. Two foams having preferred properties for this use are E-A-R C-3002-7 (apparent density = 7#/ft.^{3}) and 25-152C (a 6#/ft.^{3} foam).

RATE OF RECOVERY TEST (test established in an attempt to numerically describe those properties felt to be of prime importance to the proper operation of the Gardner anti-noise ear plugs.

Samples - The samples consist of 0.630" - 0.640" diameter plugs 0.550" ± 10% produced using a hollow tube borer so as to have parallel sides.

Samples - The samples consist of 0.630" - 0.640" diameter plugs 0.550" ± 10% produced using a hollow tube borer so as to have parallel sides.

Instrument - Consists of two parellel plates being separated by a set space of 0.375".

Procedure - Twirl the foam plug between thumb and forefinger for 15-30 seconds (a compressed diameter of about 1/4" should normally be attained). Place the compressed plug into the airspace between the two parallel plates. Measure the time in seconds for the plugs to expand and make contact (75% of linear surface to make contact) with the second plate. The stopwatch is started instantly upon removal of pressure from the plug.

Results - Results for the four foams previously described were shown in Table I.

TABLE I - RATE OF RECOVERY AND RESULTANT PRESSURE FOR E-A-R PLUGS

Foam Identification	Apparent Density ($Lbs./Ft.^3$)	Rate of Recovery (Seconds)		Pressure Measurements	
		Range	Average	Lbs./Plug	Pressure (psi)
25-152A	4	60-180	106	0.048	0.19
25-152C	6	10-25	13	0.093	0.37
C-3002-7	7	2-6	4	0.194	0.78
C-3001-13	13	<1	<1	0.33	1.32

NOTE: All results obtained at temperatures between 70°F - 75°F.

PRESSURE TEST

Samples - Same as for rate of recovery test.

Instruments - Instron Universal Testing Instrument Model TTC having suitable parallel platens spaced 0.375" apart. The Instron was so equipped according to the manufacturers instructions so as to have a full scale reding of 1.000 pound.

(CX-145)

These rate of recovery and pressure tests are set forth in the '487 patent. (CX-4, cols. 3, 4).

97. Sometime in 1975 after the '437 patent issued on May 21, 1974, Mr. Gardner discussed the '437 patent with Jack Schuman, Cabot's then recently hired Chief Patent and Trademark Counsel, Charles S. Shoup, Jr., Mr. Gardner's supervisor and Barry Blaker. It was concluded by these persons that the patent claims of the '437 patent were to narrow because of the recitation of specific diameters and lengths in the claims, and incorrect because of the use of "generally cylindrical" as a generic term to include a truncated cone and spheres. It was therefore decided to seek reissue of the '437 patent. (CX-3; CX-4; Gardner, CX-133, pp. 7-8).

VII. Commercial Success of the Claimed Invention

98. The standard E-A-R foam earplug, which is said to be represented by FIG. 1 of the '487 patent, was first manufactured in November, 1971. (Gardner, CX-139, p. 17). Since the E-A-R foam earplugs were introduced to the marketplace they have been evaluated by numerous individuals, companies and government agencies. These evaluations were said to show consistently that the foam earplugs manufactured by the E-A-R Division have extremely good attenuation of sound across the frequency range, and are comfortable to use. A letter dated 25 April, 1975, from J. W. P. Hazell to Mr. J. Lyon on the stationery of the Royal National Institute for the Deaf in London reports the results of Hazell's test on the E-A-R plugs. He stated that "I can confirm from my own tests the extremely good attenuation of sound right across the frequency range. I got an average of around about 30 db attentuation. They are certainly most useful for protection against acoustic trauma in sport and industry where there is an objection to wearing ear muffs. I have also found them to be very useful for patients with perforations who wish to go swimming and women with husbands who snore!." (Gardner, CX-133, p. 18; CX-20).

99. In September, 1972, the E-A-R foam earplug was recognized as a technically advanced product and given the "IR-100" award. The award is given each hear by Industrial Research Magazine to the one hundred most significantly new technical products of that year. Pertinent portions of the announcement in the magazine read:

> "E-A-R" Plugs, developed by National Research Corp., Cambridge, Mass., are disposable foam earplugs that custom-fit to the ear with a gentle, yet positive snugness and protect the ear against dangerous high-frequency sounds without interfering with normal sounds and conversation.
>
> Made of a foamed polymer, E-A-R plugs can be squeezed down to ear size quickly and remain that way for several seconds to allow easy insertion into the ear.
>
> These foam plugs, which perform as well as more expensive permanent plugs, eliminate the custom-ordering and high-cost of elaborate plugs. The gentle push of the expandeo foam provides all-day comfort for wearers. Specifically designed for industrial applications where high-frequency noises are a common hazard, the new disposable plugs can be used in any environment where noise is a problem.

(CX-19, p. 31; Gardner, CX-133, pp. 17-18).

100. An article which appeared in the October, 1973, issue of Air Progress reported that this magazine has, in past issues, pointed out the certainty of permanent hearing damage for pilots who fly more than 150 hours a year and suggested various means of ear protection. In this article it was said "Now we have discovered another decibel-beater that, so far, is the best of the lot. It's called the E-A-R plug, and it overcomes the familiar plastic earplugs major drawback: comfort." The article further represented:

> "E-A-R plugs are pinky-sized cylinders of soft resilient foam. You squeeze them down to the size of the ear canal, insert them into the ear and wait. The foam immediately begins to expand, fitting exactly the contour of the ear after a few seconds. (It's quite eerie to stick one in your ear, and then listen to the world fade out as the foam expands.) Unlike custom fitted earplugs, such as

> the General Electric Peacekeeper, the E-A-R plugs need no special fitting -- one size fits all ears. They're reusable, and if they get dirty, just wash them in soapy water. But if you're the supersanitary type, E-A-R plugs are cheap enough (15 cents a pair) to use once and throw away.
>
> We tried E-A-R plugs and consider them the biggest boon to pilots since the computer. They fit gently and snugly, and after a few minutes are totally unnoticeable. Noise filtering equals or betters the hulky, expensive ear muffs we've tried, yet radio communication comes through loud and clear. All in all, we'd rate E-A-R plugs as the most useful product we've tested in the past couple of years.

(CX-26).

101. An article entitled "High Frequency Attenuation Characteristics of Ear Protectors" by John H. Tanzen, Ph.D., and Fred H. Bess, Ph.D., appeared in the Journal of Occupational Medicine of November, 1973. The article reports a comparison of various ear protectors conducted by the authors. Among the items tested were Cabot's E-A-R polymer foam earplugs. At column 3, of the second page of this article the authors report "that the foam defender (earplug) easily provided the greatest amount of protection with attenuation values ranging between 30 to 40 db and all frequencies." Dr. Townsend was from the Area of Communication Disorders, Central Michigan University Hearing Clinic, Mt. Pleasant, Michigan. In the tests conducted other plugs tested were the Ear Defender, a rubber insert (Mine Safety Appliance); and the CEP, a custom made silicon plug (Otocure, Inc.). The authors under "Discussion" did state that the results of the investigation have indicated that with the possible exception of a custom earmold, good high frequency attenuation is provided by all of the protectors evaluated. (CX-21).

102. In December of 1973, the Department of Transportation Federal Aviation Administration issued a report entitled Ear Protector Ratings. It discusses a study conducted by Jerry v. Tobias, Ph.D. and F. Michael Irons, M.Ed., of the FAA Civil Aeromedical Institute, Oklahoma City, Oklahoma. The study evaluated 21 brands of "canal-sealing appliances" which are referred to on page 2 of the report. Among the products tested was the E-A-R polyvinyl foam ear plug. At page 4 of the report the authors list Groups I to VII under Brand Names. Each group is associated with a type. Groups I and II were said to include the best attenuators; Group VII included the worst. Under Group I only "E-A-R" was listed with type "Wearer-molded". Under Group II "Com-Fit" and "Sound Silencer, wet" were listed. Both were of the pre-molded type. At page 5 of the report they also say that

> "The E-A-R (National Research Corporation) earplug is unique type in this study. The material is soft and easily compressed, but it returns to its original shape rather slowly under normal conditions, permitting an insertion of the compressed, cone-shaped form, which then expands to fill and seal the entrance to the canal. All the subjects who use this plug found it very comfortable. We have no data on the expected life of the E-A-R earplug, but one member of the laboratory staff used a pair for at least one hour per day for one month, and there was not much sign of deterioration in the material. The plug does

change compression properties when used in high summer temperatures, so it may be more difficult to insert it effectively in environments hotter than 90° or so; however, there are no numerical data to support this contention as yet. The plugs are furnished in a bright yellow. They soil rapidly, and must therefore be handled carefully if they are to be resused."

(CX-22).

103. In October of 1975, Dr. Tobias issued a second report on behalf of the U.S. Department of Transportation, Federal Aviation Administration. His data indicates that the E-A-R foam earplug was the best product tested in all three evaluation categories. The E-A-R plug surpassed the second rated plug Soft-seal in one of the three evaluation categories. Each of the categories related to attenuation. (CX-23, pp. 10-11; Gardner, CX-133, pp. 19-20).

104. In an article entitled "Plug Out Noise" which appeared in the January 19, 1976, issue of Outdoor Life, Staff Writer Bob Rodale stated:

> "E-A-R Plugs are made of a soft, spongy plastic foam that acts like no other material I've ever seen. It can easily be squeezed into a small cylinder the size of a Q-tip. And after pressure is released, it expands to original dimensions -- about 1/2 in. in diameter. Expansion takes place within about a minute. That the unique property of this plastic foam. You squeeze it, insert in your ear, then hold it in for a short time while it expands to fit and block you ear canal.
>
> These little earplugs are amazingly effective and cost only 50 cents a pair. My tests showed that they blocked out sound more effectively than custom-molded earplugs that cost more then $25.

> Although the plugs can be used over and over again, their manufacturer implies that they are disposable. "Use only fresh, clean plugs," says the instruction sheet. Users are also told to wash hands before inserting the plastic foam.
>
> All things considered, these plugs are extremely useful and effective. Perhaps even more important, E-A-R Plugs are comfortable to wear. The softness of the plastic foam prevents the irritation and annoyance that cause some shooters to avoid use of sound-control devices.

(CX-28).

105. In January, 1979, Popular Science published an article on hearing protection entitled "How to Protect Yourself from Shop Noise." At page 133, this article says "Plugs are inconvenient to insert and remove, so they are better suited to long jobs such as mowing and chain sawing. Some types of plugs are sold in various sizes to provide tight, but comfortable fit in your ear. If you use this type you may have to buy more than one size, experimenting until you find one that fits. The E-A-R plug -- made of a compressible foam that expands to fit your ear canal -- avoids that problem." (CX-29).

106. In November, 1979, Dr. Larry H. Royster, Professor of Mechanical and Aerospace Engineering at North Carolina State University, presented a paper entitled "Effectiveness of Three Different Types of Hearing Protection Devices in Preventing a Temporary Threshold Shift." Dr. Royster reports his evaluation of the E-A-R foam earplug, the American Optical Hear Guard (V-51R) and the Norton Sigma Comfit insert hearing protector devices (HPDs) in preventing hearing loss in two different industrial environments. The amount of hearing loss was determined by giving the subjects hearing tests before they began work in the morning and repeating the hearing tests approximately thirty minutes before the end of

the morning shift. The test subjects were given hearing protectors for the morning shift. In the afternoon they wore no hearing protectors and were again tested at the end of the day. The Norton Sigma Comfit hearing protector is a three-flanged premolded plug. The American Optical Hear Guard (V-51R) is a single flange premolded earplug. Samples of both of these plugs are on CPX-7. As a result of the evaluation, Dr. Royster considered the E-A-R plug to be "an acceptable HPD (hearing protection device) for exposures of up to . . . 95 db" while the V-51R and Comfit hearing protection devices were judged to be unacceptable. A rating of 95 db is equivalent to the maximum noise exhibited by 95% of industrial environments. (CX-24).

107. A report presented at the American Industrial Hygiene Conference on May 29, 1981, entitled "Field Performance Evaluation of Wear Molded Ear Inserts" contained the results of a field stury conducted by D. R. Crawford, of the Weyerhaeuser Company, and R. J. Noza of the University of Washington. The authors tested the E-A-R brand foam earplugs, premolded ear inserts and custom molded ear inserts. The authors then compared their field results to the values reported by the manufacturers on the product package. These values are reported in terms of an ANSI S3.19 attenuation. At page 5 of the report the authors provided the following discussion of their results: "The performance of the premolded and custom molded earplugs was found to be significantly less than the ANSI measured valued reported by the manufacturers. The premolded earplugs exhibited the worst performance of all with field measured mean attenuations at six of the eight test frequencies . . . The field measured performance of the custom molded earplugs was always slightly better than

the premolded type . . . The wearer molded plastic foam earplugs [the E-A-R plugs] exhibited field measured mean attenuations which were typically twice the mean attenuations measured for the premolded and custom molded earplugs, but the viability (as expressed by the standard deviation) was about the same for all earplugs tested." (While the bracketed "the E-A-R plugs" is not contained in the quoted sentence "the wearer-molded plastic foam earplugs" is "the E-A-R plugs" because Figure 3 of the report identified the product being tested as "E-A-R Brand"). The results of this test showed that the E-A-R plugs performed much better than the premolded and custom molded earplugs. The premolded and custom molded earplugs actual field performance was found to be much less than that reported by the manufacturers. In contrast, the field performance of the E-A-R foam earplugs was very close to that reported by Cabot on its package. The authors also recognized that the performance of any hearing protector depends upon whether the worker uses it properly. At page 7 of their report, they state "One way to assure maximum field performance on each individual is to select an earplug which exhibits the least sensitivity to improper use. While there is no such thing as a 'fool proof' earplug, the expandable plastic foam earplug goes a long way toward this goal." (Gardner, CX-133, pp. 22-23; CX-25).

108. In a January 1, 1982 edition, Aviation Consumer included E-A-R foam earplug in its "Honor Roll of the Decade" on the occasion of its tenth anniversary issue. The selections were based on a combination of personal experience and reader feedback and were said to be based on subjective judgments, personal to some degree, and not at all "infallible." It was said:

"E-A-R plug hearing protectors. These tiny miracles have been proven by the FAA to be far and away the most effective of all earplugs, they are the most comfortable of any plug. Any pilot who flies without them is missing something good."

(CX-27).

109. The patented foam earplugs sold by Cabot Corporation have been extremely successful. Approximately percent of the income of the E-A-R Division is attributable to the patented foam earplug. (Shoup, Tr. 90).

110. The superior performance and commercial success of the foam earplugs is attributable to its ease of insertability and comfort. These facts are a result of the recovery rate and equilibrium pressure claimed in the '487 patent. (Gardner, Tr. 128-129). Not all foam plastic material are suitable for making the foam earplugs of the '487 patent. To be usable, a foam earplug must have the mechanical parameters of recovery rate and equilibrium set forth in the '487 claims. (Gardner, Tr. 128-129, 213-214).

VIII. The Prior Art

111. The oldest type of earplug in this country to the inventor Gardner's knowledge is the "molded" rubbery V-51R earplug which comes in five sizes. It is extremely difficult for a very well-trained fitter to actually make sure that each person gets the right size of this earplug. An example of the V-51R earplug is the Hear Guard plug at CPX-7. Another problem with a V-51R earplug may be its contoured type shape at the end. There are some ear canals that the contoured shape will tend to work out of with time, so when a person starts using such earplugs, if the person walks around the plug can be dislodged. Another form of V-51R ear plug is the Tasco Safety Cone at CPX-7. (Gardner, Tr. p 134, 136-138, 140; CPX-7).

112. Another type of molded plug that has been on the market has a small stiff cylindrical core from which flanges extend radially. Reference is made to the 3M plug on CPX-7. These flanges can be of a different diameter. This plug is also jammed into the ear canal. If the ear canal happens to take a bend, the plug can hit the bend. (Gardner, Tr. 141; CPX-7).

113. Glass fiber or cotton have also been used as earplugs as shown on CPX-7. The user just wads the material and pushes it into his ear canal. People have experienced problems with fibers coming off inside the ear. Also, because the user can choose how much cotton or fiber to use, there is no guarantee that a sufficient amount of material will be used. (Gardner, Tr. 144; CPX-7).

114. Another type of earplug is made of wax impregnated fiber shown on CPX-7. If one touches such earplugs, "you may have it on you for the rest of the evening." (Gardner, Tr. p. 145; CPX-7).

115. Putty-like materials have also been used as earplugs. Included in this type of product is an earplug sold under the name Flents shown on CPX-7. The user must shape it and press the plug into the ear canal. This type of plug is greasy and tends to fall out. The Flents is not as greasy as the Frontier and Akustika plugs shown on CPX-7. (Gardner, Tr. 146-147; CPX-7).

116. Knight U.S. Letters Patent No. 2,717,596 (CX-10) cited by the Examiner during the prosecution of the '437 patent issued September 13, 1955 on an application filed April 26, 1954 (CX-144, p. 51). It discloses an ear protector comprising a tubular casing of resilient material, such as

rubber, having an elongated chamber therein. An elongated, longitudinally perforated filter plug is slidably housed within the chamber. (CX-10, col. 2). The disclosed earplug is essentially a V-51 earplug with a tubular base that is intended for use in environments where percussive sound, explosions and the like are likely to be encountered. The V-51 is represented by "Hear Guard." (CPX-7). The Knight patent teaches nothing about recovery rates and equilibrium rates. (Gardner, Tr. p. 151).

117. Michael et al. U.S. Letters Patent No. 2,824,558 (CX-11), cited by the Examiner during the prosecution of the '437 patent, issued February 25, 1958 on an application filed May 24, 1956 (CX-144, p. 51). It discloses an earplug adapted to be inserted in an ear canal and then expanded into the size and shape thereof. The plug comprises a hollow elongated fluid-containing resilient body tapered towards its inner end for easy insertion into an ear canal. Within said body is a valve which separates the body into inner and outer chambers, said valve being adapted to admit fluid to the inner chamber to expand it upon manual compression of the wall of the outer chamber and to retain said fluid in the inner chamber while the plug is in use. (CX-11, cols. 3, 4). In the earplug of the Michael et al patent expansion and contraction of the earplug are accomplished mechanically by causing fluid to flow within the plug. The patent neither teaches nor suggests the use of polymeric foam material. (Gardner, CX-133, p. 10).

118. Hoffman U.S. Letters Patent No. 3,097,059 (CX-12), cited by the Examiner during the prosecution of the '437 patent, issued July 9, 1963 on an application filed June 23, 1960. (CX-144, p. 51). It discloses a method for forming a earplug for supporting a hearing aid receiver in the ear. First a cotton wad is inserted into the ear canal to a significant depth. Then the entire interior area of the exterior ear is coated with mineral oil. Next the molding composition is inserted into the ear canal. Before this material hardens, the packed mass of composition is leveled and a supporting ring member for a hearing aid receiver is embedded in the material. Thereafter, the packed composition is allowed to harden in place. Then the hardened material is removed from the ear canal and a sound conducting passage is drilled from the interior end thereof to the receiver supporting ring member. Because this type of plug is custom-made, it is necessary to compress the plug before inserting it into the ear. There is no teaching or suggestion in this reference that an earplug could be made of foamed material, and that fitting of such a plug could be accomplished by controlling recovering rates or equilibrium pressures. (Gardner, CX-133, p. 11).

119. Wade U.S. Letters Patent No. 2,262,568 (CX-13) cited by the Examiner during the prosecution of the '437 patent, issued November 11, 1941 on an application filed October 21, 1939. (CX-144, p. 51). It discloses an ear protector comprising a porous latex body having a generally cylindrical form, one section of which is impregnated with a waxy material of a composition of an amorphous wax and a petroleum jelly having a melting point of approximately 125°F. The impregnated section is adapted to be inserted in the auditory canal and serves as a soft inelastic stopple for

the absorption of sound with the balance of the porous latex body being impregnated and serving as a means for holding the ear protector for insertion and removal. (CX-13, p. 2). Thus in the ear protector of Wade, the wax stiffens the latex foam to create a soft inelastic stoppel. This teaching is exactly opposite the foam earplugs of the '487 patent which can be compressed, placed in the ear canal and then allowed to expand and seal the ear canal. (Gardner, CX-133, p. 11).

120. Thomas U.S. Letters Patent No. 2,538,339 (CX-14) cited by the Examiner during the prosecution of the '437 patent, issued January 16, 1951 on an application filed September 15, 1949 (CX-144, p. 51). It discloses a frusto-conical shapped earplug comprised of a hard rubber core surrounded by an expandable and contractible material such as sponge rubber. Thomas teaches that the earplug is forced into the ear canal, small end first. During insertion the resilient material is forced into conformity to the surface of the ear canal, while the relatively stiff core will prevent the earplug from excessive lateral bending or distortion. This earplug is different from the foam earplug disclosed in the '487 patent. The foam earplug of the '487 patent is not forced into the ear canal. Rather, it is compressed, loosely slipped into the ear canal and there allowed to expand to seal the ear canal. There is nothing in the Thomas patent that teaches or suggests the equilibrium pressure and recovery rate ranges which are claimed in the '487 patent. (Gardner, CX-133, p. 12).

121. British Hulgren Patent No. 733,542 cited by the Examiner during the prosecution of the '437 patent has a publication date of July 13, 1955. (CX-15). It discloses an ear protector consisting of a molded body formed of a soft elastic spongy material wherein the walls between the pores are perforated so as to allow air to circulate between the pores. The ear protector is preferably of frusto-conical shape. That portion of the ear protector body adapted for contact with the ear canal is covered with a molding skin while the ends of the ear protector body are free of such skin. It is disclosed that the body of the ear protector may be composed of softened polyvinyl chloride or of softened copolymers in which vinyl chloride forms a substantial part of the molecular chain. It may also comprise or consist of polyisobutylene or polyvinyl butyral. The British patent teaches that "the properties and noise damping affects" of the ear protectors can be altered by controlling the size of the pores and the density material. The British patent further states that "[a]s the body of the plug consists of a soft elastic spongy material, it need only be manufactured in a few sizes, which will suit all individuals." The patent does not disclose the combination of the recovery rate and equilibrium pressure in the ranges set forth in the claims of the '487 patent. While the British patent does not disclose any specific exemplary formulation, the test of the patent discloses that the polymer foams contemplated are those of an "elastic spongy" nature; in other words, foamed materials which possess extremely rapid recovery rates. In an embodiment, the ear protectors of the British patent are supplied with a still axially oriented stem made of metal or of a hard or rubber-like synthetic resin material in order to facilitate insertion and withdrawal thereof. This is evidence of the rapid recovery rates of the forms contemplated in the British patent.

The British patent discloses that the foamed material forming the body of the disclosed ear protector is of open cell construction to provide for equilibrium of pressure between the external environment and the portion of the ear chamber obturated by the protector. It is said that this would not be necessary if the proector expanded slowly. Slow expansion permits equalization as the plugs expands. (Gardner, CX-133, p. 14; CX-15).

122. Laisne U.S. Letters Patent No. 3,123,069 (CX-17), which was brought to the attention of the Examiner during the prosecution of the '487 patent (CX-16, p. 37) issued March 3, 1984 on an application filed June 25, 1962. It discloses an ear insert. With respect to the ear insert, the patent discloses that its "resilient body portion" is preferably membranous in character, the same being of minimum thickness, and having maximum pliability and resiliency, so that the same is inherently capable of maintaining its pre-formed shape and configuration when unconfined, and instantly to assume, register with, and cling to the wall of the ear canal, regardless of the configuration, irregular or otherwise of the ear canal, and to return to and assume its original predetermined, preformed condition when withdrawn. (CX-17, col. 3, line 68 to col. 4, line 2). There is no disclosure in the Laisne patent of foamed polymers nor does the patent disclose that the insert depends on limited recovery characteristics of the material of construction as is required of the '487 claimed invention. (CX-17, item 6; CX-16).

123. Douglass U.S. Letters Patent No. 3,618,600 (CX-17) which was brought to the attention of the Examiner during the prosecution of the '487 patent (CX-16, p. 37) issued November 9, 1971 on an application filed April 1, 1969 (CX-17). A two-piece ear stopple is disclosed in the patent comprising a mushroom-shaped soft rubber head having an integral stem member extending rearwardly therefrom and a harder rubber sleeve adapted to receive said stem member. In use, the mushroom-shaped head of the stopple is placed against the external auditory meatus of the ear and an inwardly directed biasing force is applied to the harder stem member which, acting against the stem member, deforms the head into sealing engagement with the external auditory meatus. The patentee neither discloses foam polymeric materials of construction nor is his ware adapted for actual insertion into the ear canal as is the earplug of the '487 patent. (CX-17, item 33).

124. Beguin U.S. Letters Patent No. 3,644,939 (CX-17) which was brought to the attention of the Examiner during the prosecution of the '487 patent (CX-16, p. 37) issued February 29, 1972 on an application filed October 12, 1970. The patent discloses an earcup-type hearing protector wherein a rigid earcup member has an inwardly directed rigid flange element affixed to the open end thereof. To the exterior surface of this flange element there is tightly affixed an earseal construction comprising an annular envelope composed of a highly resilient plastic sheet material. The interior of this envelope contains a resilient foam polymer. Capillary holes are provided through the flange element, which holes are in communication with larger holes provided through the envelope of the earseal construction. The resulting airflow communication between the earseal and

the interior of the earcup is said to achieve greater wearer comfort and to afford strong damping of those vibrations of the earcup caused by excitation of ambient low-frequency sound waves. There is no element of the Beguin construction which is insertable into the ear canal. The patentee expresses no particular requirement concerning the polymeric foam portion of the disclosed earseal construction. The disclosed earcup wares further depend upon the employment of a separate and distinct biasing means by which the earcup is urged against the head of the wearer in order to establish sealing engagement of the earseal construction thereof to the wearer. (CX-17, item 7).

125. Kittredge U.S. Letters Patent No. 3,771,521 (CX-17) which was brought to the attention of the Examiner during the prosecution of the '487 patent (CX-16, p. 37) issued November 13, 1973 on an application filed June 19, 1969. An ear plug construction is disclosed comprising a thin cocoon of a synthetic organic polymeric film containing an elongated slug of a non-slumping silicone putty. The manner of construction and fabrication of this ware is such that longitudinal folds or creases are developed in the thin polymeric film. The film is fused down at the gathered end of the cocoon in order to provide a fused polymer knob at the end of the plug to facilitate insertion and removal from the ear canal. The silicon putty employed as the filler slug is of nonslumping dead soft character. The fitting of the earplug ware of this reference to the ear canal is achieved by squeezing the external end of the polymeric cocoon, thereby to cause flow of the silicone putty and to cause the indwelling portion of the earplug to expand and conform to the surfaces of the ear canal. The Kittridge patent does not disclose the use of foam materials. (CX-17, item 8).

126. Leight U.S. Letters Patent No. 3,895,627 (CX-17) which was brought to the attention of the Examiner during the prosecution of the '487 patent (CX-16, p. 37) issued July 22, 1975 on an application filed June 21, 1973 which was a division of an application filed July 21, 1971. The ear protector of this patent comprises a pair of soft resilient pods which are affixed to the ends of a resilient head band. The soft resilient pod construction is said to comprise a solid rubber base and a hollow tip portion. The cavity of the hollow tip portion contains a gas entrapped therein. As used, the head band, which is affixed to the solid base of the pod, biases the tip portion of the pod against the external auditory meatus with sufficient force to deform said hollow gas-filled tip, thereby to define an expanded rear portion of the tip and to engage the opening of the ear canal in sealing association therewith. The material of construction of the pods is circumscribed substantially only by the requirement that the hollow tip portion if sufficiently soft so as to conform to the shape of the ear while the base portion is sufficiently still to insure that the tip is eated firmly against the opening of the ear canal. The Leight patent does not disclose foamed polymers. (CX-17, item 9).

127. Avot French Patent 1,559,694 (CX-17) which was brought to the attention of the Examiner during the prosecution of the '487 patent (CX-16, p. 37) has a date of February 3, 1909. It discloses an insertable earplug structure which has at its inside enclosure a flexible material of which the shape and dimensions are such that it can easily penetrate into the auditive conduit. The flexible material, such as polyethylene, contains two or more precursor components which, when mixed, result in a

flexible expanded foam composition. The capsule comprises a partition element which maintains the foam components out of contact with one another until said element is ruptured when the earplug is used. In use, the capsule is inserted in the ear canal, the partition element ruptured and the foam precursors intermixed. The resulting expanding foam acts upon the deformable capsule to expand same into a sealing engagement with the wall of the ear canal. Suitable specific foam precursor components are those which result in an expanded polyurethane or polyether foams. (CX-17). There is no disclosure in the Avot patent as disclosed by inventor Gardner of a method nor means by which wearer comfort is assured utilizing Avot's foamed-in-place wares. (CX-17, item 14).

128. Italian Patent 858,371 (CX-17) which was brought to the attention of the Examiner in the prosecution of the '487 patent, has a granting date of February 16, 1970. The disclosed invention relates to foamed plastic materials with high energy absorbing capacity, prepared from polyvinyl chloride polymers or copolymeris. The foamed products produced from such formulations are disclosed to possess improved low rebound characteristics relative to prior art foamed vinyl chloride compositions of equivalent densities. The test by which this property is evaluated is disclosed to involve measurement of the rebound height attained by 1/2 inch diameter steel ball when dropped onto the surface of a 1/2 inch think test foam specimen from a vertical height of 69-1/2 inches above said surface. There is no teaching in the Italian patent that earplugs could be cut from the foams disclosed in this patent. (CX-17, item 15).

129. Netherlands Patent Application Serial No. 69.07047 (CX-17) which was brought to the attention of the Examiner during the prosecution of the '487 patent (CX-16, p. 37) has a November 11, 1969 date. The patent discloses an insertable earplug comprising a soft elastic polymeric foam frame or carrier which has been impregnated with a non-elastic, deformable and heat-softenable plastic material. The nonelastic heat-softenable plastic material can be any one of a number of wax compositions and serves to stiffen the earplug structure sufficiently at room temperature to prevent expansion of the resilient foam "frame" element. The earplugs of this patent are compressed to below ear canal dimensions such that, at room temperture, they may be inserted into the ear canal. Subsequent to insertion, body heat causes softening of the non-elastic plastic material impregnant, thereby allowing the compressed polymeric foam "frame" or "carrier" to expand and fill the ear canal. The patent discloses that the foam material should have a structure of fine pores and preferably open pores. There is no disclosure of a high concentration of an organic plasticizer in the resilient polymeric foam composition of the Dutch patent. (CX-17, item 18).

130. Mills U.S. Letters Pattent No. 3,736,929 cited in the prosecution of the Canadian, West German and Norwegian patents which corresponded to the '487 patent (Gardner, CX-133, p. 15; CX-17) issued June 5, 1973 on an application filed July 9, 1970. The patent discloses a dumbbell shaped earplug of "highly elastic material" (CX-17, col. 1, line 37) having two cavities coupled together through a commissure or constriction. The cavities are filled with a material such as latex or rubber (CX-17, col. 2, lines 55-57) which is stiff under transient forces, but highly

plastic under forces that continue to act in the same direction for periods longer than the periods of audible sound (CX-17, col. 2, lines 36-44). To use the earplug one cavity is compressed causing its contents to flow into the other cavity. The end having the compressed cavity is inserted into the ear canal. After a short time the elasticity of the dumbbell envelop causes the filler material to flow back into the compressed cavity to expand the outer wall thereof until that outer wall makes contact with the flesh of the ear canal. (CX-17, col. 6, lines 1-25). There is no disclosure in the patent of any particular recovery rate. (CX-17, item 1).

131. Berg et al. U.S. Letters Patent No. 2,371,868 cited in the prosecution of the East German application corresponding to the '487 patent (Gardner, CX-133, p. 15; CX-17) issued March 20, 1945 on an application filed February 5, 1942. It discloses porous polyvinyl chloride compositions containing plasticizers. There is no disclosure in the patent that the polymeric compositions can be used as an earplug. (CX-17, item 5).

132. British Patent 527,650 cited in the prosecution of the East German application corresponding to the '487 patent (Gardner, CX-133, p. 15; CX-17) has an acceptance date of October 14, 1940. It discloses an ear stopple, the body of which is formed from a flexible, yielding and resilient material such as rubber, rubber composition or rubber substitute. The patent does not disclose a unitary earplug composed of a resilient polymeric foam. (CX-17, item 2).

133. British Patent 833,506 cited in the prosecution of the East German application corresponding to the '487 patent (Gardner, CX-133, p. 15; CX-17) has an acceptance date of April 27, 1960. It discloses an auditory canal plug which is intended to be pushed into the ear canal. The patent does not disclose a unitary earplug composed of a resilient polymeric foam. (CX-17, item 4).

134. British Patent 578,613 cited in the prosecution of the East German application corresponding to the '487 patent (Gardner, CX-133, p. 15; CX-17) has an acceptance date of July 4, 1946. It discloses a plug for protecting the ear drum. An ingredient of the sound absorbent material used in the plug may be a resilient material formed with innumerable pores or holes of minute size, for example, a rubber sold as "air foam." The patent does not disclose a gradual rate of recovery of the material of the ear plug construction nor does the reference disclose an earplug composed entirely of a resilient polymeric foam. (CX-17, item 3).

135. DDR-26 819 patent to Kaps cited in the prosecution of the East German application corresponding to the '487 patent (Gardner, CX-133, p. 15; CX-17) issued January 27, 1964. It discloses conically shaped earplugs composed of elastic resin foam. Polyvinyl chloride is disclosed as a suitable material. Elasticity of the foam is said to limit the assortment of ear protectors to two or three sizes. Plasticizing of the polyvinyl chloride is not disclosed. Also the patent does not recite any recovery rate or equilibrium pressure (CX-17, item 10).

136. Gmb 17 05 036, cited in the prosecution of the West German application corresponding to the '487 patent (Gardner, CX-133, p. 15; CX-17) discloses a plug of elastic material of a configuration fitting to the ear conduit. The plug is said in the patent to have special elasticity so it adheres well to the ear conduit. The reference does not disclose adjustability of any equilibrium pressure property. (CX-17, item 24).

137. Gmb 16 97 139, cited in the prosecution of the West German application corresponding to the '487 patent (Gardner, CX-133, p. 15; CX-17) discloses an earplug of truncated conical shape composed of a "highly elastic" synthetic foamed polymer. Other than naming certain polymeric materials, the patent is silent as to property details of the polymeric material. (CX-17, item 25).

IX. Admission of Validity and Infringement of the '487 Patent

138. By a settlement agreement executed in May 1984, respondent Walter Schleicher, Morkenstrasse 9,200 Hamberg, West Germany recognized that the '487 patent is valid; agreed that foam earplugs sold or offered for sale by Schleicher infringed claims 1, 2, 3, 7, 11, 12, 13 and 14 of the '487 patent; and agreed to refrain from exporting infringing foam earplugs to the United States during the life of the '487 patent (CX-62).

139. By a settlement agreement executed in May 1984, respondent TECHMED, Morkenstrasse 9,200 Hamberg, West Germany recognized that the '487 patent is valid; agreed that foam earplugs sold or offered for sale by TECHMED infringed claims 1, 2, 3, 7, 11, 12, 13 and 14 of the '487 patent; and agreed to refrain from exporting infringing foam earplugs to the United States during the life of the '487 patent (CX-63).

140. By a settlement agreement executed in May 1984, respondent Eastern Safety, 45-17 Pearson Street, Long Island City, New York 11101 recognized that the '487 patent is valid; agreed that foam earplugs sold or offered for sale by Techmed infringed claims 1, 2, 3, 7, 11, 12, 13 and 14 of the '487 patent; and agreed to refrain from exporting infringing foam earplugs to the United States during the life of the '487 patent (CX-64).

141. By a settlement agreement executed in the spring of 1984, respondent AM, Ost-Str. 90, 2000 Norderstedt,West Germany recognized that the '487 patent is valid; and agreed to refrain from exporting infringing foam earplugs to the United States during the life of the '487 patent (CX-65).

142. A 1984 press release stated that infringing earplugs were sold by TECHMED, Schleicher and Eastern Safety under the names "Sound-Stop", and "Eastern Disposable Foam Ear Plugs." (CX-64).

143. A consent judgment between Norton Company and complainant Cabot Corporation was entered by United States District Judge John J. McNaught, (D. Mass.) on June 21, 1984, in Civil Action No. 78-3170. By the judgment, Norton paid complainant in settlement of all which have, could have or may have been asserted by or between Norton and Cabot arising from or relating to the claims 1, 2, 3, 6, 7, 11, 12, 13, and 14 of the '487 patent. As between Norton and Cabot, the '487 patent was declared valid and subsisting and the property of Cabot. It was said in the consent judgment that the polymeric foam earplugs composed of polyurethane manufactured by Specialty Composites Corporation and sold by

Norton infringed claims 1, 2, 3, 6, 7, 11, 12, 13 and 14 of the '487 patent and that Norton, its successor, assigns, directors, officers, employees, servants and agents, and all persons acting or purporting to act for or on their behalf were restrained and enjoined from infringing the '487 patent. (CX-47).

144. A consent judgment between Willson Safety Products, a Division of WGM Safety Corp., and Cabot Corporation was entered by United States District Judge Edward M. Cahn (D.E.D. Pa.) in January 1984 in Civil Action No. 82-4086. According to the consent judgment, as between Willson and Cabot, the '487 patent was declared valid and subsisting and the property of Cabot although Willson would not be bound by this stipulation of validity if, in any subsequent judicial proceedings, the '487 patent or claims thereunder were declared invalid. The consent judgment stated that polymeric foam earplugs composed of polyurethane and sold by Willson under the name "Soundless" infringed claims 1, 2, 3, 6, 7, 11, 12, 13 and 14 of the '487 patent. Willson, WGM Safety Corp., their successors and assigns and their directors, officers, employees, servants and agents and all persons acting or purporting to act on their behalf were restrained and enjoined from infringing the '487 patent without prior written consent from Cabot. According to the consent judgment Civil Action No. 82-4086 was dismissed with prejudice. (CX-48).

145. By a settlement agreement executed in August 1984, respondent S.S. Trading, 13-7 Kanda Cho, Chikusa-Ku, Nagoya Aichi Prefecture, Japan recognized the validity of the '487 patent. In the agreement it was said that S.S. Trading had exported foam earplugs which were manufactured in Japan to Federal Republic of Germany and that the foam ear plugs were re-exported and sold in the United States under the names "Sound-Stop" and "Eastern Disposable Foam Ear Plugs" without notice to S.S. Trading. The foam ear plugs sold under the names "Sound-Stop" and "Eastern Disposable Foam Ear Plugs" were further said to infringe claims 1, 2, 3, 7, 11, 12, 13 and 14 of the '487 patent. In the agreement S.S. Trading agreed that it will not jointly or individually direct or indirectly, export infringing foam earplugs to the United States during the life of the '487 patent, nor will it be employed by or hold any ownership interest in any person or entity which exports foam earplugs to the United States during the life of the '487 patent. (ALJ Exh. 3).

146. By a settlement agreement made in the spring of 1984, respondent Inoue, 2-13-4, Meicki Minami, Nakamure-ku, Nagoya, Japan recognized the '487 patent as valid. It asserted that it has never manufactured and sold directly to the United States any earplugs which infringe the '487 patent. Inoue agreed that it will not jointly or individually, directly or indirectly import infringing foam earplugs to the United States during the life of the '487 patent, nor will it be employed or hold any ownership interest in any person or entity which sells or imports infringing foam earplugs to the United States during the life of the '487 patent. (ALJ Exh. 4).

X. Sale of the Patented Foam Earplugs

147. In the fall of 1971, NRC management wanted to introduce the foam earplugs at a safety show. Therefore, inventor Gardner was pressed to file the patent application as promptly as possible and before any offer for sale. On October 26, 1971, the application for the '487 patent was filed. (Gardner, CX-133, p. 7).

148. The foam earplugs of the '487 patent were first manufactured in November, 1971, and first sold and used publicly in early 1973. The first documented offer for sale of the foamed earplugs occurred in the September 21, 1972 issue of Industrial Research (SX-23, p. 5).

149. The original foam earplugs that were sold were basically .610 nominal inches in diameter. In approximately November, 1974, due to a study at Central Michigan University, the diameter was changed to .540 nominal inches, plus or minus 20 mils from that. The E-A-R foam earplugs were always cylindrical in shape and, except for the change in diameter, have always looked essentially the way they do now. (Gardner, Tr. 122-123; CPX-7).

150. Cabot has never sold an earplug having the shape of a truncated cone which is an embodiment referred to in the '437 and '487 patents. (Gardner, Tr. 125; CX-3; CX-4).

151. Prior to the filing date of the reissue application on March 12, 1976, according to the inventor Gardner's knowledge, no one other than Cabot had sold or offered to sell foam ear plugs. (Gardner, Tr. 190).

XI. Infringement of the '487 Patent

152. Foam earplugs exported to the United States and which earplugs were sold or offered for sale under the names "Sound-Stop" and "Eastern Disposable Foam Ear Plugs" infringe claims 1 and 11 of the '487 patent. (CX-62; CX-63; CX-64; ALJ Ex. 3).

153. Samples of the white Dimp foam earplug obtained by J. B. MacLean in Sweden were analyzed by the technical staff of the E-A-R Division in May, 1983. The Dimp earplugs were found to be cylindrical in shape, 0.52 inches long, and 0.51 inches in diameter, composed of organically plasticized polyurethane foam, have an average recovery rate of 60 percent compression to 40 percent compression of 35.5 seconds, and have an equilibrium pressure at about 40 percent compression of about 0.765 p.s.i. (Phillips, CX-135, p. 3; Seville, CX-136, pp. 2-4; CX-36).

154. The white Dimp foam earplugs fall within the scope of claims 1 and 11 of the '487 patent. (Phillips, CX-135, p. 3; Seville, CX-136, p. 4; CX-36).

155. One foam earplug obtained from Carleton was analyzed by Ann Phillips in August, 1982. She found this plug to have a height of 0.924 inches, diameter of 0.515 inches, a recovery rate from 60 percent to 40 percent compression of 15 seconds and an equilibrium pressure at about 40 percent compression of .707 p.s.i. (Phillips, CX-135, p. 2; CX-36, p. 2).

156. Samples of the white "Hush" foam earplugs were tested by Alan Seville in the E-A-R Division Laboratories. He reported that the Hush earplugs are cylindrical in shape, 0.78 inches long and 0.53 inches in diameter, composed of organically plasticized polyurethane foam, have an average reccvery rate from 60 percent compression to 40 percent compression of 0.831 p.s.i. (Phillips, CX-135, pp. 2, 3; Seville, CX-136, p. 3; CX-39, p. 3).

157. Samples of tne white Hush foam earplugs were also analyzed by Springborn Laboratories, Inc., an independent testing laboratory in Enfield, Connecticut. They found these plugs to have an average diameter of 0.516 inches, an average length of 0.735 inches, an average recovery rate of 60 percent compression to 40 percent compression of 13 seconds, and an averge equilibrium pressure at 40 percent compression 0.70 p.s.i. Springborn concluded that "The unextracted Hush earplugs were found to fall within the range of properties and composition covered by claim 2 of U.S. Patent Re. 29,497". (CX-40, p. 7; Gardner, CX-133, p. 29).

158. The white Hush foam earplugs fall within the scope of claims 2 and 11 of the '487 patent. (Phillips, CX-135, p. 3; Seville, CX-136, pp. 3-4; CX-38; CX-39; CX-40).

159. In August, 1979, samples of the yellow Sound-Stop foam earplugs were tested by the WestGerman Government Material-Examination Institute Darmstadt. They found these earplugs to have an average diameter of 14 mm (0.546 inches), an average length of 19 mm (0.74 inches), and an equilibrium pressure of about 40 percent compression of 0.046 (kp/cm^2 (0.654 p.s.i.). (CX-31). Nor all of the 20 samples tested

recovered from 60 percent compression to 40 percent compression (see CX-31), p. 1634). The average recovery time of the 14 samples which did recover is 56.8 seconds (calculated from the table at CX-31, p. 1634).

160. Samples of the yellow Sound-Stop foam earplugs were sold in the United Kingdom under the name Hushler were tested by the Yarsley Technical Center in April, 1980. Yarsley found these plugs to have an average diameter of 0.53 inches, an average length of 0.76 inches, and an average equilibrium pressure at 40 percent compression of 0.47 p.s.i. Two of the eight plugs tested did not recover from 60 percent to 40 percent compression. The average recovery time of the other six plugs was 10.5 seconds. (CX-32).

161. The yellow Sound-Stop foam earplugs were also tested by Greg Handy in the E-A-R Division Laboratories in March, 1980. He reported that the Techmed Sound-Stop earplugs are cylindrical in shape, 0.729 inches long and 0.55 inches in diameter, are composed of organically plasticized polyurethane foam, have an average recovery rate from 60 percent compression to 40 percent compression of 14.5 seconds and have an equilibrium pressure at 40 percent compression of 0.496 p.s.i. (Handy, CX-134, p. 2; CX-33).

162. The Sound-Stop foam earplugs infringe claims 1 and 11 or the '487 patent. (Handy, CX-134, p. 2; Gardner, CX-133, p. 28).

163. Samples of the Eastern Disposable Foam Ear Plugs were tested by Alan Seville in the E-A-R Division Laboratories. He found that the Eastern Disposable Foam Ear Plugs are cylindrical in shape, 0.76 inches long and 0.55 inches in diameter, and are composed of organically plasticized polyurethane foam. In the samples tested, the recovery rate from 60 percent compression to 40 percent compression was highly variable. (Seville, Tr. 281). When the plugs were first rolled down to 60 percent compression only one recovered within one minute. (CX-35, p. 2). When the plugs were rolled down a second time three plugs recovered within one minute. (CX-35, p. 2). Mr. Seville attributed this variability to inconsistent manufacturing or the age of the plugs. (Seville, Tr. 282). After the second roll down the plugs had an average recovery rate of two minutes and 20 seconds. They also had an average equilibrium pressure at 40 percent compression of 0.765 p.s.i. (Seville, CX-136, p. 5; CX-35). Despite the variability at least some of the Eastern Disposable Foam Ear Plugs were within the scope of claims 1 and 11 of the '487 patent. (Seville, CX-136, p. 5; CX-35).

164. In October 1981, one of Cabot's distributors, O.K.I. Supply Produkte, received samples of Sound-Stop foam earplugs from AM. From the color and texture they were identified as Sound-Stop foam earplugs. (Shoup, CX-132, p. 32; CPX-23).

XII. Importation and Sale

165. Between 1978 and 1980, S.S. Trading shipped 3.5 million pairs of the accused yellow foam earplugs, manufactured by Inoue MTP of Japan and provided by Fujiyama Sangyo, to TECHMED in West Germany. (Nishikawa, CX-123, p. 2; Hitokuwata, CX-126, p. 1).

166. The earplugs were marketed by Walter Schleicher, Jr., under the name "Sound-Stop," using various company names, but most commonly TECHMED GmbH. (Shoup, CX-132, pp. 29, 30).

167. The same product was also sold in the United Kingdom by Protector Safety Products (U.K.) Ltd. (Protector Safety) under the designation "HUSHLERS." (Shoup, CX-132, p. 29; SX-10; CPX-21; MacLean, CX-67, pp. 28-30).

168. The E-A-R Division brought an action against Protector Safety for infringement of its counterpart United Kingdom patent on foam earplugs. After the English court entered an order against Protector Safety enjoining its infringement Protector Safety returned its inventory to Walter Schleicher, Jr., in Germany. Schleicher re-shipped at least some of this inventory to Tasco and Eastern Safety in the United States. (CX-53; Shoup, CX-132, p. 29; MacLean, CX-67, p. 30).

169. Complainant brought an infringement action against TECHMED under complainant's West German counterpart patent, which resulted in a determination that its patent was valid and infringed. TECHMED thereafter agreed to pay costs and damages, and rendered an accounting of its "Sound-Stop" sales. The accounting revealed that TECHMED had shipped 160,000 pairs of "Sound-Stop" foam earplugs to Eastern Safety in New York. (Shoup, CX-132, p. 30; CX-54; CX-56, p. 27).

170. An E-A-R Division salesman discovered some of these earplugs being sold in California under the name "Eastern Disposable Foam Earplugs." (Shoup, CX-132, p. 30; CX-29, pp. 13-14; CPX-22).

171. Further investigation revealed that TECHMED had shipped 100,000 pairs of "Sound-Stop" foam earplugs to Tasco (Shoup, CX-132, p. 31; CX-57).

172. Tasco offered the Sound-Stop foam earplug at the 1982 Shot Show in New Orleans. (Shoup, CX-132, p. 31).

173. AM- rodukte, through its Taiwanese agent, United Get Day Corp. of Taipei, exported samples of foam earplugs to O.K.I. Supply Company in the United States, an E-A-R Division distributorship, in 1981. The shipped samples were identified by Charles Shoup as "Sound-Stop" foam earplugs. (Shoup, CX-132, pp. 31-32; CPX-23; CX-142; Shoup, Tr., pp. 61, 62, 69, 70).

174. The accused white foam earplug is manufactured and sold in Sweden by respondent Eurosafe under the name "Dimp." It is sold in the United States by respondent Carleton under the name "Hush." (Shoup, CX-132, p. 33; Shoup, Tr., pp. 66-68; Ivarsson, CX-89, pp. 1-2; Taylor, CX-96, pp. 15-16, 18, 41; CX-36, p. 1574).

175. Using the name Protector AB (Protector), Bertil Tindberg, Eurosafe's owner, entered an exclusive supply contract for North America with respondent Carleton. The agreement was executed in January 1981 and has an initial term of five years. (CX-98, pp. 1, 7).

176. Between November 5, 1982 and January 31, 1984, Protector exported 628,000 pairs of "Hush" foam earplugs to Carleton. (Taylor, CX-96, pp. 34-35; Taylor, CX-97, p. 62; CX-104; CX-105).

177. Carleton sold some of these imported foam earplugs to E-A-R Division distributors:

(Taylor, CX-97, pp. 62-64, 66; CX-106; Kramer, CX-109, pp. 6-9; CX-120; CX-121; CX-122).

178. Safety Direct sold the earplugs it received from Carleton under the name "Silencio Disposable Foam Ear Plugs." (Kramer, CX-109, PP. 6, 7).

179. A letter dated February 4, 1983, from Swift to Carleton indicates an expectation by Swift to receive its first order of "Hush Ear Protectors." (CX-106). Peter Taylor, President of Swift, stated

on May 1, 1984, that Swift had never purchased foam earplugs from Carleton. (CX-96, p. 41-42). In a letter dated June 6, 1984, Roy Schmidt, President of Swift, stated that Swift ". . . has never imported, exported, sold or held for sale any Foam Ear Plugs other than E A R or Deci Damp brands." (ALJ Exh. 2).

180. On September 5, 1984, complainant's regional sales manager purchased 200 pairs of "Hush" foam earplugs from B&B Sales of North Hollywood, California. The box containing the 200 pairs of earplugs was marked "Made in Sweden" and each individual package of earplugs was marked "Carleton Management Associates, Inc." (CX-146; CX-147; CX-148).

XIII. Domestic Industry

181. Foam earplugs of the type claimed in the '487 patent are manufactured for the United States market by Cabot Corporation's E-A-R Division facilities located in Indianapolis, Indiana. (Gardner, CX-133, p. 16).

182. The E-A-R Division is engaged in the design, manufacture and sale of various noise control and damping products, including foam earplugs covered by the '487 patent. (Gardner, CX-133, p. 16).

183. The three types of foam earplugs manufactured by Cabot are the standard cylindrical foam earplug colored yellow and sold under the mark "E-A-R" or colored white and sold under the mark "Deci-Damp," the yellow "E-A-R" foam earplug with a longitudinal hole (both covered by the '487 patent) and paired "E-A-R" foam earplugs tethered together by means of a cord (components of which are covered by the '487 patent). (Gardner, CX-133, p. 16; CPX-2, CPX-4; CPX-5; CPX-6).

184. The yellow plugs are sold exclusively by Cabot under the designation "E-A-R Plugs." The white foam earplugs are sold in bulk to Siebe North Corporation, which packages them and sells them under the mark "Deci-Damp." Siebe North is not a licensee under the patent in suit. (Gardner, CX-133, p. 16; Green, CX-137, pp. 1, 2; Tr., pp. 7, 8, 49, 50).

185. The E-A-R Division's production facilities consist of approximately square feet. The E-A-R Division employs people in the United States. Approximately percent of its facilities and percent of its employees are involved in the production and sale of earplugs. (Shoup, CX-132, pp. 7, 15; Shoup, Tr., pp. 91, 94, 95).

186.

(Shoup, CX-132, p. 12).

187. Cabot sells its earplugs to safety equipment distributors who resell them to industrial customers and to various government agencies for use by government personnel. Pairs of earplugs are packaged in plastic bags or cardboard pillow packs which are then placed in dispenser boxes for retail sale or industrial use. Cabot normally sells its earplugs in dispenser boxes which contain 200 pairs of earplugs. (Shoup, CX-132, p. 16; Gardner, CX-133, p. 16; CPX-2; CPX-3; CPX-4).

188. The ultimate user of the E-A-R earplugs is anyone who works in a noisy environment. This includes industrial workers, many of whom are subject to OSHA noise exposure standards, military personnel and sportsmen who use guns for hunting or target practice. (Shoup, CX-132, p. 16).

A. Efficient and Economic Operation

189. Cabot's production facilities which produce foam earplugs for the United States market contain modern foam production and packaging equipment. Its research facilities contain state of the art equipment used for quality control, research and new product development. (Gardner, CX-133, p. 26).

190. Cabot employes a highly trained research and development staff, members of which are recognized leaders in the field of noise control, vibration damping and hearing protection. Its research facilities are widely recognized as one of the finest facilities for research and testing in the fields of audiometry, noise control and vibration damping. Cabot is the only manufacturer in the United States with hearing protection test facilities capable of testing products in accordance with standards of the American National Standards Institute (ANSI). (Shoup, CX-132, p. 6; Gardner, CX-133, p. 26).

191. Cabot's research, and domestic manufacturing and warehousing facilities are located in Indianapolis, Indiana. This centralized facility enables Cabot to promptly fill customer orders. (Shoup, CX-132, p. 18).

192.

(Shoup, CX-132, p. 7).

193. Complainant employs extensive quality control procedures in the production of foam earplugs. The plugs are subjected to over 80 tests and inspections, including noise attenuation tests, and meet or exceed all applicable standards. All raw materials are tested and must meet minimum quality standards. Because digital equipment records each lot of foam produced and the plugs punched from that lot, problems can be traced back through the production process and to the specific shipments of raw materials used to make the plugs. (Gardner, CX-133, p. 25; Shoup, CX-132, p. 9).

194. The E-A-R Division has continually implemented programs to improve productivity, reduce costs and increase profits. Investments in improved production equipment, modifications to existing equipment and computerization have increased productivity. (Shoup, CX-132, pp. 12-14).

195. The division's overall manufacturing costs as a percentage of sales have been reduced percent between fiscal 1982 and 1984. (Shoup, CX-132, p. 12; CX-42).

196. Actual productivity gains, allowing for inflation, have been approximately percent.

(Shoup, CX-132, p. 12).

197. Efforts to control indirect costs have also contributed to reductions in manufacturing overhead. (Shoup, CX-132, pp. 13-14).

198.

(Shoup, CX-132, pp. 22-23; Shoup, Tr., pp. 51-55).

199.

(Shoup, CX-132, p. 14).

200. The E-A-R Division's annual earplug sales in 1981 were and in 1983 were . Its after tax profit for the same years was and respectively. (SX-19; SX-21).

201. Cabot extensively advertises its earplugs in trade publications and at trade shows. Since 1974, Cabot has spent over $2 million in advertising and promoting its "E-A-R" earplugs. (Shoup, CX-132, p. 17; CX-46; SX-6; SX-7; SX-8).

202. The E-A-R Division employs direct sales people, over independent distributors, staff employees in advertising, promotion, planning and market research, sales managers and a marketing manager. (Shoup, CX-132, p. 17).

203. Cabot conducts an ongoing effort to upgrade personnel through management and technical training programs, internal and external, including a program of 100 percent reimbursement for outside educational courses. (Shoup, CX-132, p. 18).

204. Cabot has a sales incentive plan for its salesmen which consists of increasing merchandise and travel awards for meeting and exceeding sales quotas. (Shoup, CX-132, p. 17).

205. All employees of the E-A-R Division have available to them a wide range of benefits including medical, health and life insurance and an employee pension plan, all fully paid by the company. A profit sharing plan is also available to all personnel. (Shoup, CX-132, p. 18).

206. Cabot actively supports such activities as the United Way and the hearing handicapped, both as a company and through the contributions of its employees. (Shoup, CX-132, pp. 18-19).

207. The E-A-R Division publishes technical papers in the field of noise control and hearing protection which are distributed free to medical professionals and others concerned with hearing protection. (Gardner, CX-133, pp. 26-27; CX-30).

208. The E-A-R Division conducts hearing clinics for industrial and government safety directors, government safety inspectors, industrial hygienists, occupational health specialists, medical personnel,

and others. These clinics provide information on hearing protection and teach methods for developing effective hearing conservation programs. (Shoup, CX-132, p. 17; Gardner, CX-133, p. 27).

209. E-A-R also has produced films and videotapes to teach potential earplug users about hearing protection and explain how to use E-A-R plugs. (Gardner, CX-133, p. 27; CPX-8; CPX-9; CPX-10; CX-46).

XIV. Injury

210. In 1980, Tasco imported 100,000 pairs of "Sound-Stop" earplugs from TECHMED at a value of 6.58 cents per pair. In 1981, Eastern Safety imported 160,000 pairs of "Sound-Stop" foam earplugs from TECHMED at a value of approximately 14.2 cents per pair. (Prochaska, CX-90, p. 5; CX-57; CX-56, p. 27; Shoup, CX-132, p. 30).

211. Between November, 1982 and January, 1984, Carleton imported pairs of "Hush" foam earplugs from Protector AB at a value averaging cents per pair. (Taylor, CX-96, pp. 34-35; Taylor, CX-97, p. 62; CX-104; CX-105).

212. Carleton sold these imported foam earplugs to E-A-R Division distributors:

(Taylor, CX-97, pp. 62-64, 66; CX-106; Kramer, CX-109, pp. 6-9; CX-120-122).

213. In 1982, Carleton sold Hush foam earplugs at prices of cents per pair for orders of cases or more, cents per pair for cases, cents per pair for cases and cents per pair for cases. (CX-102).

214. From March 22, 1984 through April 24, 1984, Safety Direct purchased pairs of "Hush" foam earplugs from Carleton at per pair. (CX-120-CX-122).

215. Safety Direct's business is the manufacture of earmuff hearing protectors and disposable foam earplug distribution. (CX-141, p. 3).

216. The wholesale prices to distributors of E-A-R foam earplugs is based upon the quantities shipped at one time. The wholesale prices to distributors of E-A-R foam earplugs from December, 1981, to date were cents per pair for orders of cases or more, cents per pair for cases and cents per pair for cases. (CX-66; Shoup, CX-132, p. 34).

217. Safety Direct sells E-A-R foam earplugs which it advertises under the "Silencio" name. Both the "Hush" foam earplugs and the E-A-R foam earplug appear on the same page of Safety Direct's brochures. The E-A-R plugs are identified as "Silencio Disposable Ear Plugs" and given the product number MDD-80. The "Hush" plugs are also identified as "Silencio Disposable Foam Ear Plugs," but are given the product number MDD-83. The brochure states that the "Hush" plugs are "The same high quality foam disposable ear plugs found in our MDD-80 buckets but carded 3 pair per card." (CX-112, p. 2; Kramer, CX-110, pp. 6-7, 29).

218. Safety Direct sells the E-A-R foam earplug MDD-80 at $.17 per pair and the "Hush" foam earplug at 3 pairs for $.46 (15.3 cents per pair). (Kramer, CX-110, pp. 24-25).

219. Safety Direct has sold "Hush" foam earplugs to the same customers who purchased "E-A-R" and "Deci-Damp" foam earplugs. (Kramer, CX-110, p. 31).

220. On April 22, 1983, E&M Industrial Hardware of Los Vegas ordered 10,000 pairs of "E-A-R" foam earplugs from Fibre Metal Supply Company of Concordville, Pennsylvania. Fibre Metal substituted "Hush" foam earplugs on this order and shipped them to E&M. (Rothman, CX-127, pp. 4-5, 7; CX-128, p. 4).

221. The following figures represent E-A-R's foam earplug production as a percentage of the U.S. hearing protection market for the years 1980-1984, for both the "E-A-R" brand foam earplug and the "Deci-Damp" brand foam earplug:

1980	1981	1982	1983	1984

(CX-61; Green, Tr., pp. 327-329).

222. The following figures represent E-A-R's sales and profit figures in relation to its foam earplugs for calendar years 1981-1983:

	1981	1982	1983
Sales			
Profit Before Tax			
Profit After Tax			

(SX-21).

223.

(Shoup, Tr., pp. 29, 32).

224. After a second quarter drop, Cabot's inventory increased from pairs to pairs of foam earplugs between the first quarter of 1983 and the second quarter of 1984 (SX-20).

225. E-A-R's annual United States production of foam earplugs for 1983 was pairs. (SX-23, Exh. V).

226. The total of pairs of foam earplugs imported from 1980 through 1984 represents less than percent of the domestic industry's 1983 foam earplug production of pairs. (FF 169, 171, 176; SX-23, Exh. V).

227.

(Green, Tr. pp. 338-341; see Green CX-137, p. 7).

228. Applying a figure of percent to the number of units sold for a calculation of revenues, lost sales of foam earplugs represents in lost revenues and in lost pre-tax profits, using E-A-R's 1983 ratio of profits to sales. (Shoup, Tr. 44; SX-21).

229. The 1983 and 1984 total U.S. market for foam earplugs is calculated by multiplying
by percent, for a figure of approximately
for 1983 and for 1984. (CX-61; Green, Tr., pp. 326-328).

230. E-A-R estimates that it lost sales of

units in FY 1984 to Moldex Metric, a domestic manufacturer of foam earplugs. It is estimated that this represents percent of E-A-R's expected 1984 production,

(Green, Tr., pp. 360-365; Shoup, Tr., p. 16).

231.

(Green, Tr., pp. 365-367; Shoup, Tr., p. 10-11).

232. Some test results obtained by Cabot's Quality Control Engineer indicate that some of the imported earplugs were of uneven quality and were inferior to complainant's earplugs. (Seville, CX-136, pp. 3-5).

233. Cabot's Noise Control Distributor Marketing Specialist testified that he believed there were instances of consumers confusing another earplug with an E-A-R plug, but did not know whether the other earplug was imported or domestically manufactured. (Handy, Tr. pp. 229-230).

234.

(Shoup, Tr. pp. 25-27; SX-22, p. 63).

XV. Tendency to Substantially Injure

235. The total U.S. hearing protection market for 1984 has been estimated to be (SX-22, p. 46). The U.S. market for foam earplugs in 1984 is approximately (FF 229).

236. Respondent Eurosafe currently has the capacity to produce 12.5 - 20 million pairs of foam earplugs annually. (MacLean, CX-67, pp. 16-17; Ivarsson, CX-89, pp. 2-3).

237. Based on 1983 sales of pairs of foam earplugs in the United States by E-A-R, Eurosafe has sufficient capacity to penetrate the U.S. market at the equivalent of percent of E-A-R's total U.S. production of foam earplugs for 1983. (SX-23, Exh. V).

238. The total area of the Eurosafe facility is approximately 300 square meters. (MacLean, CX-67, p. 16).

239. It takes relatively little space to manufacture and package foam earplugs. One needs only about 300 square meters of floor space. (MacLean, CX-67, pp. 8-9).

240. The total foam earplug market in Sweden is million pairs. (Ivarsson, CX-89, p. 3; MacLean, CX-67, p. 17).

241. Eurosafe is building another production facility in Landskrona, Sweden. This facility may have one, two or three production lines similar to the line in Arlov, Sweden. This facility is scheduled to open in the Autumn of 1984. Bertil Tindberg, the owner of Eurosafe, has plans to put additional machines for producing foam earplugs in other foreign countries. (Ivarsson, CX-89, pp. 2-3).

242. On October 27, 1983, Carleton ordered pairs of "Hush" foam earplugs from Eurosafe/ Protector. Under the terms of this purchase order, pairs would be delivered monthly and pairs would be delivered monthly (CX-107; Taylor, CX-96, p. 50).

243. In a July 7, 1984 letter from Peter Taylor of Carleton to Bertil Tindberg, Eurosafe's owner, Taylor projected

(CX-108, p. 2).

244. Bertil Tindberg has personally expressed his intention to penetrate the U.S. market. (MacLean, CX-67, pp. 18-19; MacLean, CX-68, pp. 52, 56; Shoup, Tr. p. 21).

245. Eurosafe advised Carleton that it could supply as many foam earplugs as Carleton needed. (Taylor, CX-96, p. 16).

246. If Carleton imports from Eurosafe and sells foam earplugs at the rate of million pairs per year, it could reduce complainant's revenue by approximately percent of the E-A-R Division's annual U.S. foam earplug sales. (Shoup, Tr. pp. 42-44).

247.

(Nishikawa, CX-123, p. 2).

248. In July, 1984, complainant learned that Walter Schleicher had resumed operations in through AM-Produkte and and that had offered to send samples of foam earplugs to the U.S. (Shoup, Tr. pp. 61-62; Shoup, CX-132, pp. 31-32; CX-142, p. 2).

OPINION

The following opinion summarizes and supplements the findings of fact and presents conclusions of law.

I. The Nature of the Action

This patent based § 337 investigation derives from the Commission's institution of Investigation No. 337-TA-184 which was published in the Federal Register on February 29, 1984 (49 Fed. Reg. 7464-65). The investigation was based on the complaint of complainant Cabot Corporation (Cabot) alleging that thirteen respondents were in violation of § 337 by reason of importation into, and sale in, the United States of foam earplugs which infringe claims 1, 2, 3, 7, 11, 12, 13 and 14 of Cabot's U.S. Letters Patent Re 29,487 (the '487 patent). Cabot, since filing the complaint, has limited the claims in issue to claims 1 and 11. (FF 54). Only respondent S.S. Trading Co., Ltd. filed a response to the complaint and responded to discovery requests. The investigation has been terminated with respect to seven of the respondents (Order Nos. 8, 9 and 12). The Administrative Law Judge in the Procedural History of this Initial Determination has granted the Commission investigative attorney's motion, supported by Cabot, for entry of default against the remaining six respondents (Motion No. 184-12).

A prehearing conference was held on September 4, 1984, and a hearing on September 4 and 5, 1984. Appearances were made by counsel for the complainant and the Commission investigative attorney.[2/] No appearances were made by any of the respondents.

2/ The Commission investigative attorney took no position as to whether there has been an infringement of claims 1 and 11 of the '487 patent.

On November 23, 1984, new rule 210.25 on default became effective (49 Fed. Reg. 46123).[3/] Referring to this rule, on May 17, 1984, the Administrative Law Judge issued Order No. 6, requiring non-settling respondents Carleton, Safety Direct, Eurosafe, Protector and Fujiyama to show cause why they should not be found in default. None of these respondents replied to the order. While an order to show cause was not issued against the remaining non-settling respondent Swift, the Administrative Law Judge has found that there is insufficient evidence to indicate a sale of the accused foam earplugs by Swift. (FF 17, 179).

3/ New Rule 210.25 reads in part:

§ 210.25 Default.

(a) Definition of default. Failure of a respondent to take actions including but not limited to the following: File a response to the complaint and notice pursuant to § 210.21 within the time provided, . . . , or appear at a hearing before the administrative law judge on the issue of violation of section 337, may be deemed to constitute a waiver of the respondent's right to appear, to be served with documents, and to contest the allegations at issue in the investigation.

(b) Procedure for determining default. If a respondent has failed to respond or appear as enumerated in paragraph (a) of this section, the administrative law judge upon motion or his own initiative shall order such respondent to show cause why it should not be found in default. If the respondent fails to show cause why it should not be found in default, the administrative law judge may make any orders appropriate to paragraph (a) of this section.

(c) Relief against a respondent in default. The Commission shall issue relief against a respondent found to be in default if:

(1) The record developed by the administrative law judge establishes a prima facie case of violation of section 337 or reason to believe there is a violation of section 337;

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II. The Invention

The invention in issue relates to polymeric foam earplugs having specific rate of recovery and equilibrium pressure. (FF 55, 58). Prior to the invention in issue many devices were known which were adapted for insertion into the human ear canal in order to suppress or attenuate the transmission of noise. (FF 56, 57, 111-115). Such devices included those made of wadded cotton, cotton wadding impregnated with a waxy substance or shapeless, compliant "dead-soft" mineral-filled waxy substance. These earplugs either were not normally greatly effective as acoustic barriers or were normally deficient due to a lack of sufficient resiliency. (FF 56).

Prior to the invention in issue, other known earplugs took the form of molded elastomeric structures. Included within this class were earplugs having molded therein check valves and other substructures designed to allow normal voice tones to be transmitted therethrough while cancelling or preventing transmission of injurous overpressures. Such molded elastomeric earplugs suffered from the fact that their size and shape were preordained and fixed in the molding thereof. (FF 56).

Lightweight earphones or headphones comprising generally a minature speaker having tubular members extending therefrom with foamed or unfoamed polymeric tips of which members were adapted for insertion in the external auditory meatus were also being used prior to the invention in issue. (FF 57). In the case of unfoamed polymeric tip members, the tip member, however, tended to slip out of the ear canal. Moreover, the relatively non-compliant character of the polymeric material did not lend itself to complete obturation of the ear canal. (FF 57). In the case of sponge

rubber tip members, the resiliency of the sponge materials was generally excessively rapid and mitigated against actual insertion of the tip member into the ear canal proper. (FF 57). In 1970 or 1971 inventor Gardner was working for National Research Corporation (NRC) which later became part of Cabot. (FF 3, 87). Then NRC was making sheets of energy absorbing foamed material intended for padding in such things as artificial football field underlayment and other sports equipment. (FF 88, 89). While Mr. Gardner was working for NRC in 1970 or 1971, a suggestion was made by someone, other than Mr. Gardner, that NRC should produce earplugs made of latex and silicone material although there was no suggestion that such earplugs should be made of a foam despite the fact that NRC was manufacturing foam. FF 88). Also there was no suggestion that the earplugs made of latex and silicone material should be capable of being inserted into the ear other than in the conventional way of forcing the plug into the ear while rubbing it against the sides of the ear canal.

In March 1971, NRC made a foam which it was attempting to sell to Motorola for use between stacked circuit boards to absorb shock. Mr. Gardner was working in NRC's Quality Control and a particularly thick batch of energy absorbing foam material arrived. (FF 90). To inventor Gardner this foam appeared perhaps adequate to cut out a section to shove into the ear and see if the use of an energy absorbing material as an earplug might have merit (FF 90). What Mr. Gardner discovered was a mechanical phenomenon which allowed plugs of foam material to be rolled down allowing ample time to insert the plugs into the ears and then to recover to give a comfortable custom fitting foam earplug which cut noise occurring in the laboratory. (FF 90). Then while taking thickness readings on samples of one of these

experimental foams which NRC had produced, inventor Gardner observed that thickness readings were very sensitive to pressure. He noted that it had long been realized that one of the valuable properties of EAR foam, and especially E-A-R C-3002-7 which was the foam Gardner was measuring at the time, was its ability to conform to surfaces extremely well while exerting no pressure to speak of. Inventor Gardner cut some earplugs of different diameters from the E-A-R C-3002-7 with a borer and tried the different sizes in his ear. He compressed the foam cylinders and inserted them into his ear where they expanded and seated against the sides of the ear canal. Inventor Gardner felt that of the sizes tried the 5/8 inch diameter cylinder seated quite nicely and cut out high frequency noise while still allowing him to hear normal conversation. (FF 90-95).

Inventor Gardner had some other foam material made up and experimented with its formulation to get materials with different recovery times and different densities. He realized that if the recovery time was too short there was a danger (particularly with individuals who had small ear canals) that the foam would expand before it had been fully inserted into the ear; that if the recovery time was too long individuals would tend to release the earplug before it had expanded sufficiently to stay in place by itself. (FF 93).

While the first earplugs inventor Gardner made were very comfortable, in the course of trying different formulations, he realized that plugs made from some of the formulations exerted excessive pressure against the ear canal making the plugs uncomfortable. It then occurred to Gardner that the pressure exerted against the side of the ear canal

was an important factor. Mr. Gardner then developed equilibrium pressure and recovery rate tests for determining whether particular foam earplugs were within the scope of his invention. (FF 94, 96). These tests are incorporated in the '487 patent. (FF 96).

III. Prosecution of the '487 Patent and the Predecessor '437 Patent

Inventor Gardner first obtained the '437 patent. Thereafter he obtained the '487 patent through reissuance of the '437 patent. (FF 54, 66, 76, 78, 86).

The Examiner in the prosecution of the '437 patent cited art showing the use of foamed polyvinyl chlorides in ear protectors. (FF 66-75). Patentability however was predicated on the claimed combination of the recovery rate and equilibrium pressure of the foam earplugs. It was successfully argued that if the recovery rate is excessively rapid, while the equilibrium pressure is low, the foam earplug would be outside the invention because it would not be possible to achieve sufficient insertion of the earplug (coupled with the low exerted pressure) to result in good sound barrier properties; that if the recovery rate criteria were met while the equilibrium pressure properties are excessive, the foam earplug would be outside the invention because substantial discomfort to the wearer would likely occur, especially because the earplug ware due to the "time delay" feature would most likely be inserted rather deeply into the ear canal, thus bringing the pressure exerted thereby to bear upon a relatively large surface thereof. (FF 66-75). Hence, inventor Gardner's invention does not include any polymeric foamed earplugs.

Inventor Gardner filed for reissue of the '437 patent on March 12, 1976 less than two years after the grant of the '437 patent[4/] (FF 78). The reissue application was filed because the inventor believed those recitations in claim 1 of the '437 patent which teach (1) the generally "cylindrical" shape of the ware, and (2) the specific ranges for the diameter and length dimensions of the ware were technically incorrect, superfluous and unnecessary. (FF 79).

During the prosecution of the reissue application, inventor Gardner added FIG 3 which was said to be a view of an embodiment of the invention having a truncated cone shape. The Examiner had identified the original drawings as being defective because that drawing did not depict the truncated cone embodiment. (FF 85). The truncated cone embodiment had been disclosed in the '437 patent. (FF 77).

4/ 35 U.S.C. 251 reads in pertinent part:

§ 251. Reissue of defective patents

> Whenever any patent is, through error without any deceptive intention, deemed wholly or partly inoperative or invalid, by reason of a defective specification or drawing, or by reason of the patentee claiming more or less than he had a right to claim in the patent, the Commissioner shall, on the surrender of such patent and the payment of the fee required by law, reissue the patent for the invention disclosed in the original patent, and in accordance with a new and amended application, for the unexpired part of the term of the original patent. No new matter shall be introduced into the application for reissue.
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> No reissue patent shall be granted enlarging the scope of the claims of the original patent unless applied for within two years from the grant of the original patent. July 19, 1952, c. 950, § 1, 66 Stat. 808.

In addition, during prosecution of the reissue application, the phrase "having a size and shape" was added to a reissue claim, the Examiner having pointed out that an Italian patent cited by the inventor in the prosecution neither disclosed nor suggested wares "having a size and shape adapted to be compressed and inserted into the human ear canal." (FF 85). Similar language is found in the '437 patent. (FF 77).

During the prosecution of the reissue application, while additional published references were brought to the attention of the Examiner, the Examiner made no rejection of the claimed subject matter on any prior art. (FF 78-86).

IV. Validity of the '487 Patent under 35 U.S.C. §§ 102 and 103

35 U.S.C. § 282 creates a presumption that a patent is valid. 35 U.S.C. § 102 provides in pertinent part:

> A person shall be entitled a a patent unless
>
> > (a) the invention was . . . 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 . . . more than one year prior to the date of the application for patent in the United States, . . .

Anticipation requires, in a single prior art reference, disclosure of each any every element of the claimed invention. Connell v. Sears, Roebuck & Co., 722 F.2d 1542, 220 U.S.P.Q. 193 (Fed. Cir. 1983); SSIH Equip. S.A. v. U.S.I.T.C., 718 F.2d 365, 218 U.S.P.Q. 678 (Fed. Cir. 1983). Moreover, where a foreign publication is used as a reference "it is not competent to read into a foreign publication any information which it does not afford on its face." Baldwin-Southwark V. Coe, 133 F.2d 359, 55 U.S.P.Q. 398, 407 (D.C. Cir. 1942).

Under 35 U.S.C. § 103, a patent may not be obtained 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. In Graham v. John Deere Co., 383 U.S. 1, 148 U.S.P.Q. 459 (1966), the Supreme Court detailed the factual considerations which courts must apply in determining the question of obviousness. The Court stated:

> "Under § 103, the scope and content of the prior art are to be determined; differences between the prior art and the claims at issue are to be ascertained; and the level of ordinary skill in the pertinent art resolved. Against this background, the obviousness or nonobviousness of the subject matter is determined. Such secondary considerations as commercial success, long felt but unsolved needs, failures of others, etc., might be utilized to give light to the circumstances surrounding the origin of the subject matter sought to be patented. As indicia of obviousness or nonobviousness, these inquiries may have relevancy." (Footnote omitted). (Emphasis added).

(383 U.S. 17-18, 148 U.S.P.Q. 467).

In United States v. Adams, 383 U.S. 39, 148 U.S.P.Q. 479 (1966), the Supreme Court again treated the question of obviousness under § 103. The Adams patent in issue covered a nonrechargeable electric battery which could be stored indefinitely without any fluid in its cells and could be activated merely by adding water. The patent called for battery electrodes of magnesium and cuprous chloride, both battery elements being old in the art though not previously combined in a single battery. The government had argued that wet batteries comprising a zinc anode and silver chloride cathode were old in the art; and that the prior art showed that magnesium may be substituted for zinc and cuprous chloride for silver chloride. In rejecting this contention, the Court stated:

> "It begs the question . . . to state merely that magnesium and cuprous chloride were individually known battery components. If such a combination if novel, the issue is whether bringing them together as taught by Adams was obvious in light of the prior art." (Emphasis added).

(383 U.S. 49, 148 U.S.P.Q. 482).

The Court also mentioned the tremendous commercial success of the Adams battery and identified this as a factor bearing on the question of obviousness.

"[S]econdary considerations" referenced by the Supreme Court in John Deere should be considered in every case for whatever probative value they have. In Jones v. Hardy, 727 F.2d 1524, 220 U.S.P.Q. 1021 (Fed. Cir. 1984) Chief Judge Markey stated:

> "Objective indicia of nonobviousness, when present, must always be considered before a legal conclusion under § 103 is reached. Stratoflex, Inc. v. Aeroquip Corp., 713 F.2d 1530, 1538, 218 U.S.P.Q. 871, 879 (Fed. Cir. 1983). [Patentee] Jones introduced evidence of long-felt need and commercial success. Hardy's admitted infringement constitutes some evidence of the merits of the claimed invention over the prior art praised but avoided by Hardy.

(220 U.S.P.Q. 1026).

Evidence of commercial success is "extremely strong and is entitled to great weight". Simonds Fastener Corporation v. Illinois Tool Works, Inc., 222 U.S.P.Q. 744, 747 (Fed. Cir. 1984).

35 U.S.C. § 103 further requires that the mind be cast back to "when the invention was made" and requires a determination of whether the invention "would have been obvious" at that time. Moreover, the question which always has to be answered in a § 103 situation is whether the subject matter of the invention "as a whole" would have been obvious. Rosemount, Inc. v. Beckman Insts., Inc., 727 F.2d 1540, 221 U.S.P.Q. 1 (Fed. Cir. 1984).

Turning to the question of anticipation, no single reference cited by the Examiner in the prosecution of the '437 and '487 patents (FF 66-75, 116-121), and brought to the attention of the Examiner in the prosecution of the '487 patent (FF 80-85, 122-129) discloses the combined mechanical parameters of recovery rate and equilibrium pressure critical to the claimed polymeric foam earplugs. (FF 66-75, 80-85, 110, 116-121), nor the "sufficiently high concentration of organic plasticizer" called for in claims 1 and 11 necessary for obtaining the parameters. (FF 55, 70, 73). Also because the prior art does not disclose the combined mechanical parameters of recovery rate and equilibrium pressure, it follows that the specified ranges, critical to the claimed invention (FF 58, 96), are absent. Finally, prior art that has surfaced in connection with foreign counterparts of the '487 patent lacks such disclosure. (FF 130-137).[5/]

Referring to 35 U.S.C. § 103, the objective indicia of nonobviousness supports a finding that the claimed invention is patentable under that section. Thus while the art of record shows certain of the elements of the claimed subject matter, such as use of a polymeric foam in ear protectors (FF 67, 121), there is no suggestion for modifying any foam polymeric material for use in earplugs such that the material should have a "sufficient high concentration of organic plasticizer," necessary for obtaining a "time delay" feature.

5/ The Administrative Law Judge has been unable to consider all of such art introduced into the record by Cabot because certain of that art, such as literature references cited during the nullity suit in West Germany (CX-17, items 26, 27, 28, 29, 30, 31), lacked translations.

There also has been abundant evidence of the commercial success of the foam ear plugs under the '487 patent. After the introduction of the foamed ear plugs into the market, the plugs created much interest. (FF 30, 98-108). Many plugs have been sold by Cabot. (FF 23-25, 109). In addition, there is recognition of the '487 patent by others in the industry. See Power Curbers, Inc. v. E.P. Etnyre & Co., 298 F.2d 484, 493, 132 U.S.P.Q. 158, 166 (4th Cir. 1962). Four respondents have admitted importing into the United States and selling foamed ear plugs that infringed the '487 patent. (FF 138-140, 142-145). On June 21, 1984, the United States District Court for the District of Mass. entered a judgment in Norton Company et al. v. Cabot Corporation et al. which declared, as between Norton (a non-respondent) and Cabot, the '487 patent valid and subsisting and the property of Cabot. By the judgment Norton paid Cabot the sum of in settlement of all which have, could have or may have been asserted between the parties relating to the '487 patent. (FF 143). On February 21, 1984, the United States District Court for the Eastern District of Pennsylvania entered a judgment in Willson Safety Products, a Division of WGM Safety Corp. v. Cabot Corporation which declared, as between Willson (a non-respondent) and Cabot, the '487 patent valid and subsisting and the property of Cabot. (FF 144). Six of the respondents, including the four admitting infringement, have executed agreements admitting that the '487 patent is valid and stating that they will not infringe the '487 patent. (FF 138-141, 145, 146).[6/]

6/ Cabot has relied on judgments of validity and infringement as to foreign counterparts in Canada, Great Britain and a pronouncement of validity by a West German court. Such judgments are not controlling.

(FOOTNOTE CONTINUES ON NEXT PAGE)

Based on the foregoing, the Administrative Law Judge reaches the conclusion that the record before him establishes that claims 1 and 11 of the '487 patent are valid.

V. Infringement of the '487 Patent

The unauthorized making, using or selling of any patented invention within the United States during the term of the patent constitutes infringement of the patent under 35 U.S.C. § 271(a).[7/] Patent infringement

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6/ CONTINUED FROM PREVIOUS PAGE

In In re Larsen, 292 F.2d 531 (C.C.P.A. 1961) the Court of Customs and Patant Appeals, referring to appellants' heavy reliance on decisions in Canada and Great Britain which allegedly held process claims allowable "under circumstances similar to those of the instant case," stated:

> "We have repeatedly held that, in view of the differences between foreign patent laws and those of the United States, the allowances of patent claims in foreign countries is not pertinent to the question whether similar claims should be allowed here; In re Guinot, 76 F.2d 134, 22 C.C.P.A. 1067; In re Kleine [Pfannenstiel, and Matthaes], 83 F.2d 928, 23 C.C.P.A. 1216; and In re Kluter, 92 F.2d 906, 25 C.C.P.A. 730. No reason appears for reaching a different conclusion here." (Footnote omitted).

Chief Judge Markey in In re Goodman, 476 F.2d 1365 (C.C.P.A. 1973), rejecting appellant's argument that the issuance of foreign patents "on the instant disclosure" is evidence of patentability, stated that "[i]t has long been established that that argument has no pertinence to the determination of obviousness." See also Timely Products Corp. v. Arron, 523 F.2d 288, 295, 187 U.S.P.Q. 257, 261 (2nd Cir. 1975).

7/ 35 U.S.C. § 271(a) provides:

> Except as other wise provided in this title, whoever, without authority makes, uses or sells any patented invention, within the United States during the term of the patent therefor, infringes the patent.

under § 271 also constitutes an unfair act within the meaning of § 337. In re Von Clemm, 729 F.2d 441 (C.C.P.A. 1955). Infringement is determined, in the absence of an admission, by ascertaining if the elements of the claims in issue read on or are found in the accused product. American Hoist and Derrick Co. v. The Manatooroo Co., Inc., 202 U.S.P.Q. 705 (7th Cir. 1979); Borosen Inc. v. United States, 156 U.S.P.Q. 406 (Ct. cls. 1967). Generally, the burden of proof as to factual issues, relating to infringement, rests upon the patent owner. (Chisum, Patents § 18.06 Vol. 4 (1982)).

A. Foam Earplugs named "Sound-Stop" and "Eastern Disposable Foam Ear Plugs"

In settlement agreements executed in May 1984, respondents Schleicher, TECHMED and Eastern Safety agreed that foam ear plugs sold or offered for sale in the United States under the names "Sound-Stop" and "Eastern Disposable Foam Ear Plugs" infrined claims 1 and 11 of the '487 patent. They also agreed to refrain from exporting infringing foam earplugs into the United States (FF 138-140). By a settlement agreement executed in August 1984, respondent S.S. Trading stated that it had exported foam earplugs which were manufactured in Japan to the Federal Republic of Germany and that the foam earplugs were re-exported and sold in the United States under the names "Sound-Stop" and "Eastern Disposable Foam Ear Plugs" without notice to S.S. Trading. These foam earplugs were admitted to infringe claims 1 and 11 of the '487 patent. (FF 145). Respondents Schleicher, TECHMED, Eastern Safety, AM, S.S. Trading and Inoue each have agreed not to infringe the '487 patent. (FF 138-141, 145, 146).

B. Dimp and Hush Foam Ear Plugs

Respondent Carleton has imported from respondents Eurosafe and Protector foam earplugs and sold them to retailers and users in the United States under the names "Hush" (FF 5-8). A "Dimp" foam earplug was discovered by one of Cabot's Swedish distributors. The "Dimp" is sold in the United States under the name "Hush". (FF 6).

Samples of "Dimp" foam earplugs obtained in Sweden were analyzed by Cabot in May 1983. The Dimp earplugs were found to be cylindrical in shape, 0.52 inches long, and 0.51 inches in diameter comprised of organically plasticized polymeric polyurethane foam. They had an average recovery rate from 60 percent compression of 35.5 seconds, and had an average equilibrium pressure at about 40 percent compression of about 0.765 p.s.i. (FF 153). Hence these plugs, if sold or offered for sale in the United States, are found to infringe claims 1 and 11 of the '487 patent. (FF 154).

Samples of "Hush" foam earplugs were tested by Cabot. It was found that the earplugs are cylindrical in shape, 9.78 inches long and 0.53 inches in diameter, composed of organically plasticized polymeric polyurethane foam, have an average recovery rate from 60 percent to 40 percent compression of 12 seconds, and have an equilibrium pressure at 40 percent of 0.831 p.s.i. (FF 155-157). Thus the "Hush" foam earplugs are found to infringe claims 1 and 11 of the '487 patent. (FF 158).

Accordingly, the Administrative Law Judge concludes, based on the record before him, that complainant Cabot has met its burden of proving that foam earplugs sold or offered for sale in the United States under the names "Sound-Stop," "Eastern Disposable Foam Ear Plugs," and "Hush" infringe claims 1 and 11 of the '487 patent.

VI. Jurisdiction

Pursuant to Section 337, the Commission has subject matter jurisdiction over unfair methods of competition and unfair acts in the importation into or sale in the United States of articles, the effect or tendency of which is to destroy or substantially injure an industry, efficiently and economically operated, in the United States.

While certain of the named party respondents have been terminated from the investigation, the Commission retains its jurisdiction on the basis of the importation or sale of the accused product by both the terminated respondents as well as the remaining respondents.

The Commission has in rem jurisdiction over any of the accused foam earplugs that have been imported or sold in the United States.

Therefore, it is determined that the Commission has subject matter jurisdiction over the investigation and in rem jurisdiction over the foam earplugs that have been imported into or sold in the United States.

VII. Importation and Sale

In order to invoke the subject matter jurisdiction of the Commission and to support a finding of a violation of Section 337, complainant must establish that the accused product has been imported into or sold in the United States. 19 U.S.C. § 1337(a).

The record establishes that Inoue MTP[8/] manufactured the yellow foam earplugs for Fujiyama Sangyo in Japan which were then exported by S.S. Trading[9/] to TECHMED in West Germany. TECHMED (owned and operated by Walter Schleicher, Jr.), in turn, exported the foam earplugs to Eastern Safety and Tasco[10/] in the United States. A-M Produkte, through a Taiwanese agent, has exported samples of foam earplugs to an E-A-R Division distributorship in the United States. (FF 165, 169, 171, 173).

Eurosafe manufactured the white foam earplugs in Sweden, and through Protector, exported them to Carleton in the United States. Some of these imported foam earplugs were purchased from Carleton and sold by Safety Direct. (FF 174, 176-178).

Based on the foregoing, the Administrative Law Judge concludes that complainant Cabot has established a prima facie case that there has been importation and sale at least as to certain of the named respondents.

8/ In the settlement agreement entered into between Cabot and Inoue, Inoue asserted that it had never manufactured and sold directly to the U.S. any earplugs infringing the '487 patent. (ALJ Exh. 4).

9/ In the settlement agreement entered into between Cabot and S.S. Trading, S.S. Trading was said to have exported foam earplugs to the Federal Republic of Germany, such foam earplugs having been re-exported to the U.S. without notice to S.S. Trading. (ALJ Exh. 3).

10/ On June 7, 1984, the Administrative Law Judge issued an Initial Determination (Order No. 8) terminating the investigation as to Tasco on the grounds that Tasco was no longer in business and thus not an existing entity. The Notice of Commission Decision not to review this initial determination was issued August 2, 1984.

VIII. Domestic Industry

In order to prove a violation of Section 337, the complainant must establish that the alleged unfair methods of competition have the effect or tendency ". . . to destroy or substantially injure an industry, efficiently and economically operated in the United States . . . " 19 C.F.R. § 1337(a).

A. Definition

When the unfair acts or methods of competition alleged under § 337 are based on the infringement of patent rights, the Commission has customarily defined the domestic industry as consisting of the domestic operations of the patentee devoted to the exploitation of the teachings of the patent at issue which is the target of the unfair acts or practices. Certain Molded-In Sandwich Panel Inserts and Methods for Their Manufacture, Inv. No. 337-TA-99 (1982) (Sandwich Panel Inserts); Certain Methods for Extruding Plastic Tubing, Inv. No. 337-TA-110, 218 U.S.P.Q. 348 (1982) (Plastic Tubing); Certain Slide Fastener Stringers, Inv. No. 337-TA-85, 216 U.S.P.Q. 907 (1981); Trade Reform Act of 1973: Report of the House Committee on Ways and Means, H. Rep. No. 93-571 at 78, 93rd Cong. 1st Sess. (1973). Exploitation of patent rights may include domestic production and manufacture, development and sale of patented product. Plastic Tubing; Sandwich Panel Inserts; Certain Spring Assemblies and Components Thereof and Methods for Their Manufacture, Inv. No. 337-TA-88, 216 U.S.P.Q. 225 (1981) (Spring Assemblies).

Complainant Cabot Corporation, through its E-A-R Division, is engaged in the design, manufacture and sale of various noise control and damping products, including foam earplugs covered by the '487 patent. Complainant has no domestic licensees. Complainant manufactures three types of foam earplugs. They are the cylindrical foam earplug colored yellow and sold under the mark "E-A-R" or colored white and sold in bulk by Siebe North Corporation under the mark "Deci-Damp" and the yellow "E-A-R" foam earplug with a longitudinal hole for use with hearing testing equipment or hearing aids, both of which are covered by the '487 patent, and paired "E-A-R" foam earplugs tethered together by means of a cord, components of which are covered by the '487 patent. (FF 181-184). Approximately percent of E-A-R's square feet and percent of its U.S. employees are engaged in the production and sale of foam earplugs. (FF 185).

Based on the evidence of record, I find that a domestic industry exists, which industry is defined by Cabot's operations and facilities devoted to the design, manufacture and sale of foam earplugs covered by the '487 patent.

B. Efficient and Economic Operation

To prevail under Section 337, complainant must establish that the relevant domestic industry is efficiently and economically operated. The traditional guidelines set forth by the Commission to assess efficient and economic operation include the use of modern equipment, effective quality control programs, profitability of the relevant product line, substantial expenditures in advertising, promotion and development of consumer goodwill, investment in research and development, and highly skilled and trained

personnel who receive significant employment benefits. Certain Trolly Wheel Assemblies, Inv. No. 337-TA-161, ID at 58 (1984); Certain Heavy Duty Staple Gun Tackers, Inv. No. 337-TA-137 (1983); Certain Vacuum Bottles and Components Thereof, Inv. No. 337-TA-108, RD at 69 (1982); Certain Coin-Operated Audio Visual Games and Components Thereof, Inv. No. 337-TA-105, 216 U.S.P.Q. 1106 (1982); Certain Airtight Cast-Iron Stoves, Inv. No. 337-TA-69, 215 U.S.P.Q. 963 (1981).

Cabot's research, domestic manufacturing and warehouse facilities are all located in its E-A-R Division in Indianapolis. This centralization enables complainant to fill its customer orders expeditiously. (FF 191). Investments in improved production equipment, modifications to existing equipment and computerization have increased productivity substantially. The E-A-R Division has continually implemented programs to improve productivity, reduce costs and increase profits. (FF 194).

(FF 197-199). As evidence of the success of these efforts, the Division's overall manufacturing costs as a percentage of sales have been reduced percent between fiscal 1982 and 1984, and actual productivity gains, allowing for inflation, have been approximately percent. (FF 195-196).

The E-A-R production facilities utilize modern foam production and packaging equipment

Its research

facilities contain state of the art equipment and are widely recognized as some of the finest facilities for research and testing in the fields of audiometry, noise control and vibration damping. The research and development staff are highly trained and recognized as leaders in the field of noise control, vibration damping and hearing protection. (FF 189, 190, 192).

Complainant employs extensive quality control procedures in the production of foam earplugs. The plugs are subjected to more than 80 tests and inspections, including noise attenuation tests, throughout the production process and meet or exceed all applicable standards. All raw materials are also tested and must meet minimum quality standards. (FF 193).

E-A-R also expends considerable efforts to promote its products and foster customer goodwill. Since 1974, Cabot has spent more than $2 million in advertising and promoting its "E-A-R" earplugs. In addition to trade publication and trade show promotion, E-A-R publishes technical papers in the field of noise control and hearing protection which it distributes free to those concerned with hearing protection. In an effort to teach industry, government and medical personnel about hearing protection, E-A-R produces films and videotapes and conducts hearing clinics as well. (FF 201, 207,209).

For its employees E-A-R offers a wide range of benefits including insurance programs, pension plans and a profit sharing plan. In an ongoing effort to upgrade its personnel, E-A-R conducts management and technical

training programs and offers reimbursement for outside educational courses. E-A-R also provides a sales incentive plan for its sales people, incorporating merchandise and travel awards. (FF 203-205).

(FF 200, 222, 223).

For the foregoing reasons, the Administrative Law Judge concludes that complainant Cabot has established a prima facie case that the domestic industry as defined herein, is efficiently and economically operated.

IX. Injury

In order to prevail in a Section 337 action, complainant must show that the importation and sale of foam earplugs has ". . . the effect or tendency . . . to destroy or substantially injure the domestic industry . . ." 19 U.S.C. § 1337(a). This element requires proof separate from and independent of proof of an unfair act. Further, complainant must establish a causal relationship between respondents' alleged unfair acts and the injury suffered as a result of such acts. Certain Spring Assemblies and Components Thereof and Methods of Their Manufacture, Inv. No. 337-TA-88, at 43-44, 216 U.S.P.Q. 225, 243 (1981). (Spring Assemblies).

There is evidence of record of importation and sale of at least pairs of foam earplugs during the period 1980 through the present. (FF 169, 171, 176). The importation and sale of the "Sound-Stop" foam earplugs associated with the seven respondents who have been terminated from the investigation accounts for at least of the total number of imported, infringing earplugs. (FF 169, 171).

Under certain circumstances evidence of importation by respondents no longer a party to an investigation may be considered in an assessment of injury. Certain Heavy Duty Staple Gun Tackers, Inv. No. 337-TA-137 at 75 (1984). The Commission has concluded that ". . . injury from imports by parties terminated from an investigation will as a general rule be relevant . . . when there is some indication that an 'unfair act' has occurred." Certain Food Slicers and Components Thereof, Inv. No. 337-TA-76 at 19 (1981). Noting their decision in Food Slicers, the Commission recently disagreed with the Administrative Law Judge in his determination not to include the importation by a settled respondent in assessing whether there had been substantial injury or a tendency to substantially injure the domestic industry. Certain Trolley Wheel Assemblies, Inv. No. 337-TA-161 (1984). Emphasizing that Food Slicers did not dictate the consideration of importation by terminated parties in all cases, the Commission concluded that consideration of the importations by the settled respondent in Trolley Wheels was appropriate because (1) virtually all of the infringing imports came from the settled respondent, and (2) that respondent was the importer, not the original source, and therefore the settlement agreement did not effect or limit the original source of the infringing imports. Trolley Wheels at 10.

While in the instant case the importations by the settled respondents by no means represent "virtually all" of the imports of record, they do represent a significant percentage, and as such, the evidence of those importations serves the important function of elucidating the effect of import competition upon the domestic industry. Though one of the settled

respondents, Inoue, is the original source of the "Sound-Stop" earplugs,

(SX 11, 12). Further, another settled respondent, AM-Produkte, has resumed operations in through a trading company and has recently offered to ship samples of foam earplugs to the United States. (FF 248).

Therefore, in the face of threatened renewed importations by some of the settled respondents and in contemplation of the significant percentage of total importations that the imports by the settled respondents represent, these importations are considered necessary to a proper analysis of the issues of present injury and tendency to substantially injure. This approach is in keeping with the Commission's policy favoring the amicable settlement of Section 337 actions. See Food Slicers at 19.

A. Substantial Injury

Several factors are relevant to a determination of injury to the domestic industry, including: (1) lost customers; (2) lost sales; (3) declining sales; (4) volume of imports; (5) decreased production and profitability; and (6) level of market penetration by imports. Certain Drill Point Screws for Drywall Construction, Inv. No. 337-TA-116, at 18 (1982); Spring Assemblies, at 42-49, 216 U.S.P.Q. 242, 245; Certain Flexible Foam Sandals, Inv. No. 337-TA-47, RD at 4 (1979); Certain Roller Units, Inv. No. 337-TA-44, at 10, 208 U.S.P.Q. 141 (1979); Certain Reclosable Plastic Bags, Inv. No. 337-TA-14, 191 U.S.P.Q. 674 (1977).

Complainant contends that the domestic industry has been substantially injured in the form of lost sales, lost profits and injury to Cabot's reputation.

The record reveals that since 1980 respondents TECHMED, Eastern Safety and Tasco imported 260,000 "Sound-Stop" foam earplugs from West Germany, and respondents Eurosafe/Protector and Carleton imported "Hush" foam earplugs from Sweden, into the United States. (FF 169, 171, 176). Complainant asserts that the sale of each of these pairs of foam earplugs represents a lost sale to Cabot.

Complainant must establish a nexus between respondents' sales and injury to the domestic industry, though in instances where there are few competitors or there are defaulting respondents, the standard of proof is diminished. See, Drill Point Screws, RD at 145. While there is no direct evidence in the record of a nexus between respondents' activities and the lost sales by complainant, there is circumstantial evidence to that effect.

Complainant's percentage of the U.S. market sales of foam earplugs in 1983 was approximately percent[11/] (based upon E-A-R sales of out of a total U.S. market of approximately), indicating a relatively small amount of competition to E-A-R in the U.S. market for foam earplugs. (FF 229).

(FF 234).

11/ The Commission investigative attorney, in his proposed finding of fact no. 50, states that

This figure, as well as his proposed figures for the years 1980, 1981, 1982 and 1984, are unrefuted by complainant. The Administrative Law Judge does not rely on these figures as they are inconsistent with the evidence of record, particularly in light of the figures set forth in SX-19 and CX-61 assessed in conjunction with the testimony of Mary Green at Tr. pp. 326-238 (foam earplugs constitute approximately

The only domestic competitor of record is Moldex Metric, to whom complainant lost sales of an estimated units of foam earplugs in FY 1984, or of E-A-R's expected 1984 production. (FF 230; Green, CX-137, p. 6).

The record shows that of the "Hush" foam earplugs imported by Carleton were sold to E-A-R or "Deci-Damp" customers and that Carleton was selling the imported earplugs in 1982 for cents per pair for orders of or more, cents per pair for cases, cents per pair for cases and cents per pair for cases. In March and April of 1984, Carleton sold pairs of "Hush" foam earplugs to Safety Direct (a Cabot customer) for cents per pair. (FF 212-214). Complainant's wholesale prices to distributors since 1981, on the other hand, have been cents per pair for orders of cases or more, cents per pair for cases and cents per pair for cases. (FF 216).

There is no evidence that either Tasco or eastern Safety, the purchasers of the 260,000 pairs of the imported "Sound-Stop" foam earplugs, is a customer of complainant. The "Sound-Stop" foam earplugs were sold to Eastern Safety for 14.2 cents per pair for 160,000 pairs and to Tasco for 6.58 cents per pair for 100,000 pairs. (FF 210). As these figures have not been broken down into quantities equivalent to the "cases" upon which complainant's price structure is based, price comparison is difficult.

Based upon the foregoing, and in consideration that this investigation did not have the benefit of discovery from the remaining defaulting respondents, it is determined that complainant has made a prima facie showing that at least a significant percentage of the importation and sale of the "Hush" and "Sound-Stop" foam earplugs represented lost sales to Cabot.

Notwithstanding complainant's showing of lost sales, complainant has failed to show that the domestic industry has suffered substantial injury.

The importation of pairs of foam earplugs from 1980 to the present represents less than percent of the domestic industry's 1983 foam earplug production of pairs, [12/]

(FF 226,227).

(FF 221-223).

Furthermore, the record fails to show traditional indicia of injury, such as decreased employment or an idling of production facilities and the only evidence of a lowering of prices on complainant's earplugs was in response to domestic competition. (FF 231).

12/ Complainant at p. 7 of its reply brief, states that Cabot's 1983 sales of foam earplugs was pairs. This figure is not substantiated by any cite to the record, and is in fact contradicted by other evidence of record. (FF 226).

Even assuming arguendo that each of the sales of pairs of infringing foam earplugs resulted in a lost sale to complainant, Cabot estimates that it would have realized a loss of only in revenues and in pre-tax profits[13/] over a period of several years, compared to the E-A-R Division's revenues of and pre-tax profits of in 1983, alone. (FF 222,228; SX-21).

While E-A-R's 1984 inventory has increased, complainant has presented insufficient evidence of its causation. (FF 224).

Complainant's reliance on Bally/Midway Mfg. Co. v. U.S.I.T.C., 714 F.2d 1117 (CAFC 1983) for the proposition that even a small loss of sales may establish injury, is misplaced. In that case, the Federal Circuit found that the number of infringing products sold in the United States was significant; that Bally's distributors had complained to Bally about a number of other infringing sales, and video game operators have told Bally of "copy games"; that custom officials testified that infringing Rally-X games had and were still entering the United States, and that their number "has recently increased." Id. at 1123. There is no such comparable evidence before me. Moreover, at issue in the Bally case was a particular video game which, unlike many other products, has only a brief period of popularity, accompanied by high production and sales. Id. at 1119. In Bally, the Federal Circuit focused on the Commission's disparate treatment of the two products at issue -- the Rally-X and Pac Man video games. The Commission had found no substantial injury to complainant's Rally-X game

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13/ Though the record evidences importation of at least pairs of foam earplugs, complainant estimated its lost revenues and lost profits on the basis of lost sales of pairs of foam earplugs.

because unlike Pac Man, its sales were permanently declining. The Federal Circuit reversed the Commission's Rally-X injury analysis, holding that if the import level was sufficient to establish substantial injury with respect to the Pac Man video game, the same level of imports was sufficient to prove substantial injury with respect to Rally-X, regardless of the game's diminishing popularity. Id. at 1123-25.

Finally, there is evidence that some of the imported foam earplugs were of uneven quality and of quality inferior to the "E-A-R" plugs. (FF 232). Complainant says that its reputation has been injured due to substitution of these inferior imported plugs on orders for its product and as a result of confusion by consumers between its product and earplugs made by another. The record reveals, however, only a single incident where a distributor substituted "Hush" foam earplugs on an order for 10,000 pairs of E-A-R foam earplugs and there is no evidence whatever of damage to complainant's reputation, thereby. (FF 220). When testifying, complainant's Noise Control Distributor Marketing Specialist stated that he didn't know whether the earplug confused with the E-A-R plug was domestic or foreign. (FF 233).

In sum, the volume of importation and any resulting loss of sales or profits is considered de minimus and insufficient to support a showing of present substantial injury.

B. Tendency to Substantially Injure

When an assessment of the market in the presence of the accused imported product demonstrates relevant conditions or circumstances from which probable future injury can be inferred, a tendency to substantially

injure the domestic industry has been shown. Certain Combination Locks, Inv. No. 337-TA-45, RD at 24 (1979). Relevant conditions or circumstances may include foreign cost advantage and production capacity, ability of tne impoted product to undersell complainant's product, or substantial manufacturing capacity combined with the intention to penetrate the United States market. Certain Methods for Extruding Plastic Tubing, Inv. No. 337-TA-110, 218 U.S.P.Q. 348 (1982); Certain Reclosable Plastic Bags, Inv. No. 337-TA-22, 192 U.S.P.Q. 674 (1977), Panty Hose, Tariff Commission Pub. No. 471 (1972). The legislative history of Section 337 indicates that "[w]here unfair methods and acts have resulted in conceivable loss of sales, a tendency to substantially injure such industry has been established." Trade Reform Act of 1973, Report of the House Comm. on Ways and Means, H. Rep. No. 93-571, 93 Cong., 1st Sess. at 78 (1973), citing, In re Von Clemm. 108 U.S.P.Q. 371 (C.C.P.A. 1955). See also, Bally/Midway Mfg. Co. v. U.S. International Trade Commission, 219 U.S.P.Q. 97, 102 (C.A.F.C. 1983).

There is evidence of record of an intent to further penetrate the United States market, as well as the capacity to do so.

The total United States market for foam earplugs for 1984 is approximately and for 1983 was approximately (FF 229). Complainant's United States foam earplug sales of in 1983

represented approximately percent of the total U.S. foam earplug sales in 1983. (FF 222). In 1983, E-A-R's total U.S. production of foam earplugs was units.[14/] (FF 225).

Respondent Eurosafe currently has the capacity to produce 12.5 - 20 million pairs of foam earplugs annually, is building another production facility in Sweden and has ordered additional manufacturing equipment. (FF 236, 241). Eurosafe's current capacity alone would enable it to enter the U.S. market at a rate representing between and percent of E-A-R's total U.S. production for 1983.

In addition to proof of substantial foreign capacity, there is clear evidence of the intention to direct that capacity to penetrating the U.S. market. For example, on October 27, 1983, Carleton ordered paris of "Hush" foam earplugs from Eurosafe/Protector.

(FF 242). This represents a more than increase over the number of "Hush" foam earplugs known to have been imported to date. In a July 7, 1983 letter from Peter Taylor of Carleton to Bertil Tindberg, Eurosafe's owner, Taylor projected a

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14/ Though there is evidence of record that the total U.S. market for units of foam earplugs sold in (Green, Tr., p. 324), this figure is not considered reliable in light of the following: (1) complainant produced ; (2) complainant's revenues for ; and (3) complainant has Logic dictates that the Therefore, in the analysis of tendency to injure, the size of the total U.S. market will not be relied upon, but rather, figures for complainant's total production.

(FF 243). Bertil Tindberg has personally expressed his intention to enter the U.S. market, and Eurosafe has advised Carleton that it could supply as many foam earplugs as Carleton needed. (FF 244-245).

As discussed at p. 118, supra, Carleton has sold of the "Hush" foam earplugs to E-A-R and "Deci-Damp" customers to date, and has sold at least a significant number of these at prices less than those of complainant. (FF 212-214). These sales were determined to have resulted in lost sales to complainant, p. 119, supra, and further serve to indicate a sufficient domestic distribution network, as well as demand, to pose a threat of continued lost sales to Cabot in the future. See Certain Apparatus for the Continuous Production of Copper Rod, Inv. No. 337-TA-52 at 61 (1979) (unfair act with resultant lost sales is sufficient to establish a tendency to injure under Section 337).

Cabot has indicated that if Eurosafe and Carleton are permitted to import foam earplugs at the rate of million pairs per year, it will reduce complainant's revenue by approximately percent of E-A-R's annual U.S. foam earplug sales. (FF 246).

In short, the potential and the incentive for importation of the infringing foam earplugs by Eurosafe and Carleton in the future, in light of their recent importation and sales, shows a tendency to substantially injure the domestic industry.

Based upon the foregoing, the Administrative Law Judge finds that complainant Cabot has established a prima facie case that the importation into and sale in the United States of the accused foam earplugs has the tendency to substantially injure the domestic industry.

CONCLUSIONS OF LAW

1. The Commission has jurisdiction over the subject matter of this investigation. 19 U.S.C. § 1337.
2. Patent infringement is an unfair act or method of competition under 19 U.S.C. § 1337(a).
3. Claims 1 and 11 of U.S. Letters Patent Re. 29, 487 owned by complainant, based on the evidence, is valid for the purposes of Section 337.
4. The accused foam earplugs infringe claims 1 and 11 of U. S. Letters Patent Re. 29,487.
5. The relevant domestic industry consists of complainant's domestic operations devoted to the design, manufacture and sale of foam earplugs manufactured in accordance with the claims of the '487 patent.
6. The relevant domestic industry is efficiently and economically operated.
7. Importation of the accused foam earplugs has not substantially injured the relevant domestic industry.
8. Importation of the accused foam earplugs has the tendency to substantially injure the relevant domestic industry.
9. There is a violation of Section 337 of the Tariff Act of 1930, as amended. 19 U.S.C. § 1337.
10. On the basis of the findings of fact made herein, the following respondents are in violation of Section 337: Eurosafe AB (FF 174-175); Protector AB (FF 175-176); Carleton Management Associates, Inc. (FF 175-177); and Safety Direct, Inc. (FF 177-178).

11. On the basis of the evidence of record, respondents Fujiyama Sangyo and Swift Labs are not considered owners, importers, consignees or agents within the meaning of Section 337. Fujiyama Sangyo merely sold foam earplugs to S.S. Trading for export to the European market (FF 165), and there is insufficient evidence to indicate a sale of the accused foam earplugs by Swift. (FF 17, 179).

12. All of the remaining respondents, Eurosafe AB; Protector AB; Carleton Management Associates, Inc.; Safety Direct, Inc.; Fujiyama Sangyo; and Swift Labs are in default under 19 C.F.R. § 210.21(d) for their failure to respond to the complaint and Notice of Investigation and/or their refusal to participate in discovery or in the hearing in this investigation. (See Procedural History, supra, pp. 6-7).

13. Those parties originally named as respondents in the complaint and Notice of Investigation who have since been terminated from the investigation are: TECHMED GmbH; Walter Schleicher; AM-Produkte, GmbH; Inoue MTP; S.S. Trading Co. Ltd.; Eastern Safety Equipment Co., Inc.; and Tasco Sales Co., Inc. (See Procedural History, supra, pp. 5-8).

INITIAL DETERMINATION AND ORDER

Based on the foregoing findings of fact, conclusions of law, the opinion and the record as a whole, and having considered all the pleadings and arguments presented orally and in briefs, as well as proposed findings of facts and conclusions of law, it is the Administrative Law Judge's DETERMINATION that there is a violation of Section 337 in the unauthorized importation and sale in the United States of America of the accused foam earplugs.

The Administrative Law Judge hereby CERTIFIES to the Commission the Initial Determination, together with the record of the hearing in this investigation consisting of the following:

1. The transcript of the hearing, with appropriate corrections as may hereafter be ordered by the Administrative Law Judge;

2. The Exhibits accepted into evidence in the course of the hearing, and the exhibits proffered by the Administrative Law Judge, as listed in the Appendix attached hereto.

The pleadings of the parties are not certified, since they are already in the Commission's possession in accordance with Commission Rules of Practice and Procedure.

Further, it is ORDERED that:

1. In accordance with Rule 210.44(b), all material heretofore marked in camera for reasons of business, financial, and marketing data found by the Administrative Law Judge to be cognizable as confidential business

information under Rule 201.6(a) is to be given five years in camera treatment from the date this investigation is terminated; and further,

2. The Secretary shall serve a copy of the public version of this Initial Determination upon all parties of record and the confidential version upon all counsel of record who are signatories to the protective order issued by the Administrative Law Judge in this investigation; and further,

3. This Initial Determination shall become the determination of the Commission thirty (30) days after the service thereof, unless the Commission, within thirty (30) days after the date of filing of the Initial Determination shall have ordered review of the Initial Determination or certain issues therein pursuant to 19 C.F.R. 210.54(b) or 210.55 or by order shall have changed the effective date of the Initial Determination.

Paul J. Luckern
Administrative Law Judge

Issued: November 30, 1984

CERTIFICATE OF SERVICE

I, Kenneth R. Mason, hereby certify that the attached PUBLIC VERSION INITIAL DETERMINATION, was served upon Stephen L. Sulzer, Esq., and upon the following parties via first class mail, and air mail where necessary, on December 6, 1984.

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