

In the Matter of

**CERTAIN STEEL ROD TREATING
APPARATUS AND COMPONENTS THEREOF**

Investigation No. 337-TA-97

USITC PUBLICATION 1210

JANUARY 1982



UNITED STATES INTERNATIONAL TRADE COMMISSION

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CERTAIN STEEL ROD TREATING)
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Investigation No. 337-TA-97

COMMISSION ACTION AND ORDER

Introduction

The United States International Trade Commission has concluded its investigation under section 337 of the Tariff Act of 1930, 19 U.S.C. § 1337, of alleged unfair methods of competition and unfair acts in the unauthorized importation of certain steel rod treating apparatus and components thereof into the United States or in their sale by the owner, importer, consignee or agent of either, the alleged effect or tendency of which is to destroy or substantially injure an industry, efficiently and economically operated, in the United States. The Commission's investigation concerned allegations that certain steel rod treating apparatus imported or sold by respondents Korf Industrie and Handel, GmbH, Korf Engineering, GmbH, Korf Industries, Inc., Ashlow Ltd., Ashlow Corp., Georgetown Steel Corp., Mr. Willy Korf, and Mr. Johann Heinrich Rohde, are covered by certain claims of U.S. Letter Patent 3,390,871 (hereinafter '871 patent). The '871 patent is owned by complainant Morgan Construction Co. of Worcester, Massachusetts.

This Action and Order provides for the final disposition of investigation No. 337-TA-97 by the Commission. It is based upon the Commission's determination, made in public session at the Commission meeting of December 1, 1981, that there is a violation of section 337.

Action

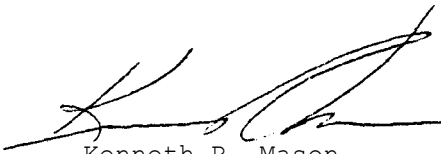
Having reviewed the record in this investigation and the recommended determination of the presiding officer, the Commission, on December 1, 1981, determined that--

1. There is a violation of section 337 of the Tariff Act of 1930 (19 U.S.C. § 1337) in the importation or sale of certain steel rod treating apparatus and components thereof which infringe U.S. Letters Patent 3,390,871, the effect or tendency of which is to substantially injure an industry, efficiently and economically operated, in the United States;
2. The appropriate remedy for such violation of section 337 is an exclusion order, pursuant to subsection (d) of section 337 of the Tariff Act of 1930 (19 U.S.C. § 1337(d)), excluding from importation steel rod treating apparatus and components thereof which infringe claim 1 of U.S. Letters Patent 3,390,871 and which are manufactured by or on behalf of respondents Korf Industrie and Handel, GmbH, Korf Engineering, GmbH, Korf Industries, Inc., Ashlow Ltd., Ashlow Corp., Mr. Willy Korf and/or Mr. Johann Heinrich Rohde, or any successor, assignee, parent company, affiliated person, subsidiary, or related business entity of the above-named parties respondent, or which are sought to be imported by Georgetown Steel Corporation, for the remainder of the term of the '871 patent, except under license by the patent owner;
3. The public-interest factors enumerated in subsection (d) of section 337 of the Tariff Act of 1930 do not preclude the issuance of an exclusion order in this investigation;
4. The bond provided for in subsection (g) (3) of section 337 of the Tariff Act of 1930 during the period this matter is before the President shall be in the amount of 100 percent of the entered value of the imported articles.

Order

Accordingly, it is hereby ORDERED THAT:

1. Steel rod treating apparatus and components thereof which infringe claim 1 of U.S. Letters Patent 3,390,871 which are manufactured by or on behalf of respondents Korf Industrie and Handel, GmbH, Korf Engineering, GmbH, Korf Industries, Inc., Ashlow Ltd., Ashlow Corp., Georgetown Steel Corp., Mr. Willy Korf and/or Mr. Johann Heinrich Rohde, or any successor, assignee, parent company, affiliated person, subsidiary, or related business entity of the above-named parties respondent or which are sought to be imported by Georgetown Steel Corporation are hereby excluded for the remainder of the term of the '871 patent except under license from the owner of said patent;
2. The articles to be excluded from entry into the United States shall be entitled to entry under bond in the amount of 100 percent of the entered value of the imported articles from the day after this order is received by the President pursuant to subsection (g) of section 337 of the Tariff Act of 1930 (19 U.S.C. § 1337(g)) 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;
3. The Secretary shall publish notice of this Action and Order in the Federal Register;
4. The Secretary shall serve a copy of this Action and Order and the Commission opinion in support thereof upon each party of record to this investigation and upon the Department of Health and Human Services, the Department of Justice, the Federal Trade Commission, and the Secretary of the Treasury.



Kenneth R. Mason
Secretary

Issued: December 10, 1981

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UNITED STATES INTERNATIONAL TRADE COMMISSION
Washington, D.C.

In the Matter of)
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CERTAIN STEEL ROD TREATING APPARATUS)
AND COMPONENTS THEREOF >)

Investigation No. 337-TA-97

Introduction

This opinion concerns our final determination in investigation No. 337-TA-97, Certain Steel Rod Treating Apparatus and Components Thereof. This investigation relates to alleged unfair acts and unfair methods of competition in the sale for importation of a steel rod treating apparatus. The accused steel rod treating apparatus is allegedly covered by the claims of U.S. Letters Patent 3,390,871.

We determine that there is a violation of section 337 in the importation or sale of the accused apparatus, that the appropriate remedy is an exclusion order directed at the named parties respondent, that the public interest does not preclude issuance of an exclusion order and that the appropriate bond is 100 percent of the entered value of the article.

Background

Complainant Morgan Construction Company is a manufacturer of steel mills and steel mill equipment and has its principal place of business in Worcester, Massachusetts. Morgan is the holder by assignment of U.S. Letters . Patent 3,390,871.

Respondents are a group of interrelated corporations and individuals, located in England, Germany and the United States, who are engaged in various

enterprises related to the steel industry and are sometimes collectively referred to as the "Korf Group." Respondent Mr. Willy Korf is a German national, and owns a controlling stock interest in a West German holding company, Korf Industrie and Handel, GmbH, K.G. (KIH). KIH in turn controls Korf Engineering, GmbH, a German company engaged in the design and engineering of steel mills. Respondent Korf Industries, Inc. (KII), a Delaware corporation, also controlled by KIH, provides various services to Korf interests in the United States. Respondent Ashlow Limited (Ashlow Ltd.), is by respondents' admission the manufacturer of the accused apparatus (Motion No. 97-1) and has its principal place of business in Rotherham, England, where it engineers and sells steel rolling mill equipment. Ashlow is a joint venture of Bridon, Ltd., a British company, and KE, with the latter exercising majority control. Respondent Ashlow Corporation, with its principal place of business in Reading, Pennsylvania, is a wholly owned subsidiary of Ashlow Ltd. and serves as Ashlow's sales representative in the United States. Respondent Georgetown Steel Corporation (GSC), the purchaser of the subject apparatus, has its principal place of business in Georgetown, South Carolina, where it operates a steel rod mill. GSC is a wholly owned subsidiary of KII. Respondent Korf is a member of the Board of Directors of GSC and KII. Respondent Mr. Johann Heinrich Rohde is the chairman of the board of Ashlow Ltd., the manufacturer of the subject apparatus, and a member of the GSC board.

Morgan initiated this investigation on December 17, 1980, by filing a complaint seeking temporary and permanent relief under section 337. The complaint alleged that KIH, KE, Ashlow Steel & Engineering Co., Ltd. (AS&E),

KII, Ashlow Corp., and GSC were engaged in the importation or sale of steel rod treating apparatus covered by the claims of U.S. Letters Patent 3,390,871 ('871 patent).

In public session on January 14, 1981, the Commission unanimously voted to institute a section 337 investigation based on Morgan's complaint. The Commission's notice of investigation was published in the Federal Register on January 28, 1981, and named KIH, KE, AS&E, Ashlow Corp., KII, and GSC as parties respondent. 1/ The Commission later amended the notice of investigation to dismiss AS&E as a party respondent and to add Ashlow Ltd. in AS&E's place. 2/ On motion of complainant Morgan, the Commission, on June 2, 1981, further amended the notice of investigation to add Mr. Willy Korf and Mr. Johann Heinrich Rohde as parties respondent. 3/ The Commission denied complainant's motion to add Coinvest B.V., and Korf Stahl as parties respondent for lack of a sufficient showing.

At various points during the course of the investigation, KIH, KE, Mr. Korf and Mr. Rohde moved to dismiss the complaint and notice of investigation. After filing notices of appearance, KIH, KII and KE first sought to be dismissed as parties on the grounds that they were not involved in the importation or sale of the accused apparatus and were not real parties in interest. 4/ The administrative law judge (ALJ) denied the motion, after finding sufficient evidence of their active involvement (Order No. 5). KIH and KE later sought dismissal for lack of in personam jurisdiction (Motions

1/ 46 F.R. 9263.

2/ 46 F.R. 22083.

7/ 46 F.R. 30738 (June 10, 1981).

4/ Motions Nos. 97-2, 97-3, 97-4.

Nos. 97-28, 97-30). The ALJ denied the motions, but granted KIH and KE leave to file an interlocutory appeal with the Commission. 5/ The Commission affirmed the ALJ's determination, after determining that the Commission's jurisdiction to issue an exclusion order under section 337 is in rem.

After being named as parties respondent, Messrs. Korf and Rohde moved to dismiss the complainant and to quash service of the complaint and notice of investigation. Messrs. Korf and Rohde argued that the Commission's service by registered mail did not conform to the Hague Convention on Service of Process Abroad of Judicial and Extra-Judicial Documents in Civil or Commercial Matters. 6/ The Commission denied the motion after determining inter alia that the Federal Republic of Germany does not regard documents emanating from administrative proceedings as within the scope of the Convention. 7/

Voluminous discovery was taken by all parties. A large number of motions were filed and disposed of by the Administrative Law Judge, Judge Duvall (hereinafter ALJ). Sanctions were entered by the ALJ against respondents for the refusal of certain officers and directors of KIH and KE to appear as ordered for depositions. 8/

Judge Duvall issued his recommended determination on August 18, 1981, finding for complainant on all issues. He concluded that the invention disclosed in the '871 patent was non-obvious, that the patent was enforceable, that the subject apparatus infringes claim 1 of the patent, and that the

5/ 46 F.R. 30737 (June 10, 1981), Memorandum Opinion.

6/ 20 U.S.T. 361, T.I.A.S. No. 6638 (entered into force 1969).

7/ Memorandum Opinion (Nov. 18, 1981).

8/ Order Nos. 12, 22. We find it unnecessary to rely on the findings of fact taken in Order No. 22 in our determination here.

requisite injury is present. Pursuant to section 210.52 of the Commission's rules, the record in the investigation and the recommended determination were certified to the Commission for its consideration. 19 CFR 210.52 (1980)

A hearing before the Commission was held on October 14, 1981. The Commission heard oral arguments regarding violation of section 337, remedy, bonding, and the public interest. The parties were given an opportunity to discuss respondents' Motion No. 97-59 seeking sanctions against complainant for withholding evidence.

The unfair act alleged is the infringement of U.S. Letters Patent 3,390,871 by the subject apparatus. Respondents, however, contend that the '871 patent is invalid under 19 U.S.C. § 103 because of the obviousness of the invention disclosed in the patent. Our discussion will begin with a brief analysis of the background of the invention. We will then consider the legal standard set forth in section 103, the various prior art references alleged to demonstrate the obviousness of the invention, and the nonobviousness of the invention as a whole.

• I. Background of the Invention

For many years prior to the introduction of the '871 apparatus, medium to high carbon steel rod was subjected to a form of heat treatment known as "patenting." 9/ Steel rod is rolled from large steel billets. Under the former practice, the rod was rolled, then passed through a laying head where the rod strand was coiled into a bundle of concentric rings. At this point, the temperature of the bundled rod was over 1500 ° F. and the rod was too hot

9/ CX-69, p. 2.

and too soft to hold its shape. If hung from a hook carrier, it would stretch, an effect known in the trade as horse-collaring. 10/ Consequently, the bundle of hot, glowing, rod was deposited on a start-stop conveyor and allowed to cool until it would not deform. Once the rod cooled sufficiently, it was transferred to a hook carrier and allowed to cool further in the ambient air until ready for further handling.

Cooling rod in this manner has two major disadvantages. First, as the rod cools, its surface oxidizes causing a loss of about 1 1/2 to 2 percent of the metal. This metal loss is known as "scale." Second, medium to high carbon steel cools too slowly, and as a result lacks tensile strength and ductility. 11/ The rod is relatively soft and weak and cannot be worked into finished products without some further treatment. Steel rod itself is rarely the desired end of the manufacturing process; the rod is "cold worked" through such processes as stamping or wire drawing into wire, screws, nails, springs, etc. 12/ Unless rod is given additional treatment before cold-working, it will break in wire drawing, causing costly down time, or if drawn without breaking, will result in a useless product. The rod needs additional heat treatment to strengthen it for cold working.

This treatment was "patenting." Steel has the property of manifesting different physical characteristics depending on how it is cooled from high temperatures. If steel is heated above the critical temperature (usually about 1350 ° F. for plain carbon steels), the crystalline structure transforms to a phase called "austenite." In the austenite phase, the carbon is

10/ RX-118, p. 30.

11/ CX-70 Tab F(1).

12/ Id.; CX-69, p. 2.

completely dissolved in the iron matrix. 13/ As the steel cools below the critical temperature, the austenite transforms into ferrite (iron) and cementite (iron carbide). The microstructure of the steel is a function of the temperature at which transformation from austenite occurs and the rate of cooling, and dictates the physical properties of the steel rod. In medium to high carbon rod, the desired microstructure is "pearlite," which occurs when the ferrite and cementite precipitate together, and form lamellae or plates of ferrite and cementite. 14/

Rod is patented by taking a cool bundle, placing it on a spindle, unwinding the rod strand, and passing it through a patenting furnace. The furnace heats the strand above the critical temperature. After the rod strand passes through the furnace, it is cooled by a variety of means. In "air patenting," the strand is allowed to cool in ambient air. Transformation occurs as the rod temperature falls to the temperature of the air. Alternatively, the strand can be passed through a bath of molten lead held near the desired transformation temperature. The submerged rod cools rapidly to the temperature of the molten lead, and transformation occurs. isothermally, i.e., at a constant temperature (that of the lead). This method is known as "lead-patenting." Lead patented rod is superior to air patented rod, and isothermal transformation was therefore regarded as the optimum means of treating rod by the industry. 15/

Patenting has a number of significant disadvantages. 16/ The primary one

13/ Transcript at 846-847 (hereinafter "Tr."); Tr. at 302; CX-70, Tab F(1).

14/ RX-7, p. 9, attachment 7; CX-70, Tab F(1).

15/ Tr. at 303.

16/ CX-69, p. 15.

is cost. Patenting furnaces are expensive and the operating costs of patenting are high. In addition, the reheating and cooling of the rod significantly increases scale loss.

For many years, the steel industry sought a way of avoiding patenting. The hope was that a method would be developed to cool rod directly from rolling temperatures to obtain the, equivalent of patented rod. 17/ At the same time, efforts were also being made to solve the problems of scale loss and of handling large masses of rod at higher and higher speeds.

It was in this setting that the invention of the '871 apparatus occurred at the Steel Company of Canada (Stelco) in 1960. The '871 apparatus was the result of the joint efforts of two men, David McLean and Charles Easter, who assigned their rights to Stelco. Morgan received the patent rights to the invention from Stelco by assignment. The original application for a U.S. patent on the apparatus was filed on August 24, 1962. The patent was issued by the Patent and Trademark Office (Patent Office) on July 2, 1968, The invention ^{is} commonly referred to as the "Stelmor, a combination of the names of Stelco and Morgan. According to complainant, the Stelmor has rendered air patenting obsolete and has limited lead patenting to a few specialized uses. 18/

II. 35 U.S.C. 103

A valid patent must be useful, novel, and non-obvious, 35 U.S.C. §§ 101, 102, 103. Conversely, a patent which lacks one of the above statutory

17/ CX-69, p. 2.

18/ CX-69, p. 8; CX-80, p. 8; Tr. at 384.

prerequisites is invalid and hence unenforceable. Utility and novelty are not issues in this case.

The starting point of any analysis of the non-obviousness of a claimed invention is the Supreme Court's decision in Graham v. John Deere Co., 383 U.S. 1 (1966). In Graham v. John Deere, Co., the Court for the first time construed the provisions of 35 U.S.C. § 103, in which Congress added to the then existing statutory requirements of novelty and utility, the statutory requirement of non-obviousness. The statute provides in pertinent part:

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

35 U.S.C. § 103. The Court set forth the criteria for a determination as to obviousness, adopting the following test:

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, failure 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.

383 U.S. at 17. Accordingly, obviousness turns on a series of basic factual inquiries into the scope and content of the prior art, the differences between the prior art and the claims at issue, and the level of ordinary skill in the pertinent art. Graham v. John Deere Co., supra; Chisum, 2 Patents, § 5.03[1].

Respondents argue that the ALJ incorrectly relied on a finding of that

the claimed invention had a "synergistic quality" in sustaining the validity of the '871 patent under section 103. The law of section 103 is complicated by confusion regarding the proper standard for combination patents. A combination patent is one which combines old, known elements.

Prior to Graham v. John Deere Co., the courts employed a variety of negative rules of invention, such as the presence of a new result or a new and different function, in scrutinizing combination patents, e.g., Great Atlantic and Pacific Tea Co. v. Supermarket Corp., 340 U.S. 147, 152 (1950). Graham v. John Deere appeared to reject such tests in favor of a single standard, obviousness. 383 U.S. at 4; Chisum, 2 Patents § 5.04[5](c) (1981).

Confusion, however, arose after the Court's decision three years later in Anderson's Black Rock Co. v. Pavement Salvage Co., 396 U.S. 57 (1969).

Holding a patent for treating asphalt pavement invalid, the Court stated:

A combination of known elements may result in an effect greater than the sum of the several effects taken separately. No such synergistic result is argued here.

396 U.S. at 61 (emphasis added). In Sakraida v. Ai; Pro, Inc., 425 U.S. 273 (1976), the Court appeared to reaffirm Anderson's Black Rock. The Court found a patent for a water flush system used in dairy barns invalid, stating that the combination could not be characterized as "synergistic" and "simply arranges old elements with each performing the same function it had been known to perform . . ." 425 U.S. at 282. Anderson's Black Rock and Sakraida are unclear, but can be read to overrule Graham's holding that the sole test of patentability under section 103 is obviousness.

The courts have since split on the issue. Several have adopted synergism as the appropriate standard for evaluating the obviousness of combination patents. E.g. Herenschensohn v. Hoffman, 593 F.2d 893 (9th Cir. 1979). The

trend, however, appears to be away from "synergism." Republic Industries, Inc. v. Schlage Lock Co., 592 F.2d 963, 972 (7th Cir. 1979); Champion Spark Plug v. Gyromat Corp., 603 F.2d 361, 372 (2d Cir. 1979); Plastic Container Corp. v. Continental Plastics, 607 F.2d 885 (10th Cir. 1979).

We conclude that the better view is that obviousness, not synergism, is the sole criterion for patentability under section 103. Reading Sakraida and Anderson's Black Rock to mean that combination patents are to be tested by the different and more rigorous standard of synergism does not square with the language of section 103 or Graham v. John Deere Co. In Republic Industries, Inc. v. Schlage Lock Co., 592 F.2d 963, 971 (7th Cir. 1979), the Seventh Circuit noted that: "In enacting section 103, Congress expressly mandated nonobviousness, not synergism, as the sole test for the patentability of novel and useful inventions: indeed, synergism is not even mentioned in the Patent Act of 1952." Moreover, the legislative history indicates that Congress added section 103 to the statute for "uniformity and definiteness," in the expectation that the section would "have a stabilizing effect and minimize great departures which have appeared in some cases." 19/ The use of a distinct and more rigorous test for combination patents seems at odds with Congress' expectation.

More importantly, "synergism" is a misnomer that adds little if anything to a determination under section 103. Synergism has been variously defined as an invention where one of the elements performs a new and different function and as an invention in which the elements interact with each other so that

19/ Senate Rept. No. 1979, June 27, 1952; 2 U.S. Code Congressional and Administrative **News**, p. 2400 (1952).

their aggregate effect is greater than the sum of the several parts taken separately. In Republic Industries, the Seventh Circuit, per Judge Swygert, observed:

There is no such thing as a mechanical or hydraulic element functioning differently in combination than it did outside the combination. A spring or valve will always function as a spring or valve, alone or in concert with other components. Moreover, mechanical elements can do no more than contribute to the combination the mechanical functions of which they are inherently capable.

592 F.2d at 971; v. Walter Kidde & Co., 79 F.2d 20, 22 (2d Cir. 1935). The usefulness of defining synergism as an invention in which the parts interact so that the aggregate effect is greater than the sum of the several parts taken separately appears equally limited. Today, almost all working mechanical inventions consist of known parts which interact with each other in predictable ways. The presence of interaction tells very little about whether it was obvious to combine the elements in a particular manner. A combination may well interact and yet be obvious.

Finally, section 103 requires an analysis of obviousness "at the time the invention was made to a person having ordinary skill in the art . . ." 592 F.2d at 971. Synergism looks to the presence of a new or different function for one of the elements or to the operation of the elements after they are combined. Consequently, synergism does not comport with the Graham or the express mandate of section 103 to ascertain obviousness at the time of the invention. Republic Industries v. Schlage Lock Co., 592 F.2d at 971.

In his recommended determination, the ALJ rejected the testimony of certain witnesses, because he found that they "fail[ed] to comprehend, much less articulate the true dimensions of the new synergistic quality resulting

from his particular combination of old devices and methods." 20/

We conclude that the ALJ erred insofar as he relied on the presence of a "synergistic quality" to sustain the validity of the '871 patent. A finding of synergism is not enough to render a combination invention non-obvious, just as the lack of synergism should not render a patent obvious. We note, however, that the ALJ's recommendation that the '871 patent is valid also rests on a thorough application of the obviousness standard mandated by Graham and section 103.

III. The '871 Patent

The '871 patent is a combination patent, or in other words combines known unpatented elements. Claim 1, the representative claim, 21/ describes:

Apparatus for producing steel rod comprising in combination:

[1.] a mechanism for rolling steel to rod diameter at an elevated temperature above transformation temperature;

[2.] a delivery means for receiving said rod continuously and directly from said mechanism;

[3.] spaced supports positioned to receive said rod from said delivery means;

[4.] rod laying means for directing said rod from said delivery means and for continuously depositing said rod on said spaced supports in the form of discretely offset rings while said rod is still at a temperature above transformation;

[5.] said rod laying means and said supports constructed and arranged to provide an offset of said rings and a dimension of contact between said rod and said supports which allows substantially complete exposure of the surface of said rod to a flowing current of a gaseous cooling medium;

20/ Recommended Determination, p. 38 (hereinafter "RD").

21/ The parties have stipulated that the validity of the patent stands or falls with Claim 1.

[6.] means associated with said delivery means for cooling said rod rapidly from rolling temperature above transformation down to a temperature near to but above transformation directly after said rod issues from said rolling mechanism and while the austenitic grains thereof are still small due to the mechanical action of said rolling mechanism, whereby austenitic grain growth following rolling is inhibited; and,

[7.] means for imparting a substantially uniform fine grained pearlitic structure suitable for extensive cold working to said rod including means associated with said spaced supports for directing a flowing current of said gaseous cooling medium around said spaced supports through said rings and to substantially all exposed surfaces of said rod to cool said rod through transformation substantially uniformly throughout the length of said rod.

The ALJ characterized the essential elements of the '871 patent as follows:

- (a) lot rolling the rod,
- (b) cooling it (preferably with water to a Selected degree) in the delivery pipes so as to inhibit austenitic grain growth,
- (c) forming it into rings at the laying head,
- (d) depositing it continuously onto spaced supports in discretely offset rings (i.e. depositing it on to a moving open conveyor in offset rings), and,
- (e) cooling it through transformation under forced air while still in overlapping' ring fotM on the conveyer.

The Stelmor apparatus ran somewhat contrary to the accepted theories of rod Patenting. 22/ When the Stelmor process was developed, it was generally believed that the rod strandS could not touch during patenting because the strands would cool more slowly at the point of contact and the rod would be non-uniform. In the Stelmor, the strands touch, but the rod is uniform. For that reason, it was not understood why the invention worked. 23/

22/ Tr. at 266; CX-69, p. 11-12.

23/ CX-40, p. 3; CX-69, p. 11.

An explanation was subsequently provided by Professor Ian Slater of the University of Aston, Birmingham, England in 1965-66 and later confirmed by tests. 24/ After rod is rolled, the austenite grains in the rod are small. As the rod cools, the grains expand or coarsen. 25/ Professor Slater showed that the austenite grain size can be inhibited by cooling above transformation temperature (i.e., the "critical" temperature), and that the small grain size has an effect in cooperation with rapid forced air cooling on a conveyor. This effect occurs because when the austenite grains are small, transformation occurs much more quickly. In the practice of the '871 patent a grain size of 7-8 is usual (i.e., 31,000 grains per cu mm) (see (CX 70, Tab F-1), whereas in patenting a grain size of 4-5 is usual (i.e., 1428 grains per cu mm) (See also CX 70, Tab F[11], Fig. 24). The transformation rate for the smaller grains is approximately three times faster than that of the large ones. 26/ The increase in transformation rate means that once transformation temperature is reached at any given point along the rod, transformation proceeds so rapidly to completion that the average temperature of transformation is not materially different for either the rapidly or the slowly cooled places, and the touching of rod rings does not prevent a uniform product.

The elements of the '871 apparatus combine to achieve this effect. 27/ As the rod issues from the rod mill the austenite grains are small. The rod then passes through the delivery pipes where it is cooled with water. The

24/ CX-80, p. 5; CXP-2; Tr. at 286.

25/ Tr. at 286; CX-69, p. 11; CXP-3.

26/ Id.

27/ CX-69, p. 8.

water cools the rod to a temperature above transformation and inhibits grain growth. After the rod is continuously laid in non-concentric or "spencerian" rings on the moving conveyer, it is blasted with forced air. The air and the spread out spencerian rings cause the rod to transform rapidly, preventing the formation of excessive amounts of undesirable free ferrite and resulting in a pearlite microstructure.

We turn now to a review of the most pertinent prior art.

IV. The Prior Art

1. Edwards, U.S. Letters Patent 1,295,139. 28/

The Edwards patent issued in 1919. It claims:

[Title combination with rod coiling mechanism, of a guide for conducting the rod from the rolling mill to said coiling mechanism, a longitudinally moving support on which the rod is delivered by said coiling mechanism whereby to form a series of offset exposed turns, and means for subjecting the rod to a reducing atmosphere while on said moving support.

The Edwards patent relates to 2 elements of the '871 patent, the (1) laying of spencerian, i.e., non-concentric, rings of steel rod on (2) a moving Conveyor. The specifications to Edwards state that the use of spencerian rings will "expose as completely as possible the entire surface of such rod, so coiled, to the action of a cooling medium." 29/ Because of the complete exposure, "the cooling of the rods is rendered uniform." 30/

In the course of this proceeding, respondents have made two arguments

28/ CX-70, Tab B(4).

29/ Id.

30/ Id.

based on Edwards. They have argued (1) that the evidence establishes that the Edwards patent by itself renders the claimed subject matter of the '871 patent obvious under 35 U.S.C. § 103, 31/ and (2) that Edwards taken in conjunction with various other pieces of prior art renders the '871 patent obvious.

We determine that respondents' claim that Edwards taken alone renders the subject matter of the '871 patent obvious is mistaken. The Edwards apparatus differs in significant respects from the Stelmor apparatus. It lacks water cooling means for cooling the rod and inhibiting austenitic grain growth. Thus the Edwards apparatus is incapable of laying the rod on the conveyor while the austenite grains are small and the rod's temperature is near to but above transformation. Edwards also lacks means for directing forced air at the spencerian rings. These structural differences are critical, since without these elements, the Stelmor combination would not achieve the desired metallurgical result. 32/

It is clear, moreover, that even with a most charitable reading, Edwards does not suggest or teach a structure capable of producing the equivalent of air patented rod. Edwards taught that laying the rod on a series of offset non-concentric rings would result in "practically a complete exposure of its surface during the period of cooling, whereby the cooling of the rod is rendered uniform." 33/ Nevertheless, Edwards did not describe his apparatus in terms of expected metallurgical benefits, such as eliminating patenting,

31/ Respondents Ashlow Limited, Ashlow Corporation, Korf Industries, Inc., anaGeorgetown Steel Georgetown's Reply Brief, p. 3.

32/ CX-98, p. 5.

33/ U.S. Letters Patent 1,295,139, p. 1, lines 76-79.

but in terms of reducing oxide formation. 34/ He teaches the use of non-concentric offset rings as a means for more effectively exposing the surface of the rod to a deoxydizing medium during cooling in order to reduce scale. 35/ As Mr. John Hitchcock 36/, a former Morgan engineer, testified, Edwards' primary concern was scale, although his apparatus may have carried with it some incidental metallurgical benefits. 37/

The lack of any meaningful effect on the rod microstructure is corroborated by the performance of the Edwards structure in simulation tests, During May 1967, Morgan and Stelco simulated the Edwards apparatus under the supervision of Professor Slater and Dr. Stryker. The tests employed an enclosed chamber with a water cooled roof. The rod was laid on the moving conveyor in spencerian rings and run through the chamber. Mr. Norman Wilson, a Morgan engineer with extensive experience in rod mill technology, witnessed the tests. He testified that 100 feet from the laying head the rod rings were still red hot, and the rod product was of poor quality. 38/ Consequently, we agree with the ALJ's conclusion that the tests substantially indicated that "the uniform cooling taught by Edwards was too slow to meet the requirements of faster mill speeds and metallurgical quality suitable for final working without patenting." 39/

34/ Id. at p. 1, lines 60-79, 79-87.

35/ Id. at p. 1, lines 52-60, 70-72, 79787.

36/ RX-118, p. 47.

37/ RX-118, p. 5 6.

38/ CX-98, p. 5; Tr. at 796. The fact that the tests were run without a deoxydizing medium 'does not'undercUi their probative value. Mr. Wilson testified that it would be inconceivable that the introduction of such a medium would accomplish "satisfactory cooling.." Tr. at 867.

39/ RD at 18.

2. The Roeblings Trenton plant and the Lewis Patent.

Respondents rely heavily on a controlled cooling apparatus built by Mr. Dartrey Lewis at the Trenton plant of John A. Roebling's Sons Corp.

During the 1950's Dartrey Lewis was engaged in research regarding rapid cooling systems designed to duplicate patenting. The result of this research was U.S. Letters Patent 2,994,328. 40/ The patent claimed an "apparatus for heat treating rapidly moving hot rolled rod including a plurality of liqui-1 quenching means for cooling such rod." As set forth in the specifications, the Lewis patent involves taking the rod after it issues from the rolling mill and passing it through a series of 4 water cooling stations in order to rapidly cool the rod from 1800° F to within the range of 900° F to 1300° F, then holding the rod within that range for 10 seconds or more while the carbon comes out of solution.

The Roebling's Trenton facility reflected the work of Lewis and of Mr. John H. Corson, who was also engaged in research on water patenting systems. The facility is described in the so-called Bradbury Trip Report, a report prepared by two Morgan employees after a 1958 visit to the Roebling's Trenton facility (RX-301). At Roebling's the rod passed through a series of 4 water cooling stations to a pouring reel, where it was laid in bundles on a moving conveyor. 41/ The bundles then passed into a 40-foot wind tunnel.

40/ CX-70 Tab B(9). The Lewis patent sought to obtain the equivalent a patented rod by passing the rod through four water cooling stations prior to the pouring reel.

41/ RX-301.

Respondents assert that the Roebling's Trenton facility contained the essential features of the '871 patent 42/ and, in addition, teaches the principle of using water and air cooling to transform hot rolled rod. They contend: 43/

- (1) That Roebling's Trenton used water cooling (the 4 stations) to control austenitic growth.
- (2) That the Roebling's Trenton "pouring reel" corresponds to the '871 patent's laying head.
- (3) The means for cooling rod through transformation is shown by the wind tunnel.
- (4) That Roebling's Trenton produced "improved metallurgical quality in the rod so as to eliminate the need for separate patenting." 44/

The key to their argument is the following passage in the Bradbury Trip

Report: 45/

Note: - After discharge from the coilers the coils enter a 40 ft. wind tunnel through which air is passed at 60,000 C.F.M. On leaving the tunnel the coils are cool enough for bundling. The rapidity of this air cooling seems to be significant as the treatment will obviously retard the development of lamellar pearlite and carbide coalescence in the 1300° F. temperature zone. It is believed that it is this combination of low coiling temperatures followed by rapid air cooling which enable Roebling's to reduce the amount of conventional patenting normally required for rope and spring grades. Roebling's claim various advantages from their fast cooling process.

Much of the controversy over Roebling's Trenton centers on the role of the wind tunnel. If the wind tunnel was used to cool the rod through transformation, the Roebling's Trenton facility is highly pertinent prior

42/ Respondents Brief Before the Commission at 22 (hereinafter RBBC).

43/ RBBC at 23; RX-301.

44/ RBBC at 24.

45/ RX-301, p. 2.

art. If not, Roebling's Trenton is basically the Lewis-Corson four stage water patenting process and is much less relevant.

Judge Duvall concluded that the Roebling's apparatus resulted in transformation of the rod prior to its entry into the wind tunnel. 46/ We agree.

Mr. Terrence G. Bradbury, a Stelco metallurgist and the author of the Bradbury Trip Report, later testified that the wind tunnel had little or nothing to do with the metallurgical qualities of the rod, since transformation had already occurred. 47/ He regarded his earlier statements in the Trip Report as erroneous. Mr. Norman Wilson, a Morgan engineer with extensive experience in the rolling mill industry, had an opportunity to inspect the Roebling's apparatus. He stated that the wind tunnel was only for the purpose of cooling the rod after it had been collected from the reel, and had only a minor effect on the metallurgy. 48/ According to Mr. Wilson, any statements in the Bradbury Trip Report to the effect that the air cooling affected the rod metallurgy were "not accurate." 49/

Mr. Wilson's and Mr. Bradbury's testimony is supported by language within the Trip Report itself. The Report states that "recalesence of some 75 ° to 100 ° F." occurred while the rod lay in the pouring reel. 50/ Recalesence, or the release of heat, indicates that the iron and carbon atoms have begun to

46/ RD at 31.

47/ RX-113, pp. 55-56.

48/ CX-98, pp. 3-4.

49/ CX-98, p. 4.

50/ RX-301, p. 2.

come out of solution and that transformation has begun. 51/

A review of the history of the Roebling's facility helps clarify the role of the wind tunnel. It had been longstanding practice at Roebling's to use exhaust fans to cool the rod prior to bundling. A memorandum written by one R. J. Schuler on July 19, 1951 reported the results of Schuler's experiment with the installation of an exhaust fan to Dartrey Lewis. 52/ The experimental fan was installed in the top of a "cooling tunnel." 53/ Schuler's study was undertaken because Roebling's was planning to consolidate the output of two reels on a single conveyor and needed a means for rapidly cooling the rod bundles.

The fans reappear in memorandum to Dartrey Lewis of February 2, 1954 written by one H. F. Stirn. 54/ Stirn reported that in order to handle an increase in rod capacity, large exhaust fans were installed on two outside conveyors and on the two shorter center conveyors. 55/ Stirn repeatedly emphasized that the fans resulted in a significant reduction of scale. "The reason for the drop in scale from .746 to .54 is mainly due to the new cooling arrangement on the present conveyors." 56/ In 1954, Roebling's Trenton was visited by D. N. McLean and Mr. Bradbury, who reported: 57/

51/ CX-70 Tab B(7), Lewis, "Combined Hot Rolling and Patenting of Rod," 32 Wire and Wire Products, No. 10; Pollmeier and Hoffman, "Heat Treatment of Wire Rod at Rolling Heat So As to Obtain a Good Drawing Structure," 9 Wire World International 171 (October 1967) CX-70 Tab E(3).

52/ CX-111, EI-170, No. 9, p. 1 (July 19, 1951).

53/ Id., p. 2.

54/ CX-111, EI-170, No. 12 (Feb. 2, 1954).

55/ Id., pp. 2-3.

56/ Id. p. 2.

57/ RX-113, TGB-2, (Bates No. 500213), P. 1. The experimental cooling line was variously reported as being 110, 113, and 115 feet long. The 30 foot cooling lines did not employ experimental water cooling.

Rod coiled on the reels set 115 feet from the Mill are passed for this distance through guide pipes constaining high pressure water. After coiling they are further cooled in a 40 foot (air) tunnel with 60,000 C.F.M. fans.

McLean and Bradbury reported that Lewis informed them that the wind tunnel resulted in a considerable saving in scale. The 1954 report does not mention any metallurgical benefits apart from scale. 58/

In 1958, when Bradbury visited Roebling's Trenton the wind tunnel had been in use for over four years. Apparently its only function was to reduce scale and cool the rod for bundling. Dartrey Lewis did not mention the wind tunnel in his 1957 article 59/ describing his work on producing the equivalent of patented rod through controlled cooling. He apparently never sought patent protection on it. 60/ To our knowlege there is no evidence in the record deriving directly from Lewis himself regarding some dramatic new discovery between 1957 and 1958. Roebling's Trenton, like the Lewis and Corson patents, teaches the use of elaborate four stage water cooling systems to obtain limited improvements in the rod metallurgy.

Moreover, even assuming that the wind tunnel was used to achieve transformation (which it was not), it would not render the Stelmor apparatus obvious under section 103. The Roebling's Trenton facility differed from the Stelmor in that the rod was coiled in a pouring reel rather than a laying head. It was formed into bundles, and then passed into the wind tunnel where air flowed parallel to the conveyor rather than up through the rings. 61/ The

58/ Id., p. 1-2.

59/ CX-70(B)(10), supra.

60/ E.g., U.S. Letters Patent 2,994,328, CX-70(B)(9). This patent was issued on August 1, 1961, and concerns water patenting.

61/ Tr. at 746-47. In the '871 patent the air is blown through the bundle.

use of a pouring reel meant that the rod did not pass continuously into the air cooling, but instead sat for about two minutes while being coiled, and remained on the conveyor another four to six minutes before entering the wind tunnel. 62/ In contrast, on a Stelmor apparatus the rod is formed into spencerian rings and falls continuously onto a moving conveyor, where after passing through a short equalization zone, it enters the forced air blast. 63/ Bradbury testified that the wind tunnel was subject to a relatively low rate of cooling in view of the rod bundle mass Lewis was trying to cool. 64/

In any case, the rod produced at Roebling's Trenton was not equivalent to patented rod. In 1957, Lewis wrote: 65/

At the present state of the art the product is not fully equivalent to conventional patenting. The process is considered as a means for increasing the amount of raw ripping of hot rolled rod to about 75% reduction in area for 0.75% carbon rods and larger reductions for lower carbons. Rod patented in this way is used in cases where wire drawing is followed by a second patenting. The process is not suitable for final patenting without further refinement.

And in 1958, Bradbury stated that the combination of "low coiling temperatures followed by rapid air cooling . . . enabled Roebling's to reduce the amount of patenting normally required for rope and spring grades." He added: 66/

The process is claimed to have virtually eliminated the patenting process at the rod stage when a second patenting treatment is specified at some stage in the wire drawing process. In the case of .75C grades hot rolled rods are drawn "green" to about 75% reduction in area and lower carbon grades can be given larger reductions.

62/ CX-98, pp. 3-4; Tr. at 218.

63/ CX-69, pp. 8-9.

64/ RX-113, p. 107; see Id. at 72. The air in the wind tunnel was blown parallel to the conveyor rather than up through the bundle. e.g. Tr. at 747-48.

65/ CX-70(B) (10).

66/ RX-301, p. 2.

Thus the Trip Report confirms what Lewis had written in 1957, that Roebling's allowed the elimination of one patenting step, when the rod was to be repatented later on. Bradbury explained: 67/

For some classes of wire, -- and I speak of quality of wire -- something that's very, very fussy, like rope wire, elevator wire, mine hoist wire, aircraft cable wire, very, very special wires, you must end up with a high degree of ductility in your wire, even though it has been subjected to a large amount of cold work in drawing it from rod down to the wire. So, the practice is to give it what is known as an "interstage patenting treatment." You don't bother patenting it in the rod form. You can draw it green, maybe two or three holes. But, if you were to draw it any further, it would either break or else it would, if it didn't break, it wouldn't have very much ductility left in its when it was finished.

So, you patent it at some particular, at what is known as some "breakdown size," halfway through the reduction, you patent in what is known as "wire patenting," in that case. In other cases, you have to give it what is known as a "double patenting process." The rod must be patented. And you draw it down to halfway, then you repatent it to remove the cold work, then you draw it the rest of the way. That's a very special high-quality wire.

Roebling's did not eliminate the need for patenting except in certain highly specialized uses where the rod was to be repatented anyway. Mr. Bradbury repeatedly testified that Roebling's rod did not approach the metallurgical structure obtained from conventional patenting 68/ and that samples taken from Roebling's were undesirable because of the presence of large amounts of free ferrite. Mr. Vitelli, who worked at Roebling's, confirmed that Roebling's rod failed in tests performed at Trenton Spring Products, 69/ and that it could not be drawn to finished wire without intervening heat treatment. 70/

67/ RX-113, pp. 104.

68/ RX-113, pp. 105, 107; Tr. 254-56; CX-80, pp. 3-4.

69/ CX-81, p. 4; Tr. at 429.

70/ Id.

Consequently, the Roebling's Trenton apparatus, wind tunnel or no wind tunnel, does not teach a structure capable of producing the equivalent of a patented rod. Nor does it teach that in combination with Edwards' spencerian rings significantly improved metallurgical quality, equivalent to conventional patenting, would result.

2. O'Brien and The Sparrows Point Facility.

The O'Brien patent, U.S. Letters Patent 2,516,248, also concerned an apparatus for the controlled cooling of hot rolled rods of iron and steel, A controlled cooling line modeled after O'Brien was built at Sparrows Point in Baltimore. The O'Brien patent claims inter alia: 71/

The method of cooling ferrous rods which comprises taking a hot rolled rod after it leaves the finishing roll pass at a temperature in the neighborhood of 1800° F., briefly water-cooling the rod to a temperature above 1500° F., eliminating residual water from the rod surface, forming the rod into a coil, conveying the coil in a step-by-step movement to a first position for inspection, advancing the coil to a second position, covering the top of the coil, blowing air laterally through the convolutions of the coil until the temperature of the coil is reduced at least to 1100° F., removing the covering from the coil, and then conveying the coil for further cooling.

The specifications to O'Brien state that:

[T]he quality and uniformity of grain structure, particularly of high carbon steels, are notably improved, the pearlite instead of coarse lamellar plates being in the form of small uniform grains which facilitate subsequent heat treatment and drawing the rod into wire.

The ALJ found that the Stelmor apparatus was patentable over

O'Brien. 72/

71/ CX-70 Tab A(10).

72/ RD at 36.

O'Brien clearly teaches the use of two stage water and air cooling to obtain "notable" improvement in the quality and uniformity of the grain structure of the rod. The O'Brien apparatus, however, differs in significant respects from the Stelmor. O'Brien does not teach the use of water cooling to inhibit grain growth, although, as the ALJ pointed out, this may be inherent in the reference to 1500° F as the minimum temperature after water cooling and air cooling to at least 1100° F. More importantly, O'Brien air cooled the rod in a bundle on a start-stop conveyor. Thus, air cooling was delayed while the rod was being coiled into a bundle, 73/ while in contrast, the spencerian rings of the Stelmor fall in continuous laps onto a moving conveyor and pass into the air blast. In addition, a bundle has a greater tendency to retain heat than spread-out spencerian rings, thus resulting in slower cooling. As Judge Duvall found: 74/

The fact that the rods are bundled rather than spread out in overlapping rings probably results in relatively slower cooling, and hence greater grain growth than in the Stelmor process. This apparent failure of O'Brien to appreciate fully the importance of the rate of cooling over time explains why, unlike in the Stelmor process, subsequent heat treatment before wire drawing was still necessary.

Consequently, O'Brien falls short of teaching a structure for inhibiting grain growth with water cooling, then rapidly transforming the rod with an air blast.

The O'Brien process was put in practice at the Bethlehem Steel Company's plant at Sparrows Point, Maryland. According to Mr. Wilson, who visited Sparrows Point, it did not produce medium to high carbon rod which could be cold worked to a finished wire product without patenting. 75/ Dartrey Lewis

73/ CX-70(B)(10), p. 1, col. 2, lines 41-47.

74/ RD at 36.

75/ CX-69, p. 6.

also visited Sparrows Point, and reported: 76/

It made no difference to their wire drawing procedure. They were unable to draw the green rod any more holes than previously. They did find, however, somewhat less breakage trouble in the mill because of the greater uniformity of the rod.

He concluded: "Bethlehem's air blast cooling of rod coils on the rod mill conveyor is not a substitute for patenting." Lewis' report corroborates Wilson's testimony. In 1958, Bradbury reported much the same thing on his inspection of Sparrows Point, concluding that it was "not a substitute for patenting." 77/

Sparrows Point was only successful in the sense that it showed promising results. 78/ It never achieved the elimination of patenting. This corroborates the testimony of complainant's witnesses that O'Brien does not teach a process or an apparatus for cooling rod directly from rolling to obtain the equivalent of patented rod. Nor does it suggest that if joined with Edwards, the goal would be achieved. O'Brien did not appreciate the importance of rapid air cooling through transformation while the austenite grains are still small. 79/

3. Crum and Cleaner's Hangar

The Crum patent, U.S. Letters Patent 3,103,327, relates to an apparatus for handling wire or rod-like materials, wherein the rod is arranged in successive loops on a conveyor and then reassembled into a compact bundle (i.e., a "Crumpak"). Crum stated: 80/

76/ RX-911, p. 2.

77/ RX-301, p. 8.

78/ RX-301, p. 8.

79/ RD at 36.

80/ CX-70 Tab D(5), col. 3, lines 10-20.

The loops carried by the belt conveyor 13 may be subjected to processing steps, such as conventional pickling or acid treatment, annealing, heat treatments of various kinds, coating, descaling, cleaning, etc., or any combination of treatments.

That patenting is a form of "heat treatment" means very little, since all that Crum does is to vaguely indicate that spencerian rings could be used in conjunction with a broad category of treatments in which the '871 apparatus falls. An article written by Mr. John Zouck, an employee of Wirecrafter's Inc., describes a "ferrous wire rod cleaning line" employing Crum's system. The Zouck article's reference to "the insertion of rod and wire patenting facilities in the cleaning line" 81/ is not a reference to controlled cooling, but to a process for taking cold rod, reheating it in ring form in a patenting furnace, and patenting it in the conventional way with a lead or salt quench. 82/ As Mr. Wilson testified, Cleaner's Hangar was a hot air drying operation for baking a borax coating onto spread-out rod rings (CX-98, pp. 2-3). Accordingly, neither Crum nor Zouck is particularly relevant here, since neither teaches or relates to the controlled cooling of steel rod to achieve the metallurgical equivalent of patented rod.

Respondents argue, however, that one aspect of the Cleaner's Hangar facility is pertinent here, namely the use of a slotted structure to direct more air to the sides of the conveyor where the metal mass is greatest. The Patent and Trademark Office was not aware of this slotted structure when it reviewed the application for the '871 patent. However, the obviousness of the slotted structure does not affect the patentability of the Stelmor, since the

81/ RX-300, Zouck, "Continuous Conveyorized Loop Processing--A New Concept in Rod and Wire Handling," Wire, pp. 1454-55 (October 1961); CX-70[D](4).

82/ CX-81, pp. 8-9; CX-98, pp. 2-3; Tr. at 451-52, 458, 477. The lead or salt quench referred to in the article is a traditional method of patenting. CX-69, p. 2.

non-obviousness of the apparatus resides in the combination as a whole, rather than in any single element. Indeed slotted structure cooling means are not even mentioned in claim 1.

4. The German Patentschrift

Respondents' argument that a 1957 German patentschrift No. 959,634 (Krantz) shows "spaced [conveyor] supports" bearing a closer technical resemblance to the '871 than the prior art before the examiner is equally misplaced. Again, the non-obviousness of the '871 apparatus resides in the combination as a whole, and cannot be defeated by the obviousness of a single feature. Furthermore, as Judge Duvall found there is: 83/

nothing in Krantz suggesting the use of water cooling to inhibit austenitic grain growth or the laying out of rod in overlapping rings to assure forced air cooling during transformation and substantially uniform fine grained pearlite microstructure described in the suit patent.

5. Non-Obviousness of the subject matter as a whole.

In upholding the validity of the '871 patent over Edwards, Roebling's Trenton, O'Brien, Crum, and the German Patentschrift, the ALJ relied in part on his assessment of the credibility of the expert witnesses. He regarded the testimony of complainant's witnesses, Mr. Wilson and Mr. Vitelli, as more credible than that of respondents' witness, Dr. Stacey. 84/ He concluded that

83/ RD at 34.

84/ RD at 38. As the ALJ noted, Dr. Stacey's claims that the subject matter of the patent was obvious in 1962 are suspect, since he himself was unsuccessfully engaged in research on the same problem until 1968. RD at 39. His views also appear to benefit from a large dose of hindsight. Dr. Stacey worked for Bridon, which holds a 40% interest in Ashlow Ltd., from 1971-1978, and presently works for a company which sells rod to Bridon. He apparently was involved on Ashlow's behalf in some negotiations with GSC (CX-11, Bates No. 201168). Like Mr. Wilson and Mr. Vitelli, who work for Morgan, he is an interested witness.

the Stelmor apparatus had a synergistic quality, citing the inability of experts to explain its operation (RD at 40). He also concluded that the apparatus produced a new and useful result (RD at 41-43). Apparently the ALJ shared complainant's view that none of the prior art achieved the metallurgical equivalent of patented rod. He found that the result could not have been predicted from the prior art.

In their oral argument before the Commission, respondents challenged the ALJ's findings on a variety of grounds. One, synergism, has already been discussed. Respondents also contend that (1) the non-obviousness of an apparatus must reside in its structural features rather than any product or process characteristics 85/ and (2) the ALJ erroneously found non-obviousness based on process and product features of the '871 apparatus. We conclude that respondents are correct on the first count but wrong on the second.

An applicant who seeks both a process and an apparatus must independently establish the non-obviousness of each. As the Supreme Court stated in Providence Rubber Co. v. Goodyear: "The machine may be substantially old and the product new. In that event, the latter, and not the former, 'would be patentable.'" 76 U.S. 788, 796 (1869); see 35 U.S.C. § 100(b). Thus, one who discovers a new use for a product (apparatus) which is structurally identical to an old product (apparatus) cannot obtain a product (apparatus) patent. In re Thurau, 135 F.2d 344, 347 (C.C.P.A. 1943); H.K. Regar & Sons, Inc. v. Scott & Williams Inc., 63 F.2d 229, 231 (2d Cir. 1933); Chisum, 1 Patents § 1.03[8] (1981).

Respondents argue that while Morgan may have been entitled to a patent on the rod product or the process, it was not entitled to an apparatus

85/ Transcript of Commission Hearing, pp. 107-09, 121, 142, 144.

patent. 86/ In their view, the ALJ failed to apply the Graham v. John Deere test properly 87/ and incorrectly found the structure non-obvious based on the rod product. Judge Duvall clearly recognized that non-obviousness must reside in structural features. 88/

It is a long standing principle of patent law that a slight structural change in a product (or apparatus) is patentable if the change is critical in

86/ Transcript of Commission Hearing at 109, 123.

87/ Id. at 122.

88/ RD at 26. [T]he patentability of a claim to an apparatus does not rest merely on a difference in the method by which the apparatus operates or produces the product; rather it is the apparatus itself which must be new and unobvious. See *In re Pilkington*, 411 F.2d 1345, 1348, 162 U.S.P.Q. 145 (C.C.P.A. 1969). However, if a claim contains structural limitations sufficient to distinguish the claim from the prior art and meet the novelty and nonobviousness requirements, then the addition of further process limitations will not preclude patentability. In *re Garner*, 412 F.2d 276, 279 n. 8, 162 U.S.P.Q. 221 (C.C.P.A. 1969). Indeed, since April, 1974, it has been PTO policy that "an article may be claimed by a process of making it provided it is definite." 2 Chisum, supra at § 8:05[3], citing Manual of Patent Examining Procedures, Ser. 706.03(e). Thus, product (or apparatus)-by-process claims are allowable, even if the invention could be described in purely structural terms, so long as the definiteness requirement is met.

Even though a product or apparatus may be claimed in process terms, however, the product or apparatus must be new and unobvious in structural terms in order to meet the novelty and unobviousness requirements. *Cochrane v. Badische Anilin & Soda Fabrik*, 111 U.S. 293 (1884). In *re Stephen*, 345 F.2d 1020, 1023, 145 U.S.P.Q. 656 (C.C.P.A. 1965). To this end, certain apparent "process" words in claims may be interpreted as structural limitations when they are used in an adjective non-process sense and adequately define a physical characteristic of the product or apparatus. 2 Chisum, supra at § 8:05[5]; In *re Garner*, supra (in invention of thermal insulation panel formed from expanded perlite particles, recitation of particles is "interbonded one to another by interfusion between the surfaces of the perlite particles" was construed as structural, rather than process limitation). Similarly, it is arguable, the process references in claim 1 of the suit patent such as "transformation temperature," "austenitic grain growth" or "substantially uniform fine grained pearlitic structure" can reasonably be construed as structural limitations of the apparatus, keyed to the appropriate available Isothermal Transformation Diagram. (CX 1, Fig. 1).

terms of function. H. C. White v. Morton E. Converse & Son Co., 20 F.2d 311, (2d Cir. 1927); Traitel Marble Co. v. U. T. Hungerford Brass & Copper Co., 18 F.2d 66, 68 (2d Cir. 1927); Chisum, 1 Patents § 1.03[8][b] (1981). In Toplar v. Topliff, 145 U.S. 156 (1892), the Supreme Court held that a device for keeping a buggy stable by equalizing the pressure on the carriage springs was patentable, although it involved but a slight modification of a previous device.

While it is possible that the Stringfellow and Surles patent might, by a slight modification, **be made** to perform the function of equalizing the springs which it was the object of the Augur patent to secure, that was evidently not in the mind of the patentees, and the patent is inoperative for that purpose. Their device evidently approached very near the idea of an equalizer; but this idea did not apparently dawn upon them, nor was there anything in their patent which would have suggested it to a mechanic of ordinary intelligence, unless he were examining it for that purpose. It is not sufficient to constitute an anticipation that the device relied upon might, by modification, be made to accomplish the function performed by the patent in question, if it were not designed by its maker, nor adapted, nor actually used, for the performance of such functions.

145 U.S. at 161. Thus, where it would not occur to one of ordinary skill in the art to perform the slight modification and achieve the new function, the device is patentable. In Traitel Marble Co. v. U.T. Hungerford Brass & Copper Co., the Second Circuit, per Judge Learned Hand, held:

If the thing itself be new, very slight structural changes may be enough to support a patent, when they presuppose a use not discoverable without inventive imagination. We are to judge such devices, not by the mere innovation in their form or material, but by the purpose which dictated them and discovered their function. Certainly the art would have waited indefinitely, in the light of all that McKnight disclosed for Calkin's contribution to its advance. It will not serve now to observe how easy it was, given the suggestion, to change his invention into that of the patent in suit.

18 F.2d 66, 68 (2d Cir. 1927). These cases are not precisely on point, since in our view, the Stelmor's structural modifications vis-a-vis the prior art

are anything but slight. Nevertheless, they serve to help dispose of respondents' contention that the presence of certain structural similarities between the Stelmor apparatus and the prior art defeats patentability. Thus, while Edwards concerned scale, and Lewis, Roebling's, and O'Brien never eliminated patenting, the Stelmor accomplished a new function of achieving the controlled cooling of rod suitable for direct wire drawing without intervening heat treatment. Those skilled in the art could not have foreseen the consequences of the structural modifications. 89/

Furthermore, we conclude that respondents' argument that the novel qualities of Stelmor rod product are "wholly irrelevant" to a determination as to obviousness is incorrect. Certainly, a new result does not establish the non-obviousness of an old device. Nevertheless where a product or apparatus differs from prior art, a new result is a factor which is relevant to obviousness. In United States v. Adams, 383 U.S. 39 (1966), the Supreme Court considered a patent on a battery. The government had argued that the patent was invalid because the battery's electrodes were mere substitutions taught by the prior art. The Court disagreed:

Nor is the Government's contention that the electrodes of Adams were mere substitutions of pre-existing battery designs supported by the prior art. If the use of magnesium for zinc and cuprous chloride for silver chloride were merely equivalent substitutions, it would follow that the resulting device--Adams'--would have equivalent operating characteristics. But it does not. The court below found, and the Government apparently admits, that the Adams battery "wholly unexpectedly" has shown "certain valuable operating advantages over other batteries" while those from which it is claimed to have been copied were long ago discarded.

383 U.S. at 50-51. Indeed, like the government in Adams, respondents here appear to place an unreasonably narrow emphasis on the structural similarity

89/ E.g., CX-69, pp. 11-12; CX-40; CX-80, p. 5.

of certain Stelmor features to the prior art. This ignores the focus on the "invention as a whole" mandated by section 103. As Judge Learned Hand observed:

All machines are made up of the same elements; rods, pawls, pitmans, journals, toggles, gears, cams, and the like, all acting their parts as they always do and always must. All compositions are made of the same substances, retaining their fixed chemical properties. But the elements are capable of an infinity of permutations and the selection of that group which proves serviceable to a given need may require a high degree of originality. It is that act of selection which is the invention . . .

B.G. Corp. v. Walter Kidde & Co., 79 F.2d 20, 22 (2d Cir. 1935). The new and unexpected qualities of Stelmor rod product are part of the invention as a whole and weigh in favor of a finding of non-obviousness.

Finally we turn to respondents' contention that the so-called Hitchcock Memorandum renders the Stelmor apparatus obvious. In 1961, Hitchcock, a Morgan employee, wrote: 90/

Believing that facility for coiling and cooling rod bundles up to 3,000 pounds weight or more is one of the most urgent needs in modern rod mills. I present the following description in principle of one means by which this might be done.

He continued:

The laps at this stage are cooled having passed through a chamber where air was blown through them and through the perforated conveyor itself (perhaps expanded metal). The time required for cooling strands separated in this fashion is very brief, estimated by Wilson at five seconds.

Hitchcock's proposal would have borne a striking resemblance to the conveyor structure of the Stelmor apparatus.

Hitchcock's Memorandum apparently remained in Morgan's internal files and was not known to McLean and Easter at Stelco when they invented the '871 apparatus. It is, however, evidence of the state of knowledge of those

skilled in the art.

Hitchcock's idea was to take Edwards and add means for forced air cooling in order to cool larger rod bundles. He clearly did not contemplate using the structure so conceived to obtain rod suitable for cold working without intervening heat treatment. Furthermore, his conception lacks a basic element of the combination. It does not mention means for cooling the rod after rolling so as to inhibit austenitic growth and to bring the rod to a temperature near to but above transformation. 91/ This element, according to Mr. Wilson, is crucial since the Stelmor apparatus "must be so equipped in order to function properly." 92/ It can be argued that if Hitchcock had experimented with his idea, it is possible that he might have found that there were "inherent" metallurgical advantages in his invention. But this possibility does not defeat patentability since section 103 mandates an assessment of the obviousness of the "invention as a whole." Here the invention is an apparatus for producing rod capable of being drawn without intervening heat treatment, not a device for cooling larger rod bundles. The fact that one investigating an obvious solution to the problem of larger rod bundles might have happened on the solution to the patenting problem does not negate patentability. The C.C.P.A. has repeatedly held that the fact that it is obvious to try something does not render an invention deriving therefrom obvious. Application of Goodwin, 576 F.2d 375, 377 (C.C.P.A. 1978); Application of Tomlinson, 363 F.2d 928 (C.C.P.A. 1966).

Unlike McLean and Easter, Hitchcock never developed his idea into a working machine. Consequently, a determination that the '871 apparatus is

91/ RX-305.

92/ CX-69, p. 9.

patentable does not conflict with the policy against tying up old known machines with a patent monopoly. The '871 patent did not deprive the public of a structure already in use, but placed before the public a new and beneficial device. Hence the cases holding that one cannot patent a known machine based on a new use or previously unknown inherent advantage are inapposite. See e.g. In re Thurau, 135 F.2d 344, 347 (C.C.P.A. 1943).

Accordingly, for the reasons set forth above, we determine that the invention disclosed in the '871 patent is non-obvious under section 103.

6. Secondary Considerations

Secondary considerations such as commercial success, long felt need, etc., are relevant to the question of obviousness. Graham v. John Deere Co., 383 U.S. 1, 17-18 (1966). As the Supreme Court recognized, such considerations often provide a valuable perspective on obviousness.

These legal inferences or subtests do focus attention on economic and motivational rather than technical issues and are, therefore, more susceptible of judicial treatment than are the highly technical facts often present in patent litigation.... Such inquiries may lend a helping hand to the judiciary which, as Mr. Justice Frankfurter observed, is most ill-fitted to discharge the technological duties cast upon it by patent litigation.

383 U.S. at 35-36. Morgan argues that several secondary considerations weigh heavily in favor of a finding of non-obviousness. Mr. Wilson testified that to his knowledge, since the '871 invention went into commercial use "not one new high speed steel rod mill has been built anywhere in the world without provision for cooling according to [sic] Stelmor as defined in the '871 patent." 93/ Morgan points out that over 200 Stelmor lines have been sold and

93/ CX-69, p. 12.

that the invention provoked an immediate and lively response from the industry. 94/

Morgan also emphasizes the efforts of Lewis, O'Brien, Kopec and Corson as evidence of long felt need. Their work, reflecting the knowledge of persons highly skilled in the art, is persuasive evidence of the industry's long standing recognition of the problem and of the non-obviousness of the Stelmor solution. Morgan bolsters the argument with evidence that the elimination of patenting saves the steel industry on the order of \$120,000,000 in annual operating expenses. This figure indicates that there was a very real financial incentive to eliminate patenting (CX-69, p. 15).

Respondents dismiss complainant's claims with an assertion that the commercial success of the Stelmor process is completely unrelated to the subject matter claimed in the '871 patent. According to respondents, the Stelmor's success is due to Morgan's salesmanship and virtual monopoly over the rod mill equipment industry. 95/ They also assert that there could have been no long felt need, since Lewis had already eliminated patenting and is in fact the one deserving of complainant's "accolades". 96/ Finally at the Commission hearing respondents' counsel argued that commercial success is irrelevant unless it occurs within the time that the patent application is before the Patent Office. 97/

We conclude that each of respondents' arguments is incorrect. The '871 apparatus is closely related to the Stelmor process and product patents. The

94/ CX-81, p.9; CX-72; CX-69, p. 5.

95/ Respondents' Reply Brief After Trial pp. 4-6.

96/ RBBC at 32-33.

97/ Transcript of Commission Hearing at 180.

apparatus is a means for accomplishing the process. Both patents resulted from the same patent application. 98/ Morgan or its licensees have sold over 200 Stelmor lines since the invention became commercially available in 1967. 99/ These lines were sold with what is known as a "Stelmor License." The GSC license is a typical example. 100/ In the license, Morgan, as the patent holder granted GSC "a paid-up, nonexclusive, nontransferable license under the process and product claims of said 'Patent Rights.'" 101/ In return, GSC agreed to pay Morgan a substantial sum. 102/ In our view, the Stelmor license establishes that there was a clear relationship between the advantages of the Stelmor process and product as embodied in the '871 apparatus and the sale of over 200 Stelmor lines. Steel producers were willing to pay a substantial sum in order to obtain patent rights inextricably intertwined with the '871 apparatus. This is persuasive evidence that the requisite nexus between the commercial success and the claimed invention is present. In re Caveney, 386 F.2d 917 (C.C.P.A. 1967). Accordingly, respondents' contentions that the commercial success is solely due to Morgan's advertising, salesmanship and strong market position are misplaced.

Furthermore, as the ALJ correctly found, neither Lewis, Roebling's, O'Brien, Crum, Sparrows Point, Kopec or Cleaner's Hanger succeeded in obtaining rod suitable for cold-working without patenting. Thus, respondents

98/ RX-315.

99/ CX-88, p. 2; CX-4.

100/ CX-3.

101/ Id. Morgan apparently did not license the apparatus patents.

102/ Id.

second argument that there was no long felt need also is mistaken.

Finally, respondents' claim that commercial success must occur while the patent application is pending before the Patent Office is simply incorrect. Respondents have cited no cases for this proposition, and we have found none. 103/ To find commercial success irrelevant because it does not occur while the application is pending conflicts with common sense, since in many instances an invention is not marketed until the application is granted. Thus, evidence which is always relevant to obviousness, Stevenson v. U.S. International Trade Commission, 612 F.2d 546 (C.C.P.A. 1979), would be unjustifiably excluded. Accordingly, we find that the non-obviousness of the Stelmor apparatus is supported by its commercial success and by long felt need.

V. Inventorship

Congress has provided that a patent cannot be granted to one who did not invent the subject matter of the patent. 35 U.S.C. §§ 102(f), 111, 115, 116. In addition, when there is joint inventorship, i.e., more than one person contributes to the conception of the solution, the patent must Issue to both inventors. Non-joinder, the failure to add a joint inventor, or misjoinder, the erroneous addition of a person who is not a joint inventor, render the patent unenforceable. Chisum, 1 Patents § 2.02, 2.03.

Joint inventorship was discussed in Monsanto Co. v. Kamp as follows:

103/ There are some cases regarding evidence in appeals from decisions of the PTO, but these are not on point. See *In re Lobdell*, 167 F.2d. 634, 635 (CCPA 1948). These case involve application of the rule that in an appeal from the Patent Office's denial of a patent application, the Court of Customs and Patent Appeals (CCPA) will not consider evidence not in the record before the Patent Office.

A joint invention is the product of collaboration of the inventive endeavors of two or more persons working toward the same end and producing an invention by their aggregate efforts. To constitute a joint invention, it is necessary that each of the inventors work on the same subject matter and make some contribution to the inventive thought and to the final result. Each needs to perform but a part of the task if an invention emerges from all of the steps taken together. It is not necessary that the entire inventive concept should occur to each of the joint inventors, or that the two should physically work on the project together. One may take a step at one time, the other an approach at different times. One may do more of the experimental work while the other makes suggestions from time to time. The fact that each of the inventors plays a different role and that the contribution of one may not be as great as that of another, does not detract from the fact that the invention is joint, if each makes some original contribution, though partial, to the final solution of the problem.

261 F. Supp. 818, 824 (D.D.C. 1967).

One seeking to challenge the validity of a patent for inventorship nonjoinder or misjoinder has a heavy burden. Inventorship is a technical defense and therefore disfavored. Chisum, supra at § 2.03[4]. It must be established by clear and convincing evidence. Id.

The '871 patent issued to McLean and Easter as joint inventors. Respondents claim that Easter was not an inventor, and therefore, that the patent is invalid. 104/ The asserted grounds for this allegation are (1) McLean's deposition statement indicating that he alone was the inventor, and that he agreed to co-sign with Easter as a result of corporate pressure and loyalty; (2) statements by McLean, Bradbury, and two others indicating that Easter had little contact with McLean and very limited knowledge of the suit patent, especially the metallurgy involved. 105/

104/ RBBC at 10-11, 41-42.

105/ RX-197, p. 160; RX-103, p. 35; RX-142, p. 54.

Complainant concedes that Easter's contribution to the invention was much less than McLean's, but points out that Easter proposed the idea of laying the rod in non-concentric rings. This idea became an integral part of the '871 invention. In view of McLean's contribution, the disparate efforts of McLean and Easter are irrelevant. The ALJ agreed holding that the burden of establishing invalidity by clear and convincing evidence had not been satisfied. He also found that complainant is entitled to correct the inventorship mistake, assuming one has occurred, since there was no fraudulent intent. Chisum, supra, § 2.04.

We agree. It is clear that Easter suggested the idea of laying the rod in overlapping non-concentric rings on a moving conveyor to McLean. 106/ McLean was then working on cooling the rod in bundles, but later adopted the idea, which is a critical element of the combination. It should be noted that the fact that McLean feels that he deserves the bulk of the credit for the development of the Stelmor is not decisive of the issue of whether Easter was properly named as a joint inventor as a matter of law. It may well be that McLean's energy and imagination made him the moving force behind the invention, but Easter's contribution, even if smaller by comparison, makes him an "inventor" as the term is used in patent law. DeLaski and Tropp Circular Woven Tire Co. v. William R. Tropp and Sons Co., 218 Fe 458, 464-65 (1). N.J, 1914), aff'd 226 F. 941 (3d Cir. 1915).

VI. Written Description Requirement

Respondents allege that the '871 patent is invalid because it fails to meet the written description requirement of 35 U.S.C. § 112 in that the

106/ CX-96, CX-97.

original patent application did not contain a specific description of the "austenitic grain growth . . . inhibited" language of the claim. The original application was filed on August 24, 1962, and the language was added to claim 1 in an amendment of June 24, 1966, following the work of Professor Slater.

We adopt the ALJ's analysis of this issue. The ALJ concluded that the specifications in the original patent clearly conveyed to those skilled in the art the knowledge that steel rod subjected to water cooling means following⁴ the last stand of a rolling mill, as specified in the original application, would have the metallurgical effect of inhibiting austenitic grain growth.

VII. Enforceability

Respondents contend that the '871 patent is unenforceable in light of complainant's allegedly fraudulent behavior before the Patent Office. See Norton v. Curtiss, 433 F.2d 779 (C.C.P.A. 1970). 'Specifically, respondents argue that at several points during the prosecution of the '871 patent, the complainant concealed the most relevant prior art from the patent examiner or made misleading statements regarding the significance of certain art which was before the examiner. The prior art in question includes Roebling's Trenton, the Bradbury Trip Report, and a magazine article describing Crum's apparatus.

The most serious allegation of misconduct on the part of complainant concerns its failure to disclose to the examiner the "Bradbury Trip Report" which described the Roebling facility and the Sparrow's Point facility. One piece of prior art before the examiner was the Crum patent which taught a steel rod treating apparatus in which rings of wire rod were discretely offset

on a moving conveyor. In a comment to the examiner, complainant distinguished its claimed invention from Crum by the fact that the latter does not teach two-stage cooling system in which the second stage features cooling by forced air after laying. The Roebling's facility (described in the Bradbury Report) was never cited to the examiner. Respondents allege that Roebling's discloses a combination of water cooling before laying and continuous air cooling after laying to improve the pearlitic structure and to reduce the need for conventional patenting. According to respondents, complainant was aware of the Roebling reference and had, in fact, been advised in 1965 by a patent attorney to disclose it to the patent examiner. 107/

In response to this allegation of misconduct, as well as to others which will be discussed below, complainant makes two arguments. First, under the standard of practice before the Patent Office at the time that the application for the '871 patent was under consideration (1962-1968), an applicant was required to produce only section 102 prior art references, or section 103 references which would combine to render the claimed invention obvious to one of ordinary skill in the art at the time. There was no duty to disclose section 103 art which an applicant believed in good faith did not render the claimed invention obvious. 108/ Second, even under the stricter standard currently in force at the Patent Office, there would have been no duty to

107/ This legal advice was given by an opposing attorney in an adversarial context. There is little reason, therefore, to insist that complainant rely upon it in the further prosecution of its patent application.

108/ A section 102 prior art reference (35 U.S.C. § 102) is one in which all of the elements of the invention for which a patent is sought are contained. A section 103 prior art reference (35 U.S.C. § 103) is one from which a person of ordinary skill in the art at the time of the claimed invention might have inferred all of the elements of the claimed invention.

disclose the references cited by respondents because they were no more relevant than the prior art actually submitted to the patent examiner by the complainant.

Complainant's first argument regarding the standard of disclosure applicable at the time of the prosecution of the '871 patent raises a serious legal issue which has not been specifically addressed by the Court of Customs and Patent Appeals. Under the current standard set forth in Rule 56, 109/ an applicant must disclose each reference for which "there is a substantial likelihood that a reasonable examiner would consider it important in deciding whether to allow the application to issue as a patent." 35 CFR § 1.56. If a reference is of arguable significance to the patentability of a claimed invention, an applicant may not interpose his judgment for that of the patent examiner by failing to disclose it.

Mr. Dann, a former Commissioner of the Patent and Trademark Office and a witness for complainant, testified that until the 1970's, there was no indication in the Patent Office rules that a reference must be disclosed if the applicant had concluded in good faith that the reference did not preclude patentability of the claimed invention. Mr. Dann also noted that a rule embodying a stricter standard of disclosure had been considered by the Patent Office in 1963, but rejected. Complainants also cite several cases which indicate that a good faith decision not to reveal prior art was a valid defense to charges of fraudulent conduct during the 19'0's and should be applied to conduct which occurred during that period. In re Clark, 187 U.S.P.Q. 209, 216 (C.C.P.A. 1975) (Judge Miller concurring); Hercules v.

109/ 35 CFR § 1.56.

Exxon, 497 F. Supp. 661 (D.C. Del. 1980); Xerox Corp. v. Dennison Mfg. Co., 322 F. Supp 963, 168 U.S.P.Q. 700, 705 (S.D. N.Y. 1971); see also Kayton, "Fraud in Patent Procurement," 43 Geo. Wash. L. Rev. 1, 93-94 (1974).

For their part, respondents rely the testimony of their expert witness, Mr. Banner, also a former Commissioner of the Patent and Trademark Office, to the effect that Rule 56 is a mere codification of Patent Office practice 110/ which had existed since 1945 when the Supreme Court declared in Precision Instrument Mfg. v. Automotive Maintenance Machinery Co., 324 U.S. 806, 818 (1945) that patent applicants owe the Patent Office an "uncompromising duty of candor and good faith."

Unfortunately, Precision Instrument and its progeny 111/ are extremely vague. Despite their lofty language regarding the duty of patent practitioners to the Patent Office, they provide little guidance on the question of submission of prior art in specific instances. It is impossible to imagine that the quite precise standard of Rule 56 was implicit in the language of Precision Instrument. In light of this silence on the question of disclosure, both from the Supreme Court and from the Patent Office, we believe that standard of "good faith" which is urged by complainant and has been adopted by several courts is the appropriate measure for complainant's prosecution of the '871 patent.

Further, we believe that the retroactive application of Rule 56 to conduct occurring during the mid-1960's would be unfair to those practicing

110/ Respondents cite: U.S. Industries, Inc. v. Norton Co., 210 U.S.P.Q. 97 (N.D. N.Y. 1980); True Temper Corp. v. CF & I Steel Corp., 202 U.S.P.Q. 412 (10th Cir. 1979).

111/ Kingsland v. Dorsey, 338 U.S. 318 (1949).

before the Patent Office during that period. See *In re Clark*, 187 U.S.P.Q. 209, 216 (C.C.P.A. 1975) (Judge Miller concurring). Retroactive application of Rule 56 could have no deterrent effect on patent applicants in view of the fact that practitioners were not aware of it. Finally, our refusal to apply Rule 56 would in no sense "undermine" the patent system. In determining the validity of the '871 patent, we have evaluated evaluating the prior art which respondents contend should have been presented to the Patent Office.

The ALJ also adopts the "good faith" standard, but for a different reason. The ALJ observes that complainant's witness, Mr. Dann, was in charge of the Patent Office during the relevant period and is therefore a better authority on the state of the law at the time. The ALJ therefore concurs with the complainant that the less-exacting "good faith" standard of conduct is applicable to the complainant's prosecution of the '871 patent.

Although we agree with the result in this instance, we believe that reliance upon experts for legal opinions should be limited. While guidance may be sought from expert witnesses in difficult fields of law, the duty of determining the law must remain with the ALJ and the Commission.' Such a determination should not be based upon the relative credibility of opposing witnesses.

We believe that there was no duty to disclose the Bradbury Trip Report to the patent examiner either under the old standard or the new because the Roebling's facility which it describes was no more pertinent than the Lewis article and the Lewis patent which were cited to the examiner. As we noted in our discussion of obviousness, the Roebling's facility employed an elaborate water cooling system to achieve transformation rather than two stage water and

air cooling as set forth in the Stelmor. Transformation from austenitic to pearlitic structure began in the pouring reel and not during air cooling. The Lewis-Corson water patenting system was amply described in the Lewis and Corson patents and the *Lewis* article. Thus complainant correctly and in good faith believed that the pertinent prior art had been cited to the examiner.

Respondents' second allegation of misconduct by complainant concerns the significance of the Zouck and Cleaner's Hanger references to complainant's application for the '871 patent. During the prosecution, the examiner rejected claim 21 in light of Crum. One of the bases on which complainant then distinguished Crum from its claimed invention was that the former disclosed a support structure which obstructed the passage of air through the rods in the area at the outside of the edges where air circulation is most needed. Respondents contend that complainant knew that the Crum apparatus was in commercial use in the Cleaner's Hanger facility, operating without the defect alleged by complainant. According to respondents, a slotted structure employed at Cleaner's Hanger is "strikingly similar" to the slotted structures shown in Figures 7 and 8 of the '871 patent and would have remedied the Crum supports. Complainant was aware of the Zouck article describing Cleaner's Hanger because a French court relied on Zouck in rejecting complainant's claim of means for directing more air to the sides of the conveyor. 112/ Accordingly, respondents argue that complainant was obliged to reveal the Zouck reference to the examiner.

112/ *Schloemann, A.G. v. Morgan Construction*, Translation of decision of the Third Chamber of the Superior Court of the Seine (1967). The rejection only went to the single element. The French court found that the combination of elements was patentable as an apparatus and as a process. RX-317, Bates Nos. 103989-90.

We find it difficult to believe that the Zouck article could have influenced the examiners decision as to the slotted structure of claim 5, since the article does not even mention this feature. Furthermore, the Zouck article and the Cleaner's Hanger facility concern an apparatus for cooling reheated rod rather than one, such as that disclosed by the '871 patent, for cooling hot rolled rod. On the basis of these differences, complainant had no duty, either under the old standard or under the new, to cite the Zouck or Cleaner's Hanger references. Furthermore, it is difficult to perceive how the slotted structure at Cleaner's **Hanger** could have remedied the problem of limited air cooling on the sides of the conveyor, since the belts would continued to obstruct the air flow.

Respondents also assert that complainant committed fraud on the Patent Office when it argued to the examiner that its claimed invention was patentable over the Crum reference because the latter did not teach a support structure providing access for a cooling fluid to the rod. Respondents argue that complainant made this argument even though it knew of the the Krantz German patentschrift which disclosed such a support structure. Krantz was cited in an adversary's submission to a foreign tribunal. The submission cites Krantz for its "refined grain structure," not for spaced supports. The Krantz patent itself contains a drawing that depicts spaced supports, but provides no elaboration on the principle of avoiding obstruction of air flow.

Although the Krantz supports are technologically similar to Figure 3 of the '871 patent, it bears no relationship to the claims of the '871 patent.

The Krantz reference concerns cooling steel bar, not steel rod, and in no sense suggests water cooling to inhibit austenitic grain growth or the laying out of rod in overlapping rings to assure forced air cooling during transformation. Applying either the standard of conduct in effect in the 1960's or Rule 56, complainant did not act inequitably by failing to draw the Krantz patent to the attention of the examiner.

Respondents maintain that, although the Edwards patent was ultimately cited by the examiner, the complainant acted inequitably by not itself citing that reference to the examiner. It did cite Edwards to the Patent Office (RX-315, p. 55).

Finally, respondents allege that complainant concealed the existence of a document which demonstrated that one of its employees, John Hitchcock, had conceived the invention claimed in the '871 patent before McLean had done so.

The Hitchcock proposal lacks critical elements of the '871 patent: means for rapidly cooling the rod to inhibit the austenite growth and means for cooling the rod to a temperature near to but above transformation. After consulting with counsel, complainant concluded that it was not obliged to disclose Hitchcock's alleged conception.

As the Fifth Circuit held in Becton, Dickinson & Co. v. Sherwood Medical Industries, Inc., 516 F.2d 514, 524 (5th Cir. 1975):

Fair dealing ... is not a mechanical mandate that every patent ultimately cited by the Examiner in issuing the patent or, more, so, by the unlimited industry of [sic] counsel in a years-later infringement suit in which every writing, periodical, or patent, foreign or domestic, is dredged up as prior art, must be cited in the application. It is again a matter of judgment in the light of accepted practices by and with the Patent Office in using good, not bad, faith in citing art thought to be of sufficient relevance.

We find that respondents have not sustained their burden of establishing fraud or inequitable conduct by clear and convincing evidence. Stevenson v. International Trade Commission, 612 F.2d 546, 555 (C. .P.A. 1979).

VIII. Infringement of the '871 patent.

"[W]hoever without authority makes, uses or sells any patented invention within the United States during the term of the patent therefor, infringes the patent." 35 U.S.C. § 271 (1976). Infringement can be literal, when the language of the claim reads literally on the accused apparatus, or can result from the application of the doctrine of equivalents. Graver Tank & Manufacturing Co. v. Linde Air Product Co., 339 U.S. 605 (1950).

The GSC controlled cooling line in controversy was originally built in 1971, pursuant to a Stelmor license granted by Morgan. The license authorized GSC to use the Stelmor process patent, U.S. Letters Patent 3,321,432, 113/ and the right to make replacement parts for all components designed by Morgan. 114/

The GSC order is what is known in the trade as a "revamp." It modernizes GSC's two existing production lines so that they can handle larger rod co⁴ls at increased mill speeds (65 m/s to 90 m/s).

Respondents argue that the revamp is a mere "repair" of an existing machine rather than a new Stelmor apparatus. The rule is that a licensee is entitled to "repair" a patented device, but is not entitled to "reconstruct" a

113/ CX-3.

114/ CX-3.

new device. The line between a repair and a reconstruction is not a clear one, and each case rests on its own facts. In Wilson v. Simpson, 50 U.S. 108 (1850), the Supreme Court considered the alleged infringement of a patent on a planing machine. In Wilson defendant acquired a planing machine covered by plaintiff's patent, which incorporated a series of cutting knives. These knives wore out after a few months use, long before the expected life of the machine itself. The Court held that defendant was entitled to replace the knives without plaintiff's consent.

If, then, the use of the machine depends upon the replacement of the knives, and the assignee could replace them from time to time, as they were needed, during the first term of the patent, though they are an essential and distinct constituent of the principle or combination of the invention, frequently replacing them, according to the intention of the inventor, is not a reconstruction of the invention, but the use only of so much of it as is absolutely necessary to identify the machine with what it was in the beginning of its use or before that part of it had been worn out.

50 U.S. at 125. In Aro Mfg. Co. v. Convertible Top Co., 365 U.S. 336 (1971) (hereinafter Aro I), the Court held that replacing the worn out fabric of a convertible top for an automobile was a permissible repair. The combination patent in question covered a metal frame with a flexible fabric stretched over it. The fabric wore out in about three years, while the frame was good for the life of the car. Defendant Aro Manufacturing sold replacement fabrics. The Court noted that the fabric was an unpatented element of the combination and that a licensee has a right to preserve a patented combination so far as it may be affected by wear or breakage. Accordingly, the Court held that:

maintenance of the "use of the whole" of the patented combination through replacement of a spent, unpatented element does not constitute reconstruction...

The decisions of this Court require the conclusion that reconstruction of a patented entity, comprised of unpatented elements, is limited to such a true reconstruction of the entity as to "in fact make a new article," . . . after the entity, viewed as a whole, has become spent.

365 U.S. at 346 (citation omitted).

We determine that the evidence in the record indicates that the GSC revamp is a reconstruction rather than a repair. This case is not one where the elements being replaced have become worn and are being replaced one at a time in the ordinary course of business to preserve the fitness of the apparatus. Rather, the evidence indicates that GSC became dissatisfied with the quality of the rod being produced on the existing apparatus, 115/ and concluded that in order to service its customers, it had to undertake a major revision of its existing system. 116/ The existing GSC Stelmor system is a very early one that **was** achieved by modifying a system manufactured by Schloemann, A.G. In one GSC memorandum, the existing equipment is described as "obsolete." 117/ The revamp includes the replacement of the water cooling and delivery pipe equipment to cool the hot rolled rod to 1500°. Ashlow Ltd. will also supply two new laying heads with pinch rolls for the purpose of laying the rod in non-concentric overlapping rings on the two moving conveyors. Each existing conveyor is being lengthened by 30 feet, and modified by the addition of a new air cooling fan and a new plenum chamber. The existing fans are being rearranged with one fan on each conveyor being

115/ CX 14, Bates No. 001552.

116/ CX-14.

117/ CX-18. See Respondents' exception to CFF(5), which is hereby adopted insofar as it states that the existing Schloemann laying head is "obsolete."

shifted from the No. 1 cooling zone to the No. 6 cooling zone. 118/ These parts are being specially designed and built to order by Ashlow.

The total cost of this work amounts to several million 119/ dollars or approximately four times the cost of the original apparatus. 120/ The modifications involve more engineering and more sophisticated machinery than the standard Stelmor revamp. 121/ Indeed, no element of the Stelmor combination is to be left untouched. 122/ The changes, moreover, will significantly alter the capacity of the system and improve the tensile strength and ductility of the rod produced. 123/ They go far beyond the scope of an ordinary overhaul.

We conclude that under Aro I, the original Stelmor apparatus entity w⁴11 cease to exist once GSC disassembles its existing system and removes the original water boxes, delivery pipes, laying head, pinch rolls, conveyor chains, and air fans for the first cooling zone. GSC will install the new components purchased specifically for this occasion, rearrange the old cooling fans, install the cooling fans, and extend the conveyor 30 feet. The revamped apparatus will consist of numerous wholly new components and various cannibalized parts. In sum, the facts of this case indicate that an apparatus rendered obsolete will be dissolved and a new entity resurrected in its

118/ CX-10; CX-11; CX-12; CX-13; Specification for imported Ashlow equipment, CX-17; CX-18; Wilson, CX-69.

119/ E.g., CX-10; CX-18.

120/ CX-88; CX-89.

121/ RX-140, pp. 77-78.

122/ RD at 73-74.

123/ CX-14; CX-15; CX-18; CX-19.

place. This case can be distinguished from Aro I and Wilson on the ground that the alleged infringement involves far more than the replacement of a single worn out, short-lived element. Nor is this case the mere readjustment of a machine to handle a different size of product, e.g., Wilbur-Ellis Co. v. Kuther, 377 U.S. 422 (1964).

Respondents also argue that the revamp is permitted by the express terms of GSC's 1971 Mill Contract with Morgan. The contract concerns the sale of "Stelmor Units Serial Nos. 80 and 81." 124/ A "Stelmor Un't" is defined as "the apparatus for practicing the 'Stelmor Process.'" 125/ The contract provides that: "For your use in this installation only, you will have the right also to make replacement parts for all components designed by us." 126/ GSC therefore was entitled to make replacement parts for Morgan-designed components, but such rights were limited to "this installation" and specifically to "'Stelmor Units' Serial Nos. 80 and 81." The contract does not give GSC the right to replace the components themselves or to install a new apparatus.

During the Commission's hearing, complainant stated that the 1971 contract gives GSC the right to replace all of the original components as long as the design and capacity of the apparatus remains unchanged. 127/ Th's interpretation is too broad and gives away too much. The 1971 contract permits GSC to "make replacement parts for components . ." not to replace the components themselves. Furthermore, it was specifically limited to the Stelmor units in question, and did not encompass a new apparatus entity.

124/ GSC Stelmor License, CX-3, p. 1.

125/ Id., p. 2.

126/ GSC Mill Contact, CX-3, p. 4-3-5.

127/ Transcript of Commission Hearing at 79 et seq.

Finally, relying on the testimony of their witness, Dr. Andrew Stacey, respondents contend that there can be no infringement of the '871 patent because the key inventive element of the patent, the transformation of rod, occurs on the existing sections of the conveyor. As the ALJ pointed out, this argument fails to appreciate the "integrated, interactive, cooperative relationship between the inventive elements of the patented combination" 128/ Although transformation may or may not occur on the existing conveyor, 129/ the water cooling mechanism and the laying head are necessary elements, and contribute to the metallurgical result. As Mr. Norman Wilson testified: "[T]he transformation of the steel or the new equipment to be installed at GSC will be a result of the combination of the new delivery equipment to inhibit the austenite grain growth, and the new laying head to coil the rod, both of which are essential." 130/

The ALJ found that the credibility of Dr. Stacey's testimony was undercut by his miscalculations of the actual delivery temperature of the rod and failure to take into account variances in the rate of cooling. "These miscalculations are likely to result in a calculation placing transformation at a point further down the conveyor." 131/ In addition, we note that financial documents prepared by GSC state that the purpose of lengthening the Stetmor conveyor is to improve the "quality of high carbon rod," 132/ and in

123/ RD at 73.

129/ The ALJ found that the precise point of transformation was not clear from the record. RD at 75.

130/ CX-69, p. 14.

131/ RD at 75, citing CX-17, p. 2; Stacey, RX-9;, pp. 3-4, CX-61(h); CX-86; CPX-1.

132/ CX-14, Section 3 (Rolling Mill Conveyor Deck).

particular, to obtain "more uniform tensile strength" and "enhanced ductility." 133/ By GSC's own admission, the lengthening of the conveyor deck will improve the metallurgical quality of the rod, thus further weakening Dr. Stacey's testimony.

We have compared the features of the accused Ashlow apparatus with claim 1 of the '871 patent. We conclude that claim 1 reads on the accused apparatus and that there is literal infringement.

IX. Injury

Under section 337 the "effect or tendency" of the unfair act must be to "destroy or substantially injure an industry, efficiently and economically operated in the United States . . ." 19 U.S.C. § 1337(a).

1. Domestic Industry

The Commission has construed the phrase "domestic industry" to mean that portion of the business of the patentee and its licensees devoted to the production and sale of articles covered by the patent in issue. e.g., Certain Ultra-Microtome Freezing Attachments, 337-TA-10, USITC Pub. No. 771 (April 1976).

Morgan has been engaged in the business of designing and manufacturing steel mills and steel mill equipment since 1888. Morgan is an integrated operation, meaning that it not only manufactures and assembles machinery in its workshop, but also designs steel mill equipment and carries on an ongoing research and development program. 134/ Approximately one-third of its work force is engaged in research and development, engineering, and related

133/ Id.; CX-19; CX-16.

134/ CX-88.

activities. 135/ The rest are engaged in manufacturing and administrative activities. Its manufacturing operations are organized as a workshop.

Morgan's facilities are not devoted exclusively to the production of the apparatus covered by the '871 patent. Rather they are in the nature of an all-purpose machine shop, where machines and employees can work on all product lines and adjust according to the number and kind of orders received. The ALJ recommended that: "To the extent that different portions of complainant's production facilities contribute to the manufacture of the patented apparatus, they should be considered part of the domestic industry." 136/ We adopt that view.

Morgan also subcontracts portions of the work on its various projects. For example, specialized operations such as heat treating and chrome plating are always subcontracted because the capital investment needed to perform such operations cannot be justified. 137/ Morgan will also subcontract in order to balance its shop load and to maximize the utilization of its machinery, consistent with a policy of keeping the critical precision functions to itself. These subcontractors, as the ALJ found, are also part of the domestic industry in this investigation to the extent that they produce parts of the patented apparatus. 138/

135/ Id.; RX-141. pp. 6. 30-31; RX-127, pp. 308-09; Tr. at 88-89; See RD at 80.

136/ RD at 80.

137/ CX-67 p. 3.

138/ Chairman Alberger and Commissioner Stern determine that because of the lack of adequate information in the record as to the role of the subcontractors, the subcontractors cannot be determined to be part of the domestic industry.

Respondents claim that the domestic industry is not efficiently and economically operated. These claims are without merit. Morgan has shown a consistent profit on its operations and has increased its sales over the past four years. Morgan's Stelmor operations have also been consistently profitable. Of 32 Stelmor sales from 1971-78, only 3 showed a loss, while the rest showed a substantial profit. Morgan has invested extensively in the last 6 years on capital improvements, 139/ and allocates a standard percentage of net sales to research and development. 140/

Respondents contend that Morgan's high prices are proof of its inefficiency. Complainant's prices are indeed consistently higher than those of its competitors. Mr. Neilson, Morgan's financial officer, testified that early in its history the company decided that it was important to control the manufacture of its products rather than to be limited to design and engineering. This increases Morgan's costs and puts it at a price disadvantage vis-a-vis competitors who use extensive subcontracting, but a higher quality product results.

Morgan believes that its higher prices are more than justified by lower start-up costs and higher manufacturing quality. 141/ Morgan has consistently shown a profit on its Stelmor sales. In th⁴s case success in the market is persuasive evidence of efficiency.

Morgan's policy of not bidding when it believes that it does not have a reasonable chance of securing an order is not, as respondents would have it,

139/ CX-67, p. 4.

140/ Id.

141/ Tr. at 155-56, 69.

inefficient, but instead reflects reasonable business judgment. Mr. Marsters, Morgan's vice president for rolling mill sales, testified that quoting a bid is an expensive process. 142/ For the reasons discussed above, we find that the domestic industry is efficiently and economically operated.

2. Effect or Tendency to Cause Substantial Injury

Under Section 337, the unfair act must have an effect or tendency to substantially injure the domestic industry. The issue of injury in this investigation turns on Morgan's loss of the GSC order to respondent Ashlow. It is not disputed that both Morgan and respondent Ashlow bid for the GSC order. Nor is it disputed that Ashlow won the order. The GSC contract was the only sale in the United States during 1980. Respondents, nevertheless, contend that the requisite injury has not been proven and that the ALJ's finding to the contrary was in error.

The patented apparatus is a costly capital good item. Sales of the apparatus are comparatively rare. Since 1971, sales in the United States have been made to the following customers: 143/

GSC	1971
USA-Rod Mill	1972
USS Corp. (Illinois)	1972
USS Corp. (Calif.)	1972
Armco Corp.	1972
GSC	1972
USS Corp. (Ohio)	1973
Carpenter Technology Co.	1974
Georgetown Texas	1974
Laclede Steel Co.	1974
Raritan River Steel Co.	1977
Atlantic Steel Co.	1979

142/ Tr. 33-34, 90; RX-121.

143/ CX-4.

The high cost of the apparatus and the infrequency of sales means that the loss of a sale is a very serious matter.

The loss of a single sale or of a small number of sales can cause substantial injury to an industry producing large capital intensive items in a market characterized by infrequent sales. 144/ Large Video Matrix Display Systems, Inv. No. 337-TA-75, pp. 22-23 (1981); Certain Headboxes and Paper Making Machine Forming Sections for the Continuous Production of Paper, Inv. No. 337 TA-82, p. 32 (1981). In such markets, the loss of a sale signifies a large drop in market share and a significant increase in import penetration. For a company in the business of manufacturing such items, the loss of a sale can have a significant adverse impact on its operations and result in a substantial lost profit. In this case Ashlow has taken 100% of the market by securing the only U.S. order for 1980. Morgan lost a multi-million dollar sale and a substantial profit. 145/

While Morgan made a profit on its Stelmor operations during 1980, the profit was largely due to the activities of its engineering and design section, which worked on four foreign orders secured by Morgan licensees. Morgan's Stelmor manufacturing operation did not work on the foreign orders. Since Morgan's workshop operations were significantly below 100% capacity utilization during 1980, they could have accomodated the GSC order. 146/

145/ Vice Chairman Calhoun notes that in a patent-based investigation under section 337, the loss of a single sale is injury per se, since by virtue of the patent, the patentee and its licensees have a legal monopoly right and thus are entitled to all sales. Accordingly in his view the only issue is whether the lost sales constitute "substantial injury" within the meaning of section 337.

146/ CX-88, pp. 5-6.

147/ CX-66, Attachment 3. The profit figure also includes license fees, commissions, and patent royalties derived from activity in previous years and allocated to 1980.

Mr. Marsters testified that Morgan reduced its workforce during 1980. 148/ He estimated that 7 or 8 of the employees laid off would have been kept but for the loss of the GSC order. 149/ These layoffs, coupled with the lost profit and decreased capacity utilization, are persuasive evidence of present substantial injury.

We determine that the loss of the GSC order alone has caused substantial injury to the domestic industry. 150/ 151/ 152/

148/ CX-88.

149/ Id., p. 7.

150/ Chairman Alberger and Vice Chairman Calhoun, having found present substantial injury, do not reach the issue of whether future imports will have a tendency to so injure the domestic industry.

151/ Commissioner Stern determines that there is insufficient information in the record to support a determination of tendency to injure.

152/ Commissioner Frank also determines that the tendency of the unfair act is to substantially injure the domestic industry. The Commission has in the past construed the word "tendency" as evidence of Congress' intent to prevent damage to domestic industries suffering from unfair acts or unfair methods of competition in its incipiency. See In re Von Clemm, 229 F.2d 441 (CCPA 1955). The question of whether there will be future orders by its nature is somewhat unclear since one cannot predict with absolute certainty the demands of the market or the needs of customers. The existence of future orders depends on various factors such as the demand for steel rod, the decisions of various executives, etc. Nevertheless, there is evidence that in the past sales of the patented apparatus, while irregular, have occurred every 2 or 3 years. Mr. Marsters estimated that there might be 5 orders in the next 5 years. Tr. at 66-67, 92; CX-88, p. 5. I conclude that Mr. Marsters' testimony, as one familiar with the industry and the market for steel rod treating apparatus, together with past demand establishes a sufficient likelihood of future sales in the remaining term of the patent. At the Commission's hearing Korf's counsel conceded that there is no "blanket statement" in the record that "there won't be any future sales by Korf or Ashlow or any other affiliated corporation." Transcript of Commission Hearing at 287. Korf could bid on any future U.S. orders. Since the record contains evidence of substantial underselling, it is conceivable that future sales could be lost. The loss of market share resulting from lost sales would for the reasons set forth above have a significant adverse impact on the domestic industry. Accordingly, I conclude that there is a tendency to injure within the meaning of section 337.

X. Remedy

We determine that the appropriate remedy for the violation of section 337 found to exist in this investigation is a limited exclusion order directed at steel rod treating apparatus produced by or on behalf of the named parties respondent or imported by or on behalf of certain parties respondent.

The Commission has in the past adopted a general exclusion order when the patent in question is of a sort that might readily be infringed by foreign manufacturers who are not parties to the Commission's determination. Certain Airless Paint Spray Pumps and Components Thereof, Inv. No. 337-TA-90, Commission Opinion, p. 17 (November 25, 1981). 153/ As the majority noted in Certain Airless Paint Spray Pumps, such orders can sometimes have the unintended effect of restricting legitimate trade. Accordingly, when appropriate conditions are presented, a limited exclusion order or a cease and desist order may be the preferable remedy. Certain Headboxes and Papermaking Machine Forming Sections for the Continuous Production of Paper and Components Thereof, Inv. No. 337-TA-82, USITC Pub. No. 1197 (1981). The remedy chosen

153/ Commissioner Eckes did not participate in the Spray Pumps investigation.

must be comprehensive enough to avoid all conceivable means of avoiding the prohibition, and yet narrow enough to avoid problems in the administration of the order. Id. at 9.

We conclude that a limited exclusion order will provide effective relief for complainant against goods produced by the respondents in this investigation. This investigation does not involve a low cost, mass produced item, manufactured by a large number of constantly changing foreign concerns. Rather, the apparatus in question is a large, expensive machine requiring an extended manufacturing period. Certain Airless Paint Spray Pumps and Components Thereof, Inv. No. 337-TA-90, Additional Views of Vice Chairman Michael J. Calhoun and Commissioner Eugene Frank, p. 4 (1981). Sales are relatively infrequent and appear to involve a process of competitive bidding. The market for such apparatus is an extremely limited one in which the identities of potential manufacturers and purchasers are well known. Given the time lag between the signing of a sales contract and actual delivery, together with the attention that a sale is bound to attract, we conclude that the domestic industry will be on notice of possible importations by persons subject to the order. Furthermore, whatever names appear on the customs invoice, the industry is likely to know the real source of the goods. The self-policing responsibilities faced by complainant will be minimal. Accordingly, we conclude that a limited exclusion order will effectively prevent future importations by persons subject to such an order.

We turn to the possibility of injury from new sources. The patented

apparatus is a relatively high technology device that apparently requires significant engineering and manufacturing capacity. The cost to a foreign firm of hiring skilled engineers and developing facilities capable of manufacturing the patented article appears to be a significant obstacle to entry into the market. Furthermore, a new manufacturer would face problems because of its lack of a prior history of producing reliable steel rod treating apparatus. In view of the time lag between the contract for sale of a steel rod treating apparatus and actual delivery of the apparatus and the obstacles to entry, we conclude that it is unlikely that new sources of such apparatus will be able to rapidly penetrate the U.S. market without the knowledge of the domestic industry. Consequently, the industry should have ample opportunity to seek necessary relief from the Commission if faced with injury from new sources.

XI. Public Interest

The Commission must consider the effect of any relief on the public interest. 19 U.S.C. §§ 1337(d), 1337(f). The Commission can determine not to grant relief after considering its effect on:

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...

We conclude that public interest considerations do not preclude issuance of a limited exclusion order.

At the Commission hearing of October 14, 1981, a variety of witnesses testified as to the importance of Georgetown Steel Corporation to the economy of the area around Georgetown, South Carolina. The GSC plant is a major employer and taxpayer.

Issuance of a limited exclusion order directed at the subject apparatus will not, however, result in the closing of GSC's plant. 154/ GSC's inability to import the infringing device will not preclude it from continuing to operate the plant much as it has operated before. The existing Stelmor apparatus is still in place and can still be used. Indeed it would appear that even with the installation of the new Stelmor apparatus, GSC will derive no immediate efficiency benefits. The accused apparatus is the second phase of a three part modernization plan undertaken by Georgetown 155/ and is designed to handle larger billet sizes and faster mills speeds. However, in order to realize the advantages of the infringing apparatus, Georgetown must complete further changes in its GSC facility. Mr. Koehle, GSC's vice president for manufacturing, testified that these changes have been put off indefinitely for reasons unrelated to the existence of this investigation. 156/ Moreover, exclusion of the infringing device will not prevent GSC from realizing the improvements to the furnace and caster already installed as part of phase one.

GSC's loss of the infringing device will not have a direct impact on employment at the plant. The plant can operate as before, using the existing apparatus. Georgetown presumably will continue to operate the plant, since it appears to be highly profitable. However, completion of the modernization program, which includes the infringing apparatus, will lead to a significant loss of jobs. In particular, the installation of automatic bundle binding and

154/ Transcript of Commission Hearing, p. 281 (Oct. 14, 1981).

155/ Id. at 282.

156/ Complainant's Written Submission on the Issues of Public Interest, Remedy and Bonding, Tab H, p. 43; Transcript of Commission Hearing at 296.

tying equipment will increase plant efficiency through labor-saving automation. 157/

It would appear that installation of the accused apparatus would increase the efficiency of GSC's steel mill operations. This efficiency gain, however, would be the result of the unauthorized use without compensation of an invention protected by a valid U.S. patent. Moreover, GSC's decision to purchase the subject apparatus has substantially injured a domestic industry and caused layoffs at Morgan's Worcester, Massachusetts plant. The fact that in the distant future GSC might derive efficiency gains does not outweigh the derogation of complainant's patent rights or the substantial injury to a domestic firm and its workers.

An exclusion order will not preclude GSC from modernizing its plant since it can either buy one from Morgan or attempt to obtain a license for the excluded apparatus. This would ensure that GSC and the citizens of Georgetown obtain the benefits of the subject apparatus and that substantial injury to the domestic industry and its workers will not occur.

Bonding

During the period of Presidential review of the Commission's final determination in this investigation, articles which are the subject of a Commission order are entitled to entry under a bond to be determined by the Commission, pursuant to section 337(g). The legislative history provides that the Commission, in determining the amount of the bond, "shall determine, to the extent possible, the amount which would offset any competitive advantage

157/ Transcript of Commission Hearing, p. 283. Complainant's Written Submission on the Issues of Public Interest, Remedy and Bonding, p. 9, Tab G.

resulting from the unfair method of competition or unfair act enjoyed by persons benefiting from the importation." 158/

The competitive advantage enjoyed by respondents results in their ability to sell a steel rod treating apparatus which infringes a valid U.S. patent. The effect is to use without authority or compensation the patented invention conceived and developed by McLean and Easter and assigned to Morgan. The Korf respondents enjoy a competitive advantage because the Korf Group is willing to advance large sums of money and to incur large losses in order to secure the importation of this article. 159/ The new GSC apparatus once functioning could be used as a "show case" for future sales and could operate as a loss leader helping respondents establish a foothold in the U.S. market. We conclude therefore that a bond of 100% of the value of the accused apparatus is appropriate. 160/ E.g., Certain Apparatus for the Continuous Production of

158/ See S. Rept. No. 93-1298, 93d Cong., 2d Sess. (1974) at 198).

159/ Transcript of Commission Hearing, p. 294.

160/ Vice Chairman Calhoun is of the view that the considerations discussed in the above paragraph together with other evidence supplied by complainant establish that a more appropriate bond is 300 percent of the entered value of the subject article. There is ample evidence in the record of respondents' indifference to the cost of securing the importation of the infringing apparatus. Ttp Ashlow bid for the GSC order appears to have been unrealistically low. Since that time Ashlow has incurred significant additional expenses, raising the possibility of a large loss on the order. KIH and Bridon have willingly subsidized the large losses incurred by their subsidiary through a generous line of credit. Transcript of Commission Hearing at 252, 271, 294-95, 298; Complainant's Written Submission on the Issues of Public Interest, Remedy and Bonding, Tabs J, X, W; CX-7c Tab P. In view of there being only three and a half years remaining in the life of the patent, these factors suggest a strong interest by respondents in completing the GSC sale for purposes of advance showcasing their apparatus with a view to future sales. Accordingly, Vice Chairman Calhoun concludes that a 300 percent bond is necessary in order effectively to deter future unlawful importations. Certain Headboxes and Continuous Papermaking Machine Forming Sections for the Continuous Production of Paper and Components Thereof, Inv. No. 337-TA-82, Opinion of Chairman Bill Alberger, Vice-Chairman Michael J. Calhoun, and Commissioner Catherine Bedell, USITC Pub. No. 1138, p. 45 (1981).

Copper Rod and Components Thereof, Inv. No. 337-TA-89, USITC Pub. No. 1132 (1981); Certain Headboxes and Papermaking Machine Forming Sections for the Continuous Production of Paper and Components Thereof, Inv. No. 337-TA-82a, USITC Pub. No. 1197, p. 15 (1981). Such a bond will ensure that any competitive advantage enjoyed by respondents will be offset by a reasonable increase in the cost of the accused apparatus during the period of presidential review.

Conclusion

In this case we make the following determinations: There has been a violation of section 337 in the importation or sale of the accused apparatus. 161/ The appropriate remedy is a limited exclusion order and exclusion of the subject apparatus will not have an adverse impact on the public interest. During the period of presidential review, the appropriate bond is 100 percent of the entered value of the subject article.

161/ We adopt the ALJ's findings of fact and conclusions of law to the extent not inconsistent with this opinion.

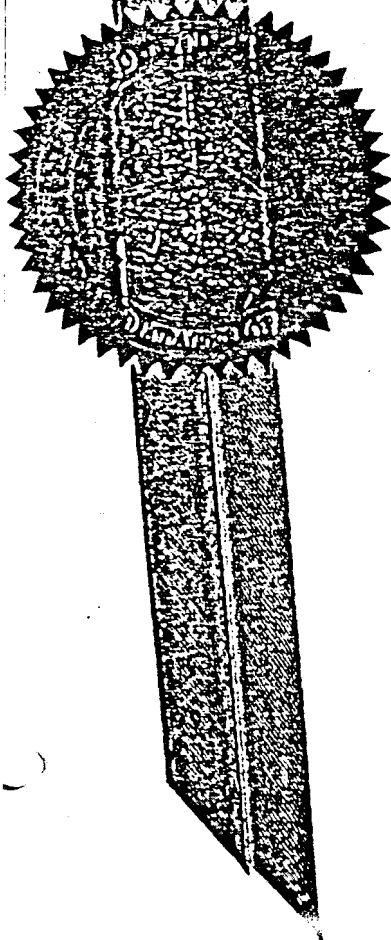
APPENDIX A

10 55

DEPARTMENT OF COMMERCE
United States Patent and Trademark Office

October 10, 1980

THIS IS TO CERTIFY that the annexed is a true copy from the records of this office
of U.S. Patent Number 3,390,871 .



By authority of the
COMMISSIONER OF PATENTS AND TRADEMARKS

2, 1968

D. W. McLEAN ET AL

3,390,1371

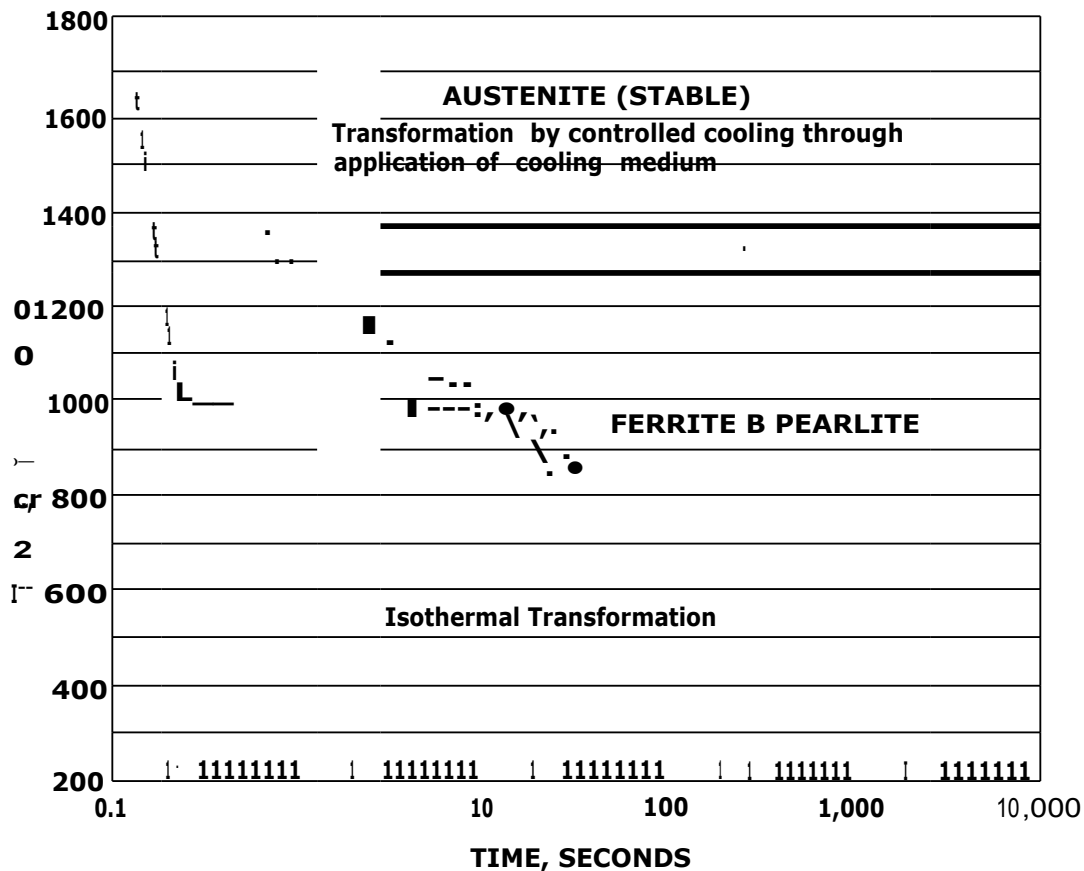
APPARATUS FOR THE CONTROLLED COOLING OF RODS

Filed June 29, 1964

3 Sheets—Sheet 1

FIG.1

0.50 CARBON STEEL



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July 2, 1968

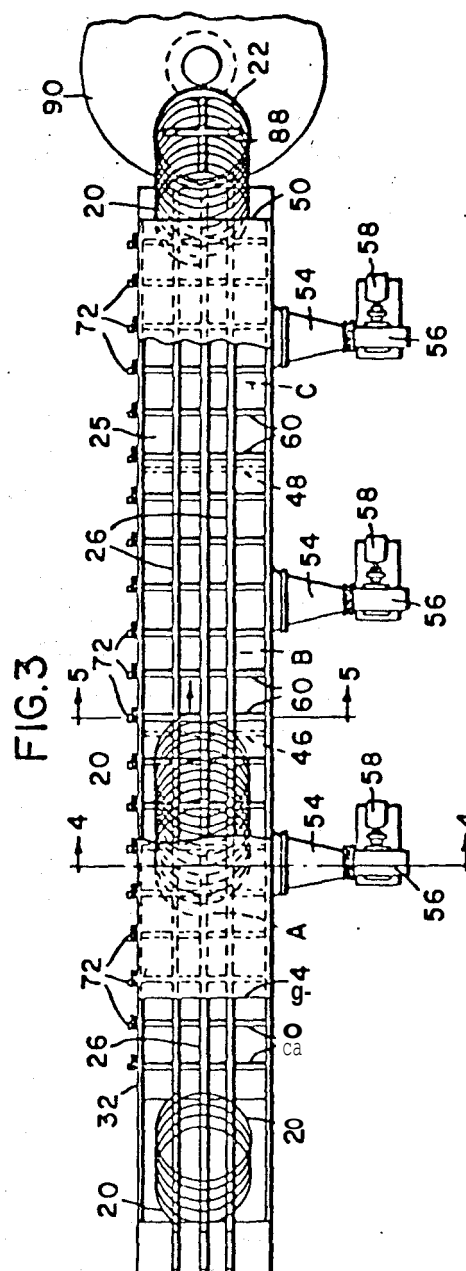
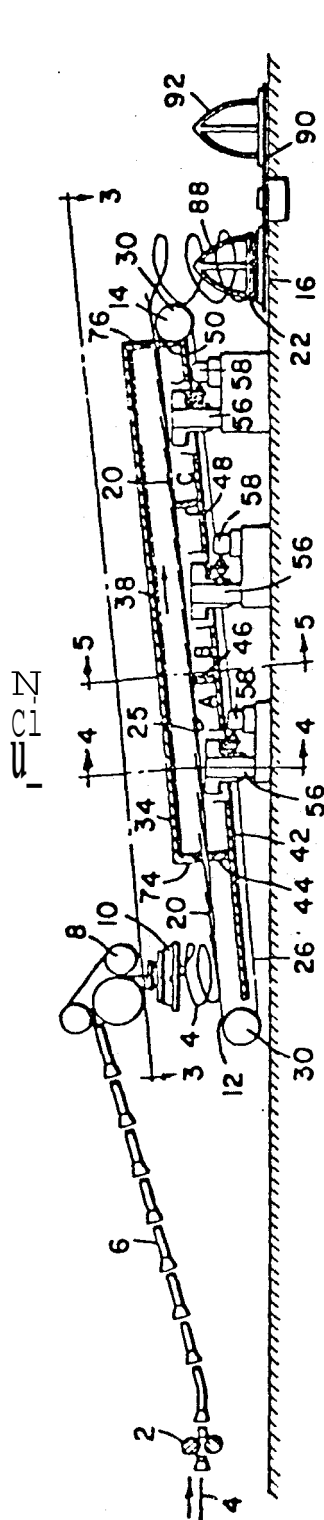
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APPARATUS FOR THE CONTROLLED COOLING OF RODS

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3 Sheets-Sheet 2



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APPARATUS FOR THE CONTROLLED COOLING OF RODS

Filed June 29, 1964

3 Sheets Sheet 3

FIG. 4

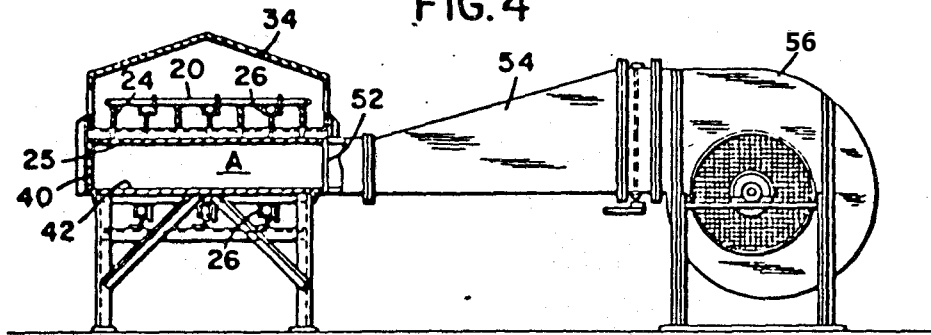


FIG. 7

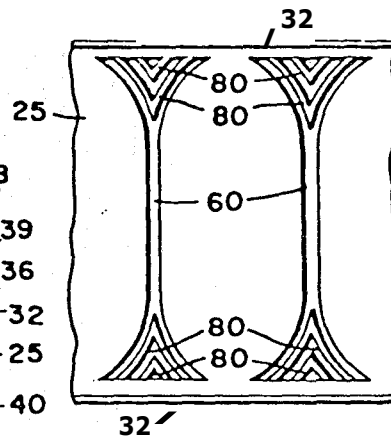


FIG. 5

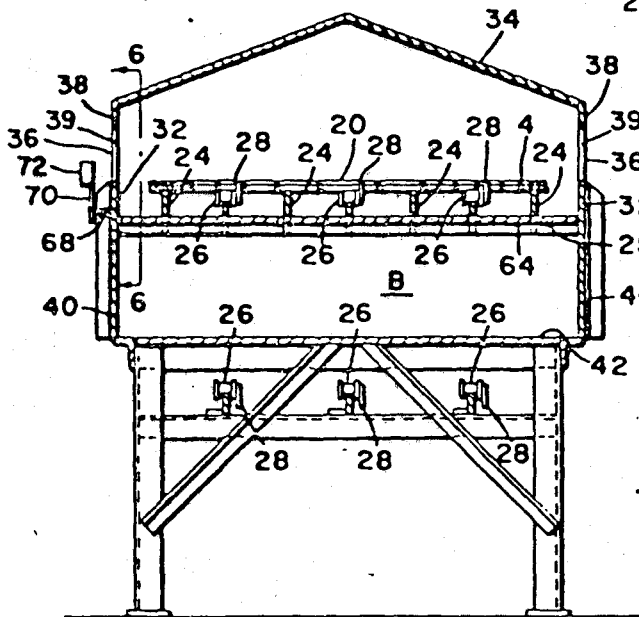


FIG. 8

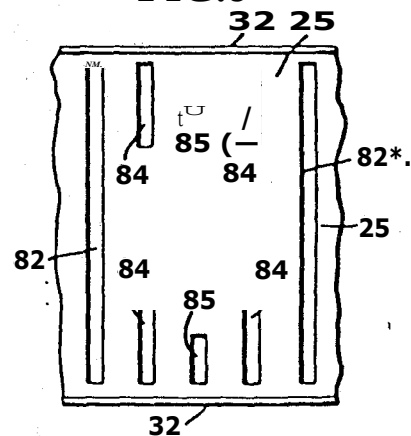
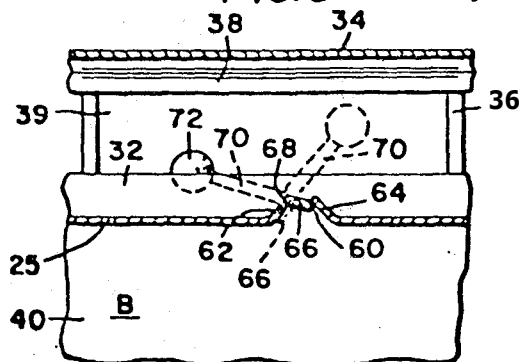


FIG. 6



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APPARATUS FOR THE CONTROLLED
COOLING OF RODS

David W. McLean, Hamilton, Ontario, and Charles G. Easter, Burlington, Ontario, Canada, assignors by irnesne assignments, to Morgan Construction Company, Worcester, Mass.

Continuation of application Ser. No. 219,220, Aug. 24, 1962. This application June 29, 1964, Ser. No. 378,812
7 Claims. (CL 266-3)

This invention, which is a continuation of U.S. Ser. No. 219,220, filed Aug. 24, 1962, now abandoned, relates to a means for imparting selected micro-structure and mechanical properties to hot rolled metal rods by controlled cooling in direct sequence with a hot rolling mill generally called a rod mill, and more particularly to an apparatus for imparting to rods of various grades of steel different micro-structures and mechanical properties, depending upon the grade of steel, subsequent processing and intended use, by controlled cooling in direct sequence with a rod mill.

In the normal production of steel rods, the rods leave the finishing stand of the rod mill at a temperature of approximately 1800° F. The delivery pipes which carry rods to the laying reels are equipped with water nozzles, and the rods are normally cooled to about 3450° F. as they enter the reels. Here the rods are formed into coils, each coil normally representing the product of a cornpkte billet weighing from 400 to about 1200 pounds. Lillie cooling occurs during coiling in conventional laying reels because the collected mass of the coil within the enclosed chamber of the reel retards heat loss during the time of approximately one minute required for coiling. After completion of coiling, coils are discharged from the reels to a conveyor on which they travel slowly, cooling slowly in still air. When each coil has cooled sufficiently (to about 1000 to 1200° F.) to permit suspension from a hook without being deformed out of circular shape, it is normally transferred to a hook carrier. This transports the coils in succession toward points of inspection, trimming, tying and shipping, to storage, or to a wire mill. It also provides sufficient time for additional slow cooling to a suitable temperature for inspection, tying and handling. This normal practice leads to a number of detrimental and costly results. The prolonged exposure to air at high temperature produces a layer of scale (iron oxide) on all exposed surfaces, resulting in a direct metal loss amounting to about 1.5%. The slow cooling promotes grain growth, and in grades of steel containing more than .20% carbon leads to metallurgical and mechanical properties which preclude subsequent processing, such as wire drawing, unless further treated. In medium and high carbon grades, steel rod coils produced in this conventional manner must be subjected before drawing into wire to a separate heat treating process generally known as patenting.

Numerous efforts have been made to overcome these objections to the conventional practice. One such effort is disclosed in United States Patent No. 2,756,169 (Corson, Goetz and Lewis) and, further amplified in United States Patent No. 2,994,328 (Lewis). This involves providing alternate cooling and heat diffusion zones in the pipes leading from the mill to the laying reels. This process was designed specifically for use with high carbon steel rods and was intended to produce micro-structure

and mechanical properties equivalent to those expected from subsequent patenting. This has failed to achieve its, objective fully because, of practical difficulties associated, particularly with rod delivery speeds. This process was applied to an early rod mill having a maximum delivery speed of about 4000 feet per minute and even at this relatively low speed required location of the reel 110 feet from the finishing stand of the mill. At modern delivery speeds of 6000 to 7000 feet per minute, the distance required precludes practical use of this process because rods cannot be pushed consistently through pipes of such length without buckling. Another effort in this direction is disclosed in United States Patent No. 2,516,248 (O'Brien). This involves placing a hood on the top of the rod coil after discharge from the laying reel and blowing air from the inside of the coil through the rings comprising the coil. Still another effort is shown in United States Patent No. 2,673,820 (Morgan) where air is blown through the rings comprising the coil while the coil is being formed in the laying reel. This and the method disclosed by O'Brien provided significant improvement over the conventional practice, particularly with regard to the reduction of scale loss. These methods, however, cooled the rod rings at quite different rates, depending upon the location of each rod ring within the coil. In the O'Brien method, the inner and outer rings are cooled quite rapidly, in fact, too rapidly to produce suitable properties for drawing into wire, while rings within the interior of the coil are cooled too slowly. In the Morgan method, the rings comprising the first and final portions of the coil receive relatively little cooling, resulting in variations of properties along the length of the rod. Furthermore, both the O'Brien and Morgan methods, originally applied to rod coils weighing less than 1000 pounds, produce intolerable variations of properties when applied to rod coils weighing 1200 to 1400 pounds.

The objects of this invention will shortly be stated in more detail in the following description, aided by the accompanying drawings in which:

FIG. 1 is a transformation diagram for .50% carbon steel;

FIG. 2 is a side elevation showing an apparatus embodying the concepts of the invention;

FIG. 3 is a plan view of FIG. 2 taken on the line 3-3 of FIG. 2;

FIG. 4 is an enlarged section on the line 4-4 of FIG. 2;

FIG. 5 is an enlarged section on the line 5-5 of FIG. 2;

FIG. 6 is a still further enlarged section on the line 6-6 of FIG. 5;

FIG. 7 shows a modified form of transverse air passage which may be used without a hood over the conveyor; and

FIG. 8 shows still another modified air passage.

The micro-structure and metallurgical and mechanical properties which are desired in rods depend upon the composition of the rod material, the subsequent processing, and the intended use. In the case of steel rods, the desired micro-structure and properties depend principally upon the carbon content of the steel. For steel containing less than about .20% carbon the desired micro-structure is predominantly fine-grained ferrite. The latter is a common metallurgical term applied to grains of steel containing little or no carbon. In steels containing about .25

carbon. the micro-structure ordinarily desired is fine-grained pearlite interspersed with ferrite, the proportions of the two constituents upon the carbon content within this range. The term applied to grains of steel containing appreciable amounts of carbon but less than 0.8% is composed of alternate layers of ferrite and cementite (iron carbide Fe_3C), having been formed by sufficiently slow cooling to avoid the harder, brittle constituents bainite and martensite. For some purposes, however, steels in this carbon range may be desired to have a micro-structure composed of coarse-grained pearlite interspersed with coarse-grained ferrite. The micro-structure desired in steels containing more than 0.70% carbon can be defined in terms of similar constituents. The desired micro-structure can be affected by alloying elements, such as nickel, chromium and silicon, if these are present in significant amounts, and in such cases also the requirements can be defined in terms of the constituents found in the micro-structure. The character of the micro-structure produced depends in part upon the composition of the rods, and in part upon the manner in which the rods are cooled. The effect of the manner of cooling can be best understood by reference to FIG. 1 which is a temperature-time-transformation diagram (hereinafter referred to as a "TTT diagram") in conjunction with the following description-

This illustration relates specifically to steel containing 0.50% carbon and containing no significant alloy additions. It will be understood that similar diagrams for other grades of plain carbon or alloy steels would have different characteristics. This type of chart is known as an isothermal transformation diagram, having temperature as ordinate and time as abscissa. The term "transformation" as used here relates to the allotropic transformation which accompanies the cooling of steel. At rolling temperature, the iron of which steel is principally composed is in the form of gamma iron which has the property of containing up to 2% carbon in solid solution. This solid solution is known as austenite. Upon cooling through a critical temperature, the austenite undergoes a transformation, becoming ferrite, which has much less capacity for holding carbon-in-solid-solution. The carbon rejected from solid solution during transformation, as well as the carbon retained in solid solution, may take one or more of many different forms, depending upon the temperature at which transformation begins and the rate of cooling during transformation. The crescent-shaped curve at the left of FIG. 1 represents for each temperature the time required to initiate the transformation. The second or inner crescent-shaped curve represents for each temperature the time at which the transformation would be completed if the temperature remained constant during transformation. Because the transformation is an exothermic reaction, because there is at most times some temperature gradient within the cross-section of the rods, and because in most cases the transformation does not occur at constant temperature, this diagram is not numerically exact; but it will serve, nevertheless, to illustrate the requirements. To produce the desired micro-structure for drawing into wire, it is essential that transformation be completed fully approximately at or near the "knee" of the inner curve. This can be accomplished in various ways. One way is by isothermal transformation, corresponding to conventional lead patenting of steel rod, in which the rod is cooled rapidly by submerging it in a liquid bath held at constant preselected temperature (in this case approximately 1000° F.) and holding it in this liquid bath at constant temperature until transformation is completed. Another way is to cool the rod rapidly to a temperature of 1200 to 1500° F. and then to impose a cooling rate such that transformation will begin at a temperature sufficiently above the knee of the inner curve to have been completed before the temperature has dropped to that at the knee of the curve. Two alternatives are shown diagram-

natives are available within the scope of this invention.

One object of this invention, therefore, is to produce, in hot rolled steel rods delivered from a rod mill, micro-structure and mechanical properties which enable the rods to be drawn into wire without intervening heat treatment.

Another object is to produce, in hot rolled rods delivered from a rod mill in most grades of steel commonly rolled in continuous rod mills, a micro-structure and mechanical properties preselected for the particular grade of steel and for the subsequent processing and end use - which will enable the rods to enter subsequent processing without intervening heat treatment.

A further object is to produce, in hot rolled metal rods, micro-structure and mechanical properties which are uniform from end to end of the rods as well as throughout the cross-section.

Still another object is to produce, in steel rods delivered from a rod mill at delivery speeds of 6000 feet per minute or higher, micro-structure and mechanical properties uniform throughout the length of the rods which will enable the rods to be drawn into wire without intervening heat treatment regardless of the weight and size of coils formed from the rods.

An additional object of the invention is to subject rods delivered from a rod mill to rapid but adjustably controlled cooling so that a minimum amount of scale will be formed on the surface of the rods and so that the metallurgical and mechanical properties of the rods can be controlled to suit the composition of the rod material, the subsequent processing, and the intended end use.

The novel mechanism which is used to carry out the above-stated objectives will now be described, Referring first to FIGS. 2 and 3, the last stand of a rolling mill is indicated at 2. The rod 4 passes through pipe 6, in which it may be water-cooled in a manner now known to the industry, at a temperature in the range from 1200 to 1500° F. The rod is then turned downwardly by a chain guide 8 to be fed into a laying head 10. The laying head may be of conventional construction of the same type as that customarily used in laying rod in a laying reel. The rod 4 is deposited on a conveyor, preferably a continuously moving conveyor, 12, which preferably slopes upwardly at a small angle so that the discharge end of the conveyor at 14 is high enough above the floor level to facilitate subsequent collection of the rod rings at the collecting position 16.

Since the conveyor moves the rod in the direction of the arrow 18, the rod as deposited thereon will be in the form of a succession of non-concentric, substantially circular convolutions 20, which are clearly shown in FIG. 3. These non-concentric convolutions are continuously deposited on the conveyor to the extent of the metal present in the original billet fed into the rolling mill. Thus the collected coil 22 will have a weight substantially the same as that of the billet. While a simplified method of collecting the rod in coil 22 has been shown, it will be understood that other means or reassembling the non-concentric rings as they leave the conveyor may be used without in any way affecting the invention herein disclosed and claimed.

The preferred form of the conveyor 12 is shown in more detail in FIGS. 4, 5 and 6. It will be seen to consist of a plurality of parallel longitudinally extending tracks 24 whose upper surfaces reside in a common plane. The tracks are supported by a longitudinally attending upper floor 25. Between these tracks are conveyor chains 26 to which are attached upwardly extending fingers 28 of sufficient length to engage the non-concentric rod rings in a manner effective to move them steadily and without distortion along the tracks 24. The chains travel over driven sprockets 30, the speed of which may be controlled to change the rate of travel of the rings along the conveyor.

In the preferred construction, the conveyor has longi-

length of the conveyor. The top of each of the walls 32 is preferably at about the same level as the rod rings. A longitudinally extending roof or cover 34 is located above most of the conveyor, being supported by a plurality of spaced posts 36 that extend upwardly from the walls 32. The roof 34 terminates on both sides in a short downturned wall 38 which is, however, sufficiently above the walls 32 to provide an adequate space 39 for the discharge of cooling air, or other medium, which, in a manner to be explained, is forced through the traveling rod rings.

The preferred mechanism for forcing cooling air through the moving non-concentric rod rings will now be described. The side walls 32 extend downwardly a substantial distance below the upper surface of the conveyor as indicated at 40, and these walls are connected by a bottom imperforate floor 42. A plurality of vertical walls 44, 46, 48 and 50 divide the space within upper and lower floors 25 and 42 and the walls 40 into a plurality of plenum chambers which are designated A, B and C. Each of these chambers has an opening in its side as shown at 52 in FIG. 4, to which opening is connected a pipe 54 leading from the discharge side of a powerful fan 56. As shown in FIG. 2, there are three fans 56 and each is driven by a suitable motor 58. It will be understood that the number and size of plenum chambers and the size and capacity of the fans may be varied at will to produce the desired volume of air that is to be passed over the moving rod ring 4 as they travel continuously along the conveyor. It will also be understood that cooling media other than air may be used, and that the cooling medium may be delivered from one or more of the plenum chambers at selected temperatures above or below atmospheric temperature to accomplish the objects of the invention. In addition, it will be understood that a liquid cooling medium may be used, in which case the coolant will be delivered through pipes and nozzles rather than through a plenum chamber, and the portion not vaporized will be collected and drained through sumps and pipes.

In order that the air may be directed over and past the rod rings to provide the uniform cooling effect that is required in the practice of this invention, the following mechanisms are utilized:

The floor 25 has a substantial number of transverse openings extending thereacross. These openings are of uniform cross-section, and one such opening is shown in FIG. 6 and indicated at 60. At this opening, the adjacent edges 62 and 64 of the floor 25 have been turned upwardly to direct the air escaping from the plenum chamber through the rod rings. These edges also engage a valve member 66. Valve member 66 is large enough to cover opening 60 and is carried by a shaft 68 which extends laterally beyond the wall 40 as shown in FIG. 5. Shaft 68 has fixed on its end an arm 70 which carries a counterweight 72. It will be seen in FIG. 6 that when the arm 70 has been swung to the left counterweight 72 will hold the valve 66 in closed position, blocking any air flow through opening 60. When the counterweight has been swung to the right, the valve 66 will assume the open dotted line position so that air forced into the plenum chamber B by fan 56 may flow freely upwardly through opening 60 to pass over all parts of the moving rod rings 4 as they move steadily over opening 60.

It is appreciated that the rod is resting on the upper edges of the tracks 24, but these tracks are relatively narrow in transverse dimension so that there is no perceptible diminution of the cooling effect of the upwardly flowing air because of the tracks 24.

By examination of FIG. 5, it will be appreciated that when the rod is laid on the moving conveyor in the form of non-concentric rings, as shown in FIG. 3, there will be a minimum of concentration of metal at the center of the conveyor with increasing concentrations as the sides of the conveyor are approached. That is to say, over any

selected cross-section through the rings there will be an increasing number of crossings as the sides of the rings are approached. Furthermore, the position of that part of each deposited ring at the center of the conveyor extends generally transversely, whereas those parts of each ring at the sides of the conveyor extend generally in the direction of the conveyor. The result of this is that where a transverse slot or an opening of uniform width is utilized through which cooling air is blown upwardly in substantially uniform quantities per unit of time over the entire area of the opening a greater cooling effect will be present at the center portions of the openings than at the edges because there is a smaller mass of metal present over a given cross-sectional area of the opening at the center than at the sides. Since the cooling air is moving upwardly at a uniform rate over the entire area of the transverse opening, it follows that the cooling rate of the rod would, under normal circumstances, be faster at the center than at the sides. Since it is essential in the present method that the rate of cooling of all parts of each ring be substantially uniform, means has been provided for applying in effect more cooling air to the side portions of the ring than at the center. What we have done is to take the air which has come upwardly through the center portions of the transverse openings and which has not been heated to the same extent as the air coming upwardly at the sides of the rings and redirect it laterally so that as it flows toward and out the side openings 39 it will flow over and around all portions of the rod rings on both sides of the center and particularly over the heavy concentrations of metal that are present toward the sides.

Putting it still another way, the hood over the conveyor and transverse openings causes a turbulent re-direction of the air that has come up through the center of the openings where there is a lesser mass of metal to be cooled. This re-directed central air, which is of somewhat lower temperature than the air that has passed up and over the heavy concentration of metal at the sides of the rings, is mingled with hotter side air and passes again over the sides of the rings so that heat is extracted from all parts of all of the rings at substantially the same rate. In this way uniform cooling is achieved.

On referring to FIG. 3, it will be noted that there are shown twenty transverse air passages 60, and each of these passages is controlled by a valve 66. In the roof of each of the plenum chambers A, B and C have been shown six passages, while two passages, normally closed, precede the transverse wall 44. Through the use of these valve passages, the quantity of air passed over the moving rod rings may be controlled in a manner to give the proper rate of cooling for the particular rod then being processed so that the requirements of that rod's transformation curve can be met to produce a rod with the correct metallurgical properties.

It is not essential that the successive curtains of cooling medium be directed vertically. The walls of the passages 60 could be sloped forwardly to rearwardly to cause the air or other medium to flow upwardly at an angle to the vertical without adversely affecting the cooling requirements.

Furthermore, it is to be understood that the invention is not to be limited to means for directing the cooling medium upwardly through the rings. Inverted supply channels could be provided which would direct the cooling medium downwardly through the rings to give the same cooling effect.

It will be noted in FIG. 2 that the roof 34 over the conveyor commences at 74 and terminates at 76. Thus there is an uncovered space on the conveyor between laying head 10 and the start of the roof at 74. In this open area of the conveyor, appreciable cooling of the rod is achieved through radiation. This open area thus provides a zone in which rods can be cooled for a brief period of time at a relatively slow rate without requiring application of a special cooling medium. This period of relatively

slow cooling prior to allotropic transformation permits grain growth to a selected degree, which is desirable for sonic materials and uses. It is to be understood that the length of the hood 34 and the preceding open area may be varied to meet particular conditions called for by the metallurgical properties of the rod being treated. Likewise, the number and dimensions of ports 60 may be increased or decreased and the volume of coolant passed through the ports that are open may be changed by the operator as needed to meet the requirements of the transformation curve. The basic consideration is that all parts of each of the non-concentric rings be uniformly cooled in a proper time so that the resulting collected rings forming coil 22 will have the required uniform metallurgical properties. It is the rapidity, control and uniformity of cooling which has not heretofore been capable of achievement by other known mechanism that is the outstanding accomplishment of the present invention.

By the time the rings have reached the end of the hood 34, the temperature of the rod will have fallen at a rate sufficient to have passed through the inner knee, thus putting the rod in such condition that subsequent cooling at reasonably rapid rates will have no further effect on the metallurgical properties nor will there be any significant scale development thereafter. In fact, by this cooling process there is negligible scale formation after the rod leaves the laying head 10 because the overall cooling is achieved so rapidly.

Other alternative means for achieving the uniform cooling of rod as it is moved along the conveyor from the laying head to the collecting position are shown in FIGS. 7 and 8. In these two structures, the overhead hood may be dispensed with insofar as the cooling requirements are concerned.

In the construction shown in FIG. 7, the rectangular transverse opening shown in FIG. 3 has been changed to a configuration in which the transverse opening is narrow in the center and expands gradually to a maximum dimension at the sides. The curvature of the sides of this opening will be proportioned to the mass of metal present at any given longitudinal section along the overlapping non-concentric rings. In this way, the lesser mass of metal at the center, which will be subjected to the succession of cooling zones for a minimum total time, will be cooled at the same rate as the greater mass of metal at the outer edges, which will be subjected to the succession of cooling zones for a maximum and proportionately longer time. The intermediate portions of the transverse openings will be correspondingly shaped to apply the coolant for such total time as required to achieve the same uniform rate of cooling of the intermediate portions of the rings.

The number of rings of the rod per unit of length of the conveyor may be varied at will without affecting the uniformity of cooling, although for a constant flow of coolant and constant rod size the rate of cooling will decrease as the number of rings is increased. When the concentration of the rings is greater, the volume of coolant forced through the transverse openings may be increased to achieve cooling at the same rate. Conversely, when the concentration of rings is decreased, the volume of coolant per unit time may be suitably decreased, thereby to achieve the same cooling rate.

When air or other gas is used as a coolant, in order to insure that the velocity of the coolant passing through the transverse opening shown in FIG. 7 is uniform over all portions, the passage may be partitioned in the manner indicated by the thin curved vertical walls 80. With a substantially uniform pressure in each of the plenum chambers A, B and C passages of uniform size will give substantially uniform velocities flowing upwardly past the rings as they move thereover.

Another modification of air passage construction which will result in uniform cooling of the non-concentric rings

without the use of a hood is shown in FIG. 8. Here there are a succession of full-width passages 82, which are similar to those shown in FIG. 3. In between these full-width passages are a series of shorter passages 84, and between each pair of passages 84 is a still shorter passage 85. The cumulative effect of this arrangement is to produce the needed greater flow of air over the sides of the overlapping rings and a lesser flow as the center is approached. The number and size of the passages may be readily adjusted to be in agreement with the varying mass of metal of the rings, which is at a minimum at the center and increases at first slowly as the sides are approached and finally rapidly just before the side areas of the rings are reached.

The collecting mechanism 16 is of a simplified form. The rod rings 4 as they leave the end of the conveyor fall over the conical head 88 to be collected in a coil 22. As soon as the last ring of the coil is deposited, the turntable 90 is rotated, bringing a new head 92 to the collecting position to receive the next oncoming succession of rod rings. As this next coil is being assembled, the coil 22 is removed from the core 88.

It is our intention to cover all changes and modifications of the examples of the invention herein chosen for purposes of the disclosure which do not constitute departures from the spirit and scope of the invention.

What is claimed is:

1. Apparatus for producing steel rod comprising in combination: a mechanism for rolling steel to rod diameter at an elevated temperature above transformation temperature; a delivery means for receiving said rod continuously and directly from said mechanism; spaced supports positioned to receive said rod from said delivery means; rod laying means for directing said rod from delivery means and for continuously depositing said rod on said spaced supports in the form of discretely offset rings while said rod is still at a temperature above transformation, said rod laying means and said supports constructed and arranged to provide an offset of said rings and a dimension of contact between said rod and said supports which allows substantially complete exposure of the surface of said rod to a flowing current of a gaseous cooling medium; means associated with said delivery means for cooling said rod rapidly from rolling temperature above transformation down to a temperature near to but above transformation directly after said rod issues from said rolling mechanism and while the austenitic grains thereof are still small due to the mechanical action of said rolling mechanism, whereby austenitic grain growth following rolling is inhibited; and, means for imparting a substantially uniform fine grained pearlitic structure suitable for extensive cold working to said rod including means associated with said spaced supports for directing a flowing current of said gaseous cooling medium around said spaced supports through said rings and to substantially all exposed surfaces of said rod to cool said rod through transformation substantially uniformly throughout the length of said rod.

2. The apparatus as set forth in claim 1 wherein the cooling means associated with said delivery means includes means for applying a liquid coolant to the surface of rod passing through said delivery means.

3. The apparatus as set forth in claim 1 wherein said gaseous cooling medium is forcibly applied.

4. The apparatus as set forth in claim 3 wherein the flow of said gaseous cooling medium is distributed in proportion to the distributed mass of metal to be cooled.

5. The apparatus as set forth in claim 4 further characterized by means for re-directing the gaseous cooling medium that has passed over the center portion of said offset rings laterally to contact the side portions of said rings where the concentration of metal is the greatest.

6. The apparatus as claimed in claim 3 means for pro-

forming a succession of nailing zones through which said oil set pins are carried along said spaced supports. the application of gaseous coolant to the rings in catch said cooling zones being independently variable.

7. The apparatus as claimed in claim 1 wherein said spaced supports are so small in the dimension of contact with said rod rings as to have negligible influence on the cooling rate of said rod by conduction of heat into said supports, and negligible interference with the uniform application of said gaseous coolant to the surfaces of said rod

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APPENDIX B

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

In the Matter of)
)
CERTAIN STEEL ROD TREATING APPARATUS)
AND COMPONENTS THEREOF)

Investigation No. 37-TA-97

COMMISSION MEMORANDUM OPINION

Introduction

This is an interlocutory appeal filed by respondents Korf Industrie, Handel, GmbH (hereinafter "KIH"), and Korf Engineering, GmbH (hereinafter, "KE"), from a denial by the administrative law judge (hereinafter "ALJ") of their motions to be dismissed as parties respondent to this investigation (Order No. 13). Upon application by KIH and KE, the ALJ granted leave to file an interlocutory appeal to the Commission pursuant to section 210.60 of the Commission's rules, 19 CFR § 210.60(b) (1980), finding that the motions involved a controlling issue of law or policy as to which there was a substantial difference of opinion and that an immediate appeal from his ruling would materially advance the ultimate completion of the investigation. The appeal raises certain questions regarding the nature of the Commission's jurisdiction and its power to require discovery which are appropriate for prompt determination. 1/ We grant the application for review and affirm the presiding officer's denial of the motions to dismiss.

1/ There appears to be a difference of views regarding the Commission's power to compel discovery. See Certification of Orders May 20, 1991, Wet's Motor Circulating Pumps and Components Thereof, Inv. No. 137-71194:.

Procedural History

This is a patent-based section 337 action, centered on allegations by complainant Morgan Construction Co. (hereinafter "Morgan") that respondents Korf Industrie & Handel, GmbH ("KIH"), Korf Engineering, GmbH ("KE"), Ashlow Ltd., Ashlow Corp., and Georgetown Steel Corp. ("GSC") have infringed claims 1-7 of U.S. Letters Patent 3,390,871 (hereinafter '871 patent).

While the circumstances surrounding the interlocutory appeal are the subject of some disagreement between the parties, the facts appear to be as follows. After service of the complaint and notice of investigation, KIH and KE submitted notices of appearance. Shortly thereafter, KIH and KE moved (Motions Nos. 97-3, 97-4) to be dismissed as parties respondent to the investigation. KIH and KE asserted that, by virtue, of their lack of involvement as owners, importers, consignees or agents, they were not proper parties respondent to the investigation. The basis for the motion, while somewhat unclear, appears to have been that KIH and KE are not the real parties in interest and that their actions do not fall within the Commission's subject-matter jurisdiction under section 337. The 4LJ denied the motions on April 10, 1981 (Order No. 5).

On April 30, 1981, KE and KIH again moved to be dismissed as parties respondent to the investigation. The grounds asserted for dismissal were an alleged lack of in personam jurisdiction and improper service of process under the Hague Convention on Service of Process. (Motions Nos. 97-28, 97-30). Complainant and the Commission investigative attorney opposed the motions in separate submissions (Response (May 1, 1981) ; Submission (lay, 4, ¹⁹⁸¹)). The ALJ heard oral argument at a pre-hearing conference conducted on May 1, 1981.

The ALJ denied the motions in an order (Order No. 13) issued on May 8, 1981, finding that respondents had waived their procedural rights under the Hague Convention by their failure to make a timely objection. As the ALJ pointed out, drawing an analogy to Rule 12(g) of the Federal Rules of Civil Procedure, the time limitations of section 337 require the prompt resolution of technical and procedural matters. Failure to consolidate such matters in a single motion constitutes a waiver. Appellants KIH and KE do not discuss the ALJ's finding of a waiver in their application for review, and that issue is not before us (Motion No. 97-40).

The ALJ further determined that in personam jurisdiction is not a prerequisite to an exclusion order, Sealed Air Corp. v. U.S. International Trade Commission, App. Nos. 79-35 and 80-4 (CCPA March 12, 1981), or, under Commission precedent, for a cease and desist order remedy, Certain Welded Stainless Steel Pipe and Tube, Inv. No. 337-TA-29. 2/

We affirm.

I

The grounds for the motion to dismiss are that the Commission allegedly lacks in personam jurisdiction under the "minimum contacts" test of International Shoe Co. v. Washington, 326 U.S. 310 (1945).

This argument rests on a single premise--that in personam jurisdiction is a prerequisite to naming a person as a party respondent to a Commission section 337 investigation. This premise reflects a fundamental misunderstanding of section 337.

2/ Inv. No. 337-TA-29, USITC Pub. No. 863, pp. 4-7 (1978) (Views of Commissioners Alberger, Minchew and Moore).

In discussing jurisdictional issues, one must distinguish between subject-matter jurisdiction and jurisdiction over the parties or the property.

Subject-matter jurisdiction is the competence of a court or agency to hear and decide a particular type of action. The Commission, as a creature of statute, is empowered under section 337 to hear and decide actions involving "unfair methods of competition or unfair acts in the importation of articles into the United States, or in their sale by the owner, importer, consignee or agent of either..." 19 U.S.C. § 133⁷.

Our subject matter jurisdiction was delegated by Congress pursuant to the foreign commerce clause of the Constitution, Frischer & Co., Inc. v. Elting, 60 F.2d 711, 713 (2d Cir. 1932), cert. denied, 287 U.S. 649 (1933), S. J. Charia & Co. v. United States, 135 F. Supp. 727, 728 (Cust. Ct. 1954), aff'd, 248 F.2d 124 (CCPA 1956). "The Constitution gives Congress broad comprehensive powers [to] regulate Commerce with foreign nations, Art. I, § 8, cl. 3." United States v. 12 200-ft. Reels of Film, 413 U.S. 123, 125 (1973). As such, there is no such thing as a "vested right" to import goods into the United States; importation is a privilege granted by Congress. Buttfield v. Stranahan, 192 U.S. 470, 493 (1904). Hence, Congress may exclude goods from the United States, or empower the Commission to do so, for "importation, even as to our own citizens, is not a vested right, but an act of grace." In re Orion Co., 71 F.2d 458, 465 (CCPA 1934).

Jurisdiction over the parties or the property, on the other hand, is the power of a court or agency to decide a particular case involving specific parties or a specific piece of property, and is based on the existence of one of three forms of power over the parties or the property--in personam, in rem,

or quasi in rem jurisdiction. When a court or agency has both subject-matter jurisdiction and jurisdiction over the parties or property, it has the power to decide a particular case.

The Court of Customs and Patent Appeals (CCPA) held in Sealed Air v. U.S. International Trade Commission, App. Nos. 79-35 and 80-04, that the Commission's section 337 jurisdiction to issue exclusion orders is in rem and not in personam. Id., Majority at 16, Dissent at 10. In Sealed Air Unipak, a Hong Kong manufacturer of plastic film, appealed from an exclusion order. Unipak claimed that it had "insufficient contacts" with the United States to warrant the exercise of in personam jurisdiction. The CCPA affirmed the Commission's order, holding that in personam jurisdiction is not required in section 337 proceedings for the issuance of an exclusion order. The CCPA held:

The order was not entered against Unipak personally. The sole effect upon Unipak is that the relevant product cannot be imported into the United States until it is established that it has not been made by the patented process. The order is directed against, and only against, certain "multicellular plastic materials manufactured abroad in accordance with the process disclosed by claims 1 and 2 of U.S. Letters Patent 3,416,984." An exclusion order operates against goods, not parties. Accordingly, that order was not contingent upon a determination of personal or "in personam" jurisdiction over a foreign manufacturer.

Id., Majority at 15-16.

Because section 337 exclusion orders are in rem, service of the complaint and notice of investigation on a named foreign party respondent is not necessarily an assertion that the Commission has in personam jurisdiction over that person. The primary function of service on such a foreign respondent is to satisfy the due process requirement of reasonable notice as set forth in Mullane v. Central Hanover Bank & Trust Co., 339 U.S. 306 (1950).

Due process requires that whether an action is in rem, in personam or quasi in rem, persons having an interest in property be given notice reasonably calculated to inform them of the pendency of a court action affecting that property and that they be afforded an opportunity to appear. 339 U.S. at 314. The Court held in Mullane:

An elementary and fundamental requirement of due process in any proceeding which is to be accorded finality is notice reasonably calculated, under all the circumstances, to apprise interested parties of the pendency of the action and afford them an opportunity to present their objections . . . the notice must be of such nature as reasonably to convey the required information, . . . and it must afford a reasonable time for those interested to make their appearance, . . . But ;f with due regard for the practicalities and peculiarities of the case these conditions are reasonably met, the constitutional requirements are satisfied.

339 U.S. at 314-15.

The Commission's service of the complaint and notice of investigation on a named foreign party respondent serves to make that person aware that the Commission has instituted a section 337 action, that there has been an allegation that the person (usually a firm) is involved in the importation or sale of the accused merchandise, and that it has an opportunity to appear and be heard. 3/

We further determine in view of the in rem nature of section 317 proceedings, in personam jurisdiction is not a prerequisite to party respondent status. When the Commission is sitting in an in rem action, it can

3/ The complainant and particularly the Commission investigat've attorney are under an affirmative duty, through the Secretary's office, to use reasonable efforts to notify persons whose goods may be affected by a section 337 remedy. Such persons, even if not parties, should be served with copies of the notice of investigation to ensure that they are on notice of the pendency of a section 337 action.

adjudicate as to a res or property and in doing so adversely affect the interest of a person as to whom it has no in personam jurisdiction. Indeed, that is precisely the reason that the Commission's section 337 jurisdiction to issue an exclusion order is in rem.

Congress enacted section 337 because in many instances foreign individuals or firms committing unfair acts to the detriment of an American industry are beyond the in personam reach of the U.S. courts and not amenable to a suit for money damages or injunctive relief. In In re Orion Co., 71 F.2d 458, 466-67 (CCPA 1934), the CCPA observed:

It will be borne in mind that many of the decisions cited in the Frischer case, supra, and here, were rendered under statutes intended to prevent unfair methods of competition in the internal commerce of the country. Much more reason appears for the prevention of such practices in the case of importations from foreign countries. In this latter class of cases, manufactured products, produced in a foreign country where the producer is beyond the control of the courts of the United States, are imported into this country. Up until the time when they are released from customs custody to the commerce of this country, no opportunity is presented to the manufacturer in the United States to protect himself against unfair methods of competition or unfair acts. After the goods have been so released into the commerce of the country, the American manufacturer may assert his rights against any one who has possession of, or sells, the goods. However, this method of control must be, and is, ineffective, because of the multiplicity of suits which must necessarily be instituted to enforce the rights of the domestic manufacturer. This phase of the matter obviously was in the minds of the Congress at the time of the preparation of said section 337 ...

Id. at 466-67 (emphasis added).

In 1935, in an investigation involving apatite from the Soviet Union, the Commission stated:

[I]t should be borne in mind that in the case of manufacture in the United States the patentee has a remedy; he can proceed against the domestic manufacturer, thereby stopping the evil at its source. But in the case of manufacture abroad of articles the method for producing which is patented only in the United States, domestic patentees cannot reach foreign manufacturers through the process of the Federal courts. If the contention of respondents should be adopted, domestic patentees would be remediless. To say that domestic manufacturers may protect rights acquired under patents against other domestic manufacturers and vendors but not against foreign manufacturers and importers is repugnant both to law and reason. 4/

Accordingly, the appropriate basis for dismissal as a party respondent in a section 337 investigation is a showing that the respondent has not been engaged in unfair acts or unfair methods of competition which come within the Commission's subject-matter jurisdiction, or that those acts have ended. For example, a party can be terminated on the basis of a licensing or settlement agreement, 5/ or because the alleged unfair acts have ceased.

KIH and KE base their motions to dismiss on the erroneous assumption that lack of in personam jurisdiction is a basis for dismissal. We determine that in personam jurisdiction is not a prerequisite for party respondent status in a section 337 proceeding. 6/ Thus it is unnecessary for us to reach the issue

4/ Quoted in In re Amtorg Trading Corp., 75 F.2d 826, 828, fn. 3 (CCPA 1935), cert. denied, 296 U.S. 576 (1936). As a matter of historical interest, Amtorg held that infringement of a process patent was not actionable under section 337. Congress subsequently passed 19 U.S.C. §1337a, granting the Commission authority to hear such cases.

5/ Section 210.51(c) of the Commission's Rules of Practice and Procedure, 46 F.R. 17530 (March 18, 1981), e.g., the termination of AS&E in this investigation because it was going out of business.

6/ We do not reach the question of whether a finding of in personam jurisdiction is necessary for the issuance of certain types of cease and desist orders. A cease and desist order can be directed at the importation of the goods in controversy, or at unfair acts subsequent to importation of the goods.

The enforceability of a cease and desist order by fines under section 337(f)(2) of the Tariff Act of 1930, clearly is contingent on in personam jurisdiction over the person subject to the order. Cease and desist orders directed at certain types of activity may require a Commission finding of in personam jurisdiction.

of the alleged absence of in personam jurisdiction under International Shoe.

II

We determine that the status of our in rem jurisdiction under section 337 to hear and decide claims against the imported article remains unchanged by recent developments in the law of jurisdiction.

Since Pennoyer v. Neff, 95 U.S. 714 (1878) was decided over a century ago, the due process clause of the 14th Amendment has limited the exercise of state court jurisdiction. Pennoyer v. Neff stood for a territorially-based theory of jurisdiction based on the physical presence of the thing (res) or person within the territory of the state where the court sat.

The law as it stood after Pennoyer v. Neff was at least in theory straightforward, and turned on the physical presence of the defendant, some of his property, or of property which was the subject-matter of the suit within the territorial limits of the state.

In International Shoe Co. v. Washington, 326 U.S. 310 (1945), the Supreme Court modified Pennoyer's territorial theory of jurisdiction and held that "due process requires only that in order to subject a defendant to a judgment in personam, if he be not present within the territory of the forum, he have certain minimum contacts with it such that the maintenance of the suit does not offend 'traditional notions of fair play and substantial justice.'" 326 U.S. at 316.

In Shaffer v. Heitner, 433 U.S. 186 (1977), the Supreme Court extended the International Shoe test to actions quasi in rem, and in broad dictum to actions in rem. The Court held that "all assertions of state-court jurisdiction must be evaluated according to the fairness and substantial

justice test set forth in International Shoe and its progeny," 433 U.S. at 212.

We conclude that section 337 in rem jurisdiction over goods imported by foreign respondents remains essentially unchanged. Our conclusion is based on the recent case of Sealed Air Corp. v. U.S. International Trade Commission, App. Nos. 79-35 and 80-04 (CCPA 1981), and on dictum in Shaffer indicating that application of International Shoe will not alter in rem jurisdiction.

As we noted above, Sealed Air involved a Commission determination under 19 U.S.C. 1337a regarding multicellular plastic film. The notice of investigation named Unipak, a Hong Kong company manufacturing plastic film, as a respondent. Unipak defaulted and refused to provide discovery. The Commission determined that section 337 had been violated and an exclusion order was issued. Unipak appealed, claiming that the exclusion order was invalid because Unipak lacked minimum contacts with the United States. The CCPA affirmed the determination of violation and issuance of an exclusion order, holding that Unipak's defense of lack of minimum contacts was "based on an incorrect view of the nature of [the] ITC's jurisdiction." Id. at 15. The CCPA emphasized that section 337 jurisdiction is over the goods, not the parties, and found that "[t]he subject-matter jurisdiction of the ITC over 'the importation of articles into the United States,' §1337(a) and its authority to exclude 'the articles concerned', § 1337(d), are fully adequate." supra, Majority at 17. We had previously reached the same conclusion in Certain Welded Stainless Steel Pipe and Tube. 7/

Taken together, Sealed Air and Shaffer indicate that the Commission's

7/ Inv. No. 337-TA-29, USITC Pub. No. 863, pp. 4-7 (1980) (Views of Commissioners Alberger, Minchew and Moore).

jurisdiction over the goods establishes, without more, sufficient "minimum contacts" as to a foreign respondent. While in Shaffer the Court extended International Shoe to actions in rem, it took great pains to emphasize that application of a fair play and substantial justice test would not alter traditional in rem jurisdiction. The Court stated:

[T]he presence of property in a state may bear on the existence of jurisdiction by providing contacts among the forum State, the defendant, and the litigation. For example, when claims to the property itself are the source of the underlying controversy between the plaintiff and the defendant, it would be unusual for the State where the property is located not to have jurisdiction. In such cases the defendant's claim to property located in the State would normally indicate that he expected to benefit from the State's protection of his interest. The State's strong interests in assuring the marketability of the property within its borders and in providing a procedure for peaceful resolution of disputes about the possession of that property would also support jurisdiction, as would the likelihood that important records and witnesses will be found in the State.

433 U.S. at 207 (emphasis added). The Court concluded:

It appears, therefore, that jurisdiction over many types of actions which now are or might be brought in rem would not be affected by a holding that any assertion of state-court jurisdiction must satisfy the International Shoe standard.

Id.

The presence of the res can be the necessary "minimum contact." This is precisely the case with section 337 jurisdiction, where the imported article is either present in the United States or constructively present by virtue of its sale and imminent importation, and where unfair acts related to the imported article are the subject-matter of our investigation. In such circumstances, as Shaffer held, a court or administrative body sitting in the state where the property is located will, as a general rule, have jurisdiction

under the 5th or 14th amendments. 8/

The United States clearly has a substantial interest in preventing the importation of goods, which, by virtue of unfair acts or unfair methods of competition, are causing substantial injury to a domestic industry. Section 337 is precisely tailored to serve this interest. The remedy chosen, an exclusion order or an order to cease and desist is the least drastic remedy possible. The relief given is prospective rather than retrospective, and does not include the monetary damages available in patent infringement actions in the federal courts. Furthermore, to the extent that any person has an interest in the continued privilege of importing goods into the United States, it is reasonable and fair to expect that person to come to the United States and establish that he or she is not involved in unfair acts to the detriment of a U.S. industry. The fact that such goods are present in the United States, and that the person desires to avoid their exclusion, indicates an expectation of benefit from the laws of the United States. Under principles of international law, the presence of a thing within a sovereign state's territory is an accepted basis for prescribing and enforcing a judgment, Restatement of the Law 2d--Foreign Relations Law of the United States, 17, particularly when the thing has an effect within the territory of a state. Id. at § 18.

Furthermore, our section 337 in rem jurisdiction is a jurisdiction of necessity as to certain foreign respondents. As noted above, Mullane v. Central Hanover Bank & Trust Co., 339 U.S. 306 (1950), involved a common trust fund. Many of the beneficiaries of the trust were not New York residents.

8/ In federal causes of action, the International Shoe test derives from the 5th amendment rather than the 14th amendment. Honeywell, Inc. v. Metz Apparatewerke, 509 F.2d 1137, 1143 (7th Cir. 1975).

Mullane, as special guardian for a non-resident beneficiary, argued that the New York Surrogate's Court could not enter a binding decree approving the fiduciary's accounts unless it had in personam jurisdiction. The effect of the final_ decree was to deprive the non-resident beneficiary of the right to sue the trustee for mismanagement or to contest the fees and expenses allowed the trustee. The Court held that New York could exercise jurisdiction under the due process clause. As the Court held, "Mlle vital interest of the State in bringing any issues as to its fiduciaries to a final settlement can be served only if the interests or claims of persons who are outside of the State can somehow be determined. A construction of the Due Process Clause which would place impossible or impractical obstacles in the way could not be justified." 339 U.S. at 313-14.

Since section 337 actions almost always involve parties from several countries, we note that ordinarily no country's courts will have in personam jurisdiction over every party. We have jurisdiction to hear claims regarding unfair acts by foreign persons in connection with the importation and sale of goods into the United States, because this is the only manner in which the vital interest of the United States in preventing unfair acts in the importation of goods can be served.

Finally, we emphasize that there is no such thing as a property right in the importation of goods into the United States. Importation is an "act of grace." In re Orion Co., 71 F.2d at 465. As such there can be no such thing as a "taking" of property when importation is denied. The owner is always free to take the goods elsewhere. Mesery v. United States, 447 F.Supp. 548, 553-54 (D. Nev. 1977). We do not determine rights to property. The only issue when an exclusion order is sought is whether the goods will be

permitted to enter the United States.

III

The issue of in personam jurisdiction has arisen here and in Wet Motor Circulating Pumps in the context of disagreements over the Commission's power to compel discovery. For that reason we think it appropriate to provide some general guidance for use in this and in future investigations. It is our view that the Commission may compel discovery and impose evidentiary sanctions with or without in personam jurisdiction.

Section 333 of the Tariff Act of 1930 authorizes the Commission to obtain evidence for the purposes of carrying out its investigations, 19 U.S.C. § 1333(a), and to obtain federal court enforcement of its subpoenas. A court may enforce a subpoena to produce books or records as to a person subject to the court's in personam process. United States Steel Corp. v. Multistate Tax Commission, 417 F.Supp. 795, 804 (S.D.N.Y. 1976) aff'd 434 U.S. 452 (1978).

If a person is subject to a court's in personam jurisdiction, he or she may be required to produce subpoenaed documents within his or her control, even if the documents are located in a foreign country. United States v. First National City Bank, 396 F.2d 897 (2d Cir. 1968); INGS v. Ferguson, 282 F.2d 149 (2d Cir. 1960); In re Uranium Antitrust Litigation, 480 F. Supp. 1138 (N.D. Ill. 1979). Because enforcement of a subpoena is contingent on in personam jurisdiction, the lack of such jurisdiction may in certain cases preclude enforcement of Commission subpoenas under section 333.

But section 333 does not mark the limits of the Commission's power to

promulgate such procedures and regulations as it deems necessary and appropriate to carrying out its duties. Section 210.21 of the Commission's rules requires a named respondent to file an answer within 20 days after service of the complaint and notice of investigation, while section 210.21(d) provides that failure to file a response constitutes a waiver of its right to appear, and permits the ALJ to impose procedural disabilities on the defaulting respondent, 19 CFR 210.21 (1980). Unipak, a foreign manufacturer of plastic film, failed to answer the complaint and refused to permit inspection of its Hong Kong plant. Unipak's failure to permit inspection of its plant effectively prevented the Commission from conducting an investigation of the alleged infringement of a process patent under 19 U.S.C. § 1337a. For that reason the CCPA affirmed the imposition of procedural disabilities for Unipak's default.

The CCPA held as follows:

In view of Unipak's failure to respond to the complaint and notice of investigation, coupled with its failure to participate in discovery, the ITC was fully justified in discharging, in the only way it could, its obligation to issue a determination on whether importation and sale of Unipak's product was in violation of 19 USC 1337. The alternative would have been to allow Unipak to frustrate the ITC's investigation, while it continued to ship its products into the U.S. to the injury of efficiently operated domestic industries. If the ITC were precluded from applying its "default" rule, when confronted with a foreign manufacturer's adamant refusal to participate, and refusal to provide indispensable evidence of noninfringement, the ITC determination would be postponed indefinitely and the ITC would be deprived of the means to perform its functions under the statute, clearly frustrating the intent of Congress.

Hence even absent a finding of in personam jurisdiction, the Commission may impose discovery sanctions against a defaulting respondent when necessary

secure information from a party, or more accurately to take evidentiary sanctions if information is not produced. 9/ Congress has provided that the Commission "shall determine, with respect to each investigation conducted by it under this section, whether or not there is a violation of this section." 19 U.S.C. 1337(c). In certain investigations information necessary for a determination is in the exclusive control of the respondent. When a respondent, who is benefiting from the privilege of importing goods into the United States, refuses to provide necessary information regarding alleged unfair acts that are harming a United States industry, we can reasonably infer that the respondent either has no interest in the continued importation of his goods, or that the information withheld would be adverse to his case. The alternative would be to allow a party respondent, involved in the importation and sale of the merchandise, to retain the privilege of importation by virtue of its refusal to provide necessary information. For that reason, the Commission rules provide for the imposition of procedural disabilities on non-cooperating respondents, 19 CFR 210.21(d), 210.36(b) (1980). This is also the approach taken by the Federal Rules of Civil Procedure, FED. R. CIV. P. 37.

In Sealed Air Corp. v. U.S. International Trade Commission, the CCPA affirmed the Commission's broad powers to impose discovery sanctions against defaulting foreign respondents. These powers derive from the Commission's authority under section 335 of the Tariff Act of 1930, 19 U.S.C. § 1335, to

9/ The question of evidentiary sanctions before us is the abstract one of whether in personam jurisdiction is a prerequisite to such sanctions. We neither approve nor disapprove the order to compel discovery or the particular sanctions imposed by the presiding officer. These questions are not before us at this time.

and appropriate.

The presence of active parties in an investigation will ordinarily present an even stronger case for requiring discovery than Sealed Air, where the foreign respondent defaulted and did not undertake a defense. An active party has shown an interest in the importation of the goods and availed itself of that opportunity to protect that importation through use of the Commission's procedures. In many situations where a party has obtained discovery of opposing parties under the Commission's rules, it would be inconsistent and unfair to deny the opposing parties an opportunity to take similar discovery.

Section 210.31 of the Commission's Rules of Practice and Procedure provides that "any party may take the deposition of any person, including a party . . ." 19 CFR § 210.31(a) (1980), while section 210.33(a) provides that "[a]ny party may serve on any other party a request to produce and permit the party making the request . . . to inspect and copy documents . . ." 19 CFR § 210.33(a) (1980) (emphasis added). Section 210.36(b) provides:

(b) Failure to comply with order compelling discovery. If a party or an officer or agent of a party fails to comply with an order including, but not limited to, an order for the taking of a deposition or the production of documents, an order to answer interrogatories, an order issued pursuant to request for admissions, or an order to comply with a subpoena, the presiding officer, for the purpose of permitting resolution of relevant issues and disposition of the investigation without unnecessary delay despite failure to comply, may take such action in regard thereto as is just. . . . 19 CFR § 210.36(b) (emphasis added).

Section 210.36(b) differs from section 210.21(d) in that it contemplates sanctions against an active party.

Under some circumstances limiting a domestic party's discovery of necessary and relevant information could give foreign parties a significant and, more importantly, an unfair advantage. While it may be that the Commission could not enforce an order compelling discovery of necessary information in Federal district court because that court would lack in personam jurisdiction over the non-complying foreign party, the Commission can order discovery in the United States and if necessary impose sanctions under Section 210.36(b). In Certain Mass Flow Devices, 10/ we stated:

The Commission is aware of the recent, interim decision by the Dutch Ministry of Economic Affairs, barring ASM/b.v. from currently participating in discovery in the Netherlands. We have no reason at the present time to presume that the concerns of the Netherlands government will not be resolved amicably and expeditiously. If for some unforeseen reason, no solution is reached in an adequate amount of time to conclude discovery, the presiding officer is not precluded from ordering discovery, including depositions and the production of documents, to take place in this country. Should the respondents not comply with such an order, the ALJ is not precluded from taking appropriate adverse inferences under section 210.36(b) of the Commission's Rules of Practice and Procedure.

There is ample precedent for ordering discovery of a foreign corporation which is a party defendant to take place in the United States. 11/ As a general rule the deposition of a corporation through its agents and officers should be taken at its principal place of business. Salter v. Upjohn Co., 593 F.2d 649 (5th Cir. 1979). However, this is not an inflexible rule. The matter of the

10/ Inv. No. 337-TA-91, Memorandum Opinion.

11/ This discussion should not be construed as approving or disapproving of the ALJ's order compelling certain officers of KIH and KE to appear for depositions in the United States. That issue is not before us at this time.

depositions of corporate defendants ultimately is within the discretion of the Court, and instances of defendants having to appear for depositions at the place of trial are not unusual. International Banco of Miami v. Banco de Economias y Prestamos, 55 F.R.D. 180 (D.P.R. 1972); Powell v. International Foodservice Systems, Inc., 52 F.R.D. 205 (D.P.R. 1971); Connell v. Biltmore Security Life Insurance Co., 41 F.R.D. 136 (D.J.C. 1966); Reliable Volkswagen Sales and Service Co. v. World-Wide Automobiles Corp., 26 F.R.D. 592 (D.N.J. 1960). The officers of foreign corporate defendants can be required to come to the United States to be deposed. Reliable Volkswagen v. World-Wide Auto Corp., 26 F.R.D. at 593-94; see Financial General Bankshares Inc. v. Lance, 80 F.R.D. 22,23 (D.D.C. 1978). The ALJ therefore has the discretion to require foreign parties to appear and be deposed in the United States when appropriate under such conditions as may be fair and just.

The power to compel discovery of a party rests in the "inherent jurisdiction" of a court, Lincoln Laboratories, Inc. v. Savage Laboratories, Inc., 27 F.R.D. 476 (D. Del. 1961). Plastic Lens Co. v. Guaranteed Contact Lenses, Inc., 35 F.R.D. 35 (S.D. N.Y. 1964); Hulvat v. Royal Indemnity Co., 277 F. Supp. 796 (E.D. Wis. 1967). Thus, the Federal Rules give either the court which is hearing the case or the court in the district where the deposition is being taken the power to order discovery. FED. R. CIV. P. 37(a)(1). Of course, the ALJ will give due regard to international comity, and attempt to work out an amicable solution that takes into account the sensibilities of foreign respondents. The decision to compel discovery in the United States is a difficult one that will require a careful weighing of all

factors including but not limited to, the good faith of the parties seeking and opposing discovery, the importance or lack thereof of the information sought, the relationship between the foreign party and the imported article under investigation, the time remaining in the investigation, the willingness of both parties to make reasonable accommodations regarding foreign discovery, and the ability to use other available information or discovery techniques. The ALJ also has discretion to impose appropriate conditions, including the payment of costs by the party seeking discovery, or limiting discovery or the manner in which discovery is taken. Nevertheless, when discovery of important or necessary information is fair and appropriate, the presiding officer may issue an order compelling discovery or imposing sanctions under section 210.36(b) against any party, regardless of whether their jurisdictional contacts with the United States are sufficient to sustain a finding of in personam jurisdiction.

Conclusion

We determine that the lack of in personam jurisdiction is not a basis for dismissing a party respondent.

We find our in rem jurisdiction under section 337 to be in accordance with Shaffer v. Heitner, 422 U.S. 186 (1977).

We determine that in personam jurisdiction is not a prerequisite for discovery or for discovery sanctions against a party, and that the ALJ has discretion to require a party to appear in the United States and be deposed.

Judge Duvall's Order No. 13 denying Motions Nos. 97-28 and 97-30 is hereby affirmed.

