Ex parte Raychem Corporation

Appeal No. 91-2888 from Art Unit 1307.

Request for Reexamination of Patent filed May 11, 1987, Control No. 90/001,240; and Request filed March 2, 1987, Control No. 90/001,178 for the Reexamination of Patent No. 4,426,339, issued January 17, 1984, based on application Serial No. 06/251,910 filed April 7, 1981. Method Of Making Electrical Devices Comprising Conductive PolymerCompositions.

Board of Patent Appeals and Interferences

1992 Pat. App. LEXIS 21; 25 U.S.P.Q.2D (BNA) 1265

June 30, 1992, On Reconsideration

NOTICE:

ROUTINE OPINION. Pursuant to the Patent Trial and Appeal Board Standard Operating Procedure 2, the opinion below has been designated a routine opinion.

[*1]

Before Seidleck, Tarring and W. Smith, Examiners-in-Chief.

COUNSEL:

Timothy H. P. Richardson for Patent Owner.

Charles M. Cox et al. for Third Party Requestor.

Primary Examiner - James Derrington.

OPINION:

Smith, William F.

Smith, Examiner-in-Chief.

ON REQUEST FOR RECONSIDERATION

Patent owner Raychem asks reconsideration of our decision of April 24, 1992, in which we affirmed the examiner's rejection of claims 1 through 100, all the claims pending in this merged reexamination proceeding.

Raychem first questions the statement at page 16 of our opinion where we set forth that Gale can be considered

cumulative to the other references relied upon by the examiner and that the examiner's conclusion of obviousness can stand absent reliance upon Gale. Specifically, Raychem questions whether this amounts to a new ground of rejection.

We do not find that this observation amounts to a new ground of rejection. One of the issues raised by Raychem in this appeal is whether Gale is properly relied upon by the examiner under the circumstances of this reexamination proceeding. We agreed with the examiner that Gale is available as evidence of obviousness. Having reached this conclusion, we also determined that Gale **[*2]** can be considered as cumulative to the remaining references relied upon by the examiner. The fact that the examiner's conclusion of obviousness can be seen to be proper when based upon fewer references than relied upon in the rejection does not necessarily amount to a new ground of rejection. *In re Kronig, 539 F.2d 1300, 190 USPQ 425 (CCPA 1976).* The fact that Gale may be viewed as cumulative does not change the thrust of the rejection. Therefore, we decline to remove this passage from our opinion as requested by Raychem.

The second point raised by Raychem is that the term "current-carrying device" used in the Appeal Brief was meant to denote a device of the type defined in claim 1. The basis for this new argument is not understood since this term does not appear in claim 1. Arguments made by Raychem in the Appeal Brief that references such as Griff or Richart do not disclose "current-carrying devices" were inaccurate since the devices of these references clearly are current-carrying. While Griff and Richart do not explicitly disclose that current-carrying devices within the generic disclosures of these references can be the specific electrical devices encompassed by the **[*3]** claims on appeal, the teachings of these references are clearly relevant to such devices. The relevant disclosures of Griff and Richart are applicable to the electrical devices of Bedard and Smith-Johannsen which are essentially the same as those claimed.

We have considered Raychem's request for reconsideration, but decline to change our decision in any manner.

DENIED

This is an appeal from the final rejection of claims 1 through 101. Claim 101 has been cancelled per the request on pages 2-3 of the Appeal Brief which leaves claims 1 through 100 for our consideration in this appeal.

Claims 1, 2, 42, and 75 are illustrative of the subject matter involved in this appeal. A copy of these claims as they appear in the appendix to the Appeal Brief is attached to this decision.

The references relied upon by the examiner are:

Richart et al. (Richart)	3,503,823	Mar. 31, 1970
Bedard et al. (Bedard)	3,858,144	Dec. 31, 1974
Smith-Johannsen et al. (Smith-Johannsen)	3,861,029	Jan. 21, 1975
Gale et al. (Gale)	4,444,708	Apr. 24, 1984

Metals Handbook, "Properties and Selection of Metals", Vol. 1, 8th Edition, page 41 (1961).

Griff, *Plastic Extrusion Technology*, "Wire **[*4]** And Cable Covering", 2nd Edition, Chapter 7, pages 192-233 (1968).

Claims 1 through 100 stand rejected under *35 USC § 103* as unpatentable over Bedard in view of Griff, Gale, Richart and Smith-Johannsen. We affirm.

BACKGROUND

This is the second appeal in this merged reexamination of U.S. Patent No. 4,426,339 ('339 patent). In our first decision, *Ex parte Raychem Corp., 17 USPQ2d 1417 (BPAI 1990)*, we concluded that the subject matter of claims 1 through 41 would have been obvious to one of ordinary skill in the art at the time of the invention under *35 USC § 103.*

In reaching this conclusion, we relied upon two patents, Smith-Johannsen and Richart, which were not relied upon by the examiner.

Accordingly, we denominated our affirmance of the examiner's rejection as a new ground under 37 CFR § 1.196(b).

In response to the new ground of rejection, Raychem elected to reopen prosecution before the examiner during which claims 42 through 100 were added and additional evidence was submitted.

THE INVENTION

The claims on appeal are directed to a process for preparing an electrical device which comprises at least two electrodes which are in physical and electrical contact with **[*5]** a conductive polymer composition. Preferably, the electrical device is a self-regulating strip heater where the conductive polymer composition comprises carbon black and exhibits so-called Positive Temperature Coefficient (PTC) behavior. As set forth in the prior art section of the '339 patent, prior to the present invention devices of this kind were manufactured by methods which comprised extruding or molding the molten conductive polymer composition around or against the electrodes. In these known methods, the electrode(s) was not heated prior to contact with the polymer composition or it was heated only to a limited extent.

As claimed, the invention revolves around the discovery that minimizing the initial contact resistance between the electrode and the conductive polymer composition will result in a smaller increase in total resistance with time. While the '339 patent sets forth several alternative methods of decreasing the initial contact resistance of these electrical devices, the claims on appeal are directed to only one of these embodiments, i.e., heating each electrode in the absence of the conductive polymer composition to a temperature above the melting point of the **[*6]** conductive polymer composition and bringing the electrodes, while they are at a temperature above the melting point of the conductive polymer composition, into direct physical contact with the molten conductive polymer composition as the device is being extruded.

OPINION

We have carefully considered the respective positions of the examiner and Raychem n1 **[**1267]** and find that the examiner's conclusion that the subject matter of claims 1 through 100 would have been obvious to one ofordinary skill in the art from a consideration of the references relied upon is correct.

n1 We have considered the arguments and record citations set forth in Raychem's Appeal Brief and Reply Brief in reaching this decision. The paper dated January 31, 1992, received at the Board February 11, 1992, amounts to a post-hearing brief which was not requested by the Board. Accordingly, this paper has not been considered. *Ex parte Cillario, 14 USPQ2d 1079 (BPAI 1989).*

Bedard discloses the basic process for preparing electrical devices including self-regulating strip heaters called for by the claims on appeal. The most significant difference between the method disclosed in Bedard and that set forth in the **[*7]** claims on appeal is the present requirement that each electrode be preheated in the absence of the conductive polymer composition to a temperature above the melting point of the conductive polymer composition prior to the electrodes contacting the molten conductive polymer composition.

In reaching his conclusion of obviousness, the examiner found that at the time of the present invention those of ordinary skill in the art were aware of the importance of allowing the conductive polymer composition to completely wet the surface of the electrodes during the extrusion process. As set forth at column 2, lines 5-12 of Bedard, incomplete wetting of the electrode with the conductive polymer composition can, under certain conditions, create "regions of high localized current density leading to degradation and a concomitant increase of resistance at the interface [between the electrodes and the conductive polymer composition]."

To this end, the specific invention of Bedard is directed to improving the wetting of the electrodes by the conductive polymer composition. As set forth at column 3, lines 24-34 of Bedard, the use of the specific processes disclosed in that reference does result **[*8]** in improved wetting n2 of the electrode by the conductive polymer composition.

n2 The use of the word "setting" instead of "wetting" in this portion of Bedard is agreed to be a typographical error. The word "setting" is to be read as "wetting."

Smith-Johannsen is also directed to methods of making electrical devices including self-regulating strip heaters in which the electrically conductive polymer coating exhibits PCT behavior. This reference provides further evidence that at the time of the present invention those of ordinary skill in the art were aware of the need to assure that the electrodes in such devices were adequately wetted by the conductive polymer composition. To this end, Smith-Johannsen discloses that an electrical device, such as a self-regulating heater, which is formed by an otherwise conventional extrusion of a conductive polymer composition around an electrode(s) will have improved electrode wetting when the extruded product is annealed. See column 2, lines 38-54 and column 4, lines 37-43 of Smith-Johannsen.

The examiner has relied upon a definition of "wetting" which appears in the *Metals Handbook.* n3 As seen from this definition, the problem concerning **[*9]** wetting of the electrodes in the electrical devices of Bedard and Smith-Johannsen would be recognized by those of ordinary skill in the art as involving the degree of adhesion of the conductive polymer composition to the metal electrode as well as the degree of continuity of contact between the conductive polymer composition and the metallic electrode.

n3 "A phenomenon involving a solid and a liquid in such intimate contact that the adhesive force between the two phases is greater than the cohesive force within the liquid. Thus a solid that is wetted, on being removed from the liquid bath, will have a thin continuous layer of liquid adhering to it. Foreign substances such as grease may prevent wetting. Addition agents, such as detergents, may induce wetting by lowering the surface tension of the liquid. For a contrast, *see water break.*"

Griff is a textbook directed to plastic extrusion technology, Chapter 7 of which is directed to Wire and Cable Covering. Griff is relevant to the present inquiry since Bedard and Smith-Johannsen disclose that the electrical devices of concern herein are formed by conventional extrusion technology.

On pages 197-198, Griff discloses that **[*10]** preheating the conductor prior to its contact with the molten plastic composition to be extruded about it "prevents premature shrinkage of the hot plastic away from the metal surface." Griff specifically states that this premature shrinkage of the hot plastic away from the metal electrode surface causes stresses that make the plastic "more susceptible to cracking when warmed." Griff also observes that preheating the conductor in this manner affects adhesion and that another benefit of preheating is the removal of substances such as moisture or oil on the conductor surface. These latter observations are of interest in that the definition of "wetting" **[**1268]** relied upon by the examiner stresses the role that the adhesive force between the metal substrate and the coated material has in this regard and discloses that foreign substances such as grease may prevent wetting.

Gale is further evidence that the problem addressed in Bedard involves a "breakdown in the already poor adhesion between the electrode and the bulk material in the accelerated oxidation and reaction of the PCT material at the electrode interface." See Gale, column 1, lines 43-60 where Bedard is cited as prior art in the reference **[*11]** and Bedard's attempts to "deal with these problems" are discussed. n4

n4 While Gale is not prior art to the claims on appeal, it is proper to consider this reference in determining the patentability of the claims on appeal under *35 USC § 103.* Gale is relevant evidence as to (1) characteristics of prior art products, i.e., the electrical devices formed in Bedard, *In re Wilson, 311 F.2d 266, 135 USPQ 442*

(CCPA 1962), and (2) the knowledge possessed by and the level of skill of the ordinary person in this art, *Ashland Oil, Inc. v. Delta Resins & Refractories, Inc., 776 F.2d 281, 308, 227 USPQ 657, 671 (Fed. Cir. 1985); In re Farrenkopf, 713 F.2d 714, 219 USPQ 1 (CCPA 1983).*

Richart is directed to methods for improving the adhesion of thermoplastic coatings to, *inter alia*, metal wire. This reference is relevant to the present inquiry in that the electrical devices of Bedard and Smith-Johannsen are formed using conventional extrusion techniques such as those disclosed in Richart. Richart sets forth at column 1, lines 56-66 that the performance and utility of coatings applied around metal substrates such as wires is largely dependent upon the "tenacity with which **[*12]** the coating adheres to its substrate." To this end, Richart discloses a number of adhesion promoting heat treatment steps to be used during or after the step of extruding a thermoplastic coating onto a metal wire.

Among the treatment steps disclosed in this reference are a post extrusion annealing of the coated wire as preferred by Bedard and Smith-Johannsen, as well as preheating the conductor prior to the molten thermoplastic coating material being applied as disclosed in Griff and used in the present invention. See column 3, lines 6-63 of Richart.

Richart discloses that in order to promote adhesion between the metal substrate and the thermoplastic polymer coating it is only necessary to provide the required temperatures at the interface between the coating and the substrate. See column 3, lines 63-70. Therefore, it is preferred that the heating be confined to the surface boundaries in order that an absolute minimal of energy will be required to "perfect adhesion in accordance with this invention."

That the techniques used in Richart are applicable to processes such as that of Bedard which involve an electrically conductive thermoplastic polymer coating is seen from column **[*13]** 2, lines 6-11 of the reference where it is stated that "if the coating is electrically nonconductive" (emphasis added). Since Richart specifically states if the coating is electrically nonconductive, the reference is in essence stating that the coating may be electrically conductive as in the electrical devices disclosed in Bedard and/or Smith-Johannsen.

As previously stated, we agree with the examiner that the disclosures of these references provide an adequate basis for concluding that the subject matter on appeal would have been obvious to one of ordinary skill in the art at the time of the present invention. Specifically, knowing that wetting of the electrodes in the electrical devices of Bedard by the conductive polymer composition is a concern, one of ordinary skill in the art would have had ample reason or motivation to preheat the electrodes in the manner required by the claims on appeal as disclosed by Griff and Richart in order to prevent premature shrinkage of the hot conductive polymer composition away from the metal electrode surface, remove any moisture or oil on the electrode surface and/or provide an even stronger adhesiveness of the conductor polymer composition **[*14]** to the metal electrode per Griff and Richart.

Smith-Johannsen and Gale confirm that those of ordinary skill in the art were aware of and concerned with the ability of the conductive polymer composition to adequately wet the metal electrodes of the electrical devices of Bedard at the time of the present invention. As set forth in Smith-Johannsen, one prior art method of enhancing the wetting of the metal electrodes by the conductive polymer composition involved the use of an annealing operation after the extrusion process. Richart discloses that those of ordinary skill in the art were aware at the time of the present invention that preheating the conductor was a known alternative to such an annealing step in order to improve the adhesion of a thermoplastic polymer to a metal conductor.

Raychem separately argues claims 2 through 22, 15, through 28, 43 through 53, 57 through 63, and 70 through 100 on page 64 of the Appeal Brief. In so doing, Raychem has only pointed out that these claims are directed to processes in which a PCT conductive **[**1269]** polymer containing carbon black is melt-extruded over at least two electrodes to produce a self-regulating strip heater. Since Bedard and Smith-Johannsen **[*15]** clearly disclose the formation of such products, these limitations do not serve as a distinction from the applied prior art.

Claims 75 through 98 are also separately argued at this section of the Appeal Brief. Specifically, it is argued that

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