Commissioner of Patents and Trademarks
Patent and Trademark Office (P.T.O.)

EX PARTE RAYCHEM CORPORATION
Appeal No. 91-2888
April 24, 1992
***1** HEARD: January 8, 1992

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 Polymer Compositions.

Timothy H.P. Richardson for Patent Owner

Charles M. Cox et al. for Third Party Requestor

Primary Examiner--James Derrington

Before Seidleck, Tarring and W. Smith

Examiners-in-Chief

W. Smith

Examiner-in-Chief

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 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

***2** 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 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 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 [FN1] and find that the examiner's conclusion that the subject matter of claims 1 through 100 would have been obvious to one of ordinary skill in the art from a consideration of the references relied upon is correct.

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 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 forthat 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]."

***3** 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 in improved wetting [FN2] of the electrode by the conductive polymer composition.

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. [FN3] As seen from this definition, the problem concerning 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.

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 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" 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 and Bedard's attempts to "deal with these problems" are discussed. [FN4]

***4** 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 formedusing 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 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 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 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.

***5** 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 polymer containing carbon black is melt- extruded over at least two electrodes to produce a self-regulating strip heater. Since Bedard and Smith-Johannsen 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 these claims are directed to a process in which the product is a self-regulating heater having a linearity ratio of less than 1.2.

As explained at column 3, lines 13-29 and column 4, lines 9-33 of the '339 patent, the so-called linearity ratio between a pair of electrodes in the electrical devices of the present invention can be correlated with the contact resistance of the device, i.e., the lower the contact resistance of the electrical device, the more stable it will be over its useful life. In this regard, we also point out that the '339 patent discloses that contact resistance can be correlated with the force needed to pull the electrode out of the polymer composition. An increase in pull strength reflects a decrease in contact resistance. See column 2, line 65-column 3, line 12 and column 4, lines 43-62 of

the '339 patent. The increase in pull strength is expected since Griff and Richart discloses that the adhesiveness of the coating will increase if the wire substrate is preheated as in the present invention.

Raychem is correct in stating that neither Bedard or Smith-Johannsen disclose any values of the linearity ratio of the electrical devices and strip heaters of those references. However, this does not end the inquiry since, where the Patent and Trademark Office is not equipped to perform the needed testing, it is reasonable to shift the burden of proof to Raychem to establish that (1) the argued difference exists and (2) that any such difference would be considered unexpected by those of ordinary skill in the art. In re Spada, 911 F.2d 705, 15 USPQ2d 1655 (Fed.Cir.1990); In re Best, 562 F.2d 1252, 195 USPQ 430 (CCPA 1977). Such evidence has not been relied upon in this appeal.

Claims 3 through 8, 15, 19 through 21, 45, 46, 77, 78, 99, and 100 are separately argued in the paragraph bridging pages 64-65 of the Appeal Brief where it is stated that these claims require that the electrodes are stranded wire electrodes. Raychem argues that Gale is not relevant to these claims since such electrodes are not useful in making electrical blanket heaters to which Gale is stated to be exclusively directed.

We first point out that Bedard and Smith-Johanssen clearly disclose the use of stranded electrodes in the manner required by the present invention. The fact that Gale may or may not use stranded electrodes for the purposes of that invention is of no moment since Gale is only relied upon to provide evidence in regard to the manner in which those of ordinary skill in the art view Bedard.

***6** The separate arguments of claims 42 through 74 and 83 on page 65 of the Appeal Brief lose sight of the clear disclosure on page 208 of Griff that the specific temperature to which a conductor is preheated is correlated to the temperature of the molten polymer composition to be extruded about the preheated conductor. Clearly, those of ordinary skill in the art recognize this precise relationship to be a result effective variable. Under these circumstances, a person of ordinary skill in the art would be expected to routinely optimize this relationship. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). Thus, one of ordinary skill in the art, when modifying the disclosure of Bedard to preheat the electrodes in accordance with the teachings of Griff and Richart in order to improve the wetting of the electrode by the conductive polymer composition would routinely optimize the precise temperature relationship between the temperature to which the conductor is to be preheated and the optimal temperature for melt extruding the specific conductive polymer composition.

The same analysis is applied to the separate argument of claims 29 through 33, 36 through 40, 64 through 68, 70 through 74, 94 through 98 on pages 65-66 of the Appeal Brief where it is argued that Griff teaches away from temperatures above 150 <<degrees>> C. However, Griff explains that this upper limit is desirable only in that exceeding this temperature does not result in further improvement in adhesion but only causes more heat to be removed in the cooling trough. Raychem has not presented any objective evidence which establishes that the specific temperature relationship called for in these dependent claims gives any

results that can be termed unexpected over the references relied upon.

Raychem also separately argues claims 23, 24, 34, 41, 58 through 61, 90, and 91 which require that the carbon black content of the conductive polymer composition be at least 15% by weight, at least 17% by weight or 22% or less by weight. It is argued that these limitations are inconsistent with the references relied upon. We disagree.

Smith-Johanssen discloses that prior art electrical devices containing electrically conductive polymer compositions contained as much as 25-75% carbon black. The specific invention disclosed in Smith-Johannsen is that the annealing step disclosed therein allows the use of lower black loading while still obtaining resistivities in the useful range. Smith-Johannsen prefers not to use more than 15% carbon black in the conductive polymer compositions of that reference. Thus, it appears that those of ordinary skill in the art at the time of the present invention were well aware that electrical devices, including self-regulating strip heaters of the type involved in the present invention, may be formed using conductive polymer compositions which include 15% or less of carbon black or as much as 75% carbon black. To optimize the precise amount of carbon black used in the conductive polymer coating of any individual device would have been prima facie obvious to one of ordinary skill in the art. In re Boesch, supra.

***7** Raychem argues that Gale is not proper evidence to be relied upon in this reexamination proceeding since it is not prior art. We first point out that Gale can be considered cumulative to the other references relied upon since Gale is relied upon only to confirm that those of ordinary skill in the art regarded Bedard as being directed to solving problems associated with wetting of the electrodes by the conductive polymer composition. The examiner's conclusion of obviousness can stand absent reliance upon Gale.

Gale is of interest because it is of a later date than the present invention and in discussing Bedard, states that it was directed to solving problems such as increased resistance at the electrode interface due to breakdown in the already poor adhesion between the electrode and the conductive polymer composition. In re Wilson, supra.

To the extent Raychem argues that Gale may not be relied upon in this reexamination proceeding under 35 USC § § 301 and 302, we refer to Ex parte McGaughey, 6 USPQ2d 1344 (BPAI 1988), where the difference between requesting reexamination under 35 USC § 302 and the conduct of reexamination proceedings if the request is granted under 35 USC § 305 is discussed. From this discussion, it is apparent that conduct of reexamination proceedings under 35 USC § 305 differs from the granting of requests under 35 USC § 302. Once reexamination was granted under § 302, the examiner was correct in relying upon Gale while conducting this proceeding under 35 USC § 305 as he would be in making a rejection under 35 USC § 103 in any other case.

Raychem's arguments that two of the three inventors named in Gale have stated in declarations that they were unaware of the specific disclosure of Bedard at the time of their work which led to the Gale patent is of little relevance since they signed the original declaration in the U.S. parent application of Gale in which this statement appears. The fact that these two individuals may not have had

knowledge of Bedard prior to that time does not detract from the fact that their patent specifically states that Bedard is directed to these problems.

We are not persuaded by Raychem's argument that the specific statements in Gale concerning Bedard are in relation only to the heaters disclosed in U.S. Patent No. 3,410,984 referenced at column 1, lines 32-34 of Gale. The entire paragraph as well as the subsequent two paragraphs when read in context indicate that Bedard is directed to solving the problems which the prior art perceived to exist in the specific heaters of U.S. Patent No. 3,410,984. Keeping in mind that Bedard is directed specifically to electrical devices, including the self-regulating strip heaters of the present invention, the most that can be gained from this argument is that problems concerning the ability of the conductive polymer composition to adequately wet the electrode in these devices was a shared problem with the specific heaters of U.S. Patent No. 3,410,984.

***8** We disagree with the argument on page 24 of the Appeal Brief that Richart "has nothing to do with current-carrying devices." Richart discloses that the preheated substrate may be a wire. Wires are certainly current- carrying devices.

Raychem makes much of the fact that Richart prefers annealing the coated substrate in order to achieve improved adhesion of the thermoplastic polymer coating rather than the embodiment in which the wire is preheated prior to contact with the molten coating. The fact that Richart may not prefer the preheating embodiment does not militate against a conclusion of obviousness since all disclosures in a reference must be considered including those which are non-preferred. In re Mills, 470 F.2d 649, 176 USPQ 196 (CCPA 1972).

The evidence relied upon from the cited portions of the record does include any objective evidence of nonobviousness which establishes that the present electrical devices or self-regulating heaters differ in an unexpected manner from those disclosed in Bedard whether they are annealed or non-annealed. While reference is made to the declaration of record of Mr. Clifford Smith on page 27 of the Appeal Brief, we note that Mr. Smith has only stated that the use of the present preheating process results in heaters which are of a "higher quality" than those produced by the prior art annealing process. Mr. Smith has not substantiated his conclusion with any objective evidence. Thus, it is not clear from this record in what manner the present heaters are considered by Mr. Smith to be of a "higher quality."

It is argued on page 33 of the Appeal Brief that the disclosure of Griff in regard to semi-conductive coatings on wires is not relevant to the present invention since the present wire coating is not semi-conductive. However, we point out that both Bedard and Smith-Johannsen describe the conductive polymer composition used in the electrical devices of those references as "semi- conductive." See, e.g., Bedard, column 3, lines 6-19 and Smith-Johannsen, column 1, line 50-column 2, line 3. Raychem has not established on this record why one of ordinary skill in the art would not consider the present conductive polymer compositions to be "semi-conductive."

Raychem argues that the disclosure of Griff at page 225 concerning

semi- conductive insulation is directed to products in which the semi-conductive polymer composition is not adjacent the metal conductor. Raychem is correct in stating that this passage does not explicitly describe a product in which the semi-conductive insulation is extruded adjacent a metal conductor. However, when this passage is read in the context of the entire reference, it is apparent that one of ordinary skill in the art would readily discern that Griff is concerned with such products. Even if it is considered that there are products in which a semi-conductive insulation layer is separated from the metal conductor by an intermediate insulation layer, this does not detract from the fact that it was well known at the time of the present invention to extrude semi-conductive polymer compositions adjacent to a metal conductor in order to make electrical devices including the self-regulating heaters per the present invention. Again, see Bedard and Smith-Johannsen.

***9** It is not clear on what basis Raychem makes arguments such as those on page 35 that Griff has nothing to do with current-carrying devices. As seen from the various standards set forth on pages 209-212 of the reference, Griff is concerned with current-carrying devices.

The arguments presented in regard to Bedard focus on the reference's preference for forming annealed strip heaters. Raychem argues that it is only the annealed strip heaters which are commercially available and that such annealed heaters do not suffer from inadequate wetting of the electrodes by the polymeric mass. We have carefully considered these arguments in the portions of the record cited in support thereof. We again point out that Bedard only prefers to anneal the electrical devices formed according to that reference, the reason for which is set forth in Smith-Johannsen. Again, the entire disclosure of a reference must be evaluated when making an obvious determination under 35 USC § 103, including the non-preferred embodiments. In re Mills, supra. We also point out that the present claims do not preclude the use of a subsequent annealing step.

Since the current which passes through the electrode in the electrical device of Bedard must also pass through the conductive polymer coating in order for the device to be functional, it is apparent that the manner and degree in which the conductive polymer composition is in contact with the electrical conductor plays an important role in the ability of the device to perform its design function. This is one reason why the concept of "wetting" of the electrode by the conductive polymer composition appears to be important in this art as documented by the applied references. Whether the degree of wetting is measured by the relative lack of shrinkage of the conductive polymer mass away from the electrode, i.e., obtaining a uniform wetting of the surface, or by the degree of adhesion of the conductive polymer composition to the metal electrode, it is apparent from this record that those of ordinary skill in the art were well aware of how to improve the needed wetting.

If one considers the electrical devices of Bedard which are not annealed to be the closest prior art, Griff and Richart provide ample reason to improve the wetting of the electrode by the conductive polymer composition of such devices by preheating the conductor prior to its contact with the molten conductive polymer composition in the extruder. Alternatively, if Raychem is correct in that one must ignore

the non-preferred embodiment of Bedard and focus exclusively on the annealed heaters of the reference, Richart provides adequate evidence that those of ordinary skill in the art would have found it prima facie obvious to use the preheating technique used in the present invention as an alternative to the annealing technique. Again, Richart discloses the pros and cons of using each of these techniques in order to provide a more adhesive (better wetting) thermoplastic coating on a wire.

***10** Raychem continues to attack the use of Bedard in rejecting the claims involved in this reexamination proceeding since an alleged infringer, Thermon, did not assert Bedard either in the previous litigation between the companies or the present reexamination proceedings. In support of these continued arguments in this second appeal, reliance is placed upon the declarations filed by William L. Anthony, an experienced patent litigator. We have carefully considered these arguments and the supporting declarations but are not persuaded. It is the responsibility of the patent examiner during any examination or reexamination proceeding to determine the patentability of the claims pending before him or her. This responsibility includes reviewing the relevant prior art and determining which, if any, of the references reviewed are relevant to the issues at hand. The fact that a patent examiner may determine that a specific reference is more relevant to determining the patentability of a claim before him or her than either the applicant or a third party, such as a requestor in a reexamination proceeding, does not somehow preclude the patent examiner from using such a reference in a rejection.

Raychem raises in this appeal, as in the first appeal, an issue concerning the alleged copying of the present invention by Thermon. We have considered these arguments again and for the same reasons reach the same conclusion that we did in the previous appeal, i.e., on this record, these arguments are not entitled to great weight. Vandenberg v. Dairy Equipment Co., 740 F.2d 1560, 224 USPQ 195 (Fed.Cir.1984); Cable Electric Products, Inc. v. Genmark, Inc., 770 F.2d 1015, 226 USPQ 881 (Fed.Cir.1985).

For the reasons set forth above and those in the Examiner's Answer, the decision of the examiner is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 CFR 1.136(a). See the final rule notice, 54 F.R. 29548 (July 13, 1989), 1105 O.G. 5 (August 1, 1989).

AFFIRMED

BOARD OF PATENT APPEALS AND INTERFERENCES

James A. Seidleck

Examiner-in-Chief

Henry W. Tarring, II

Examiner-in-Chief

William F. Smith

Examiner-in-Chief

FN1. 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).

FN2. 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."

FN3. "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."

FN4. 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).

William F. Smith

Examiner-in-Chief

APPENDIX

***11** 1. A process for the preparation of an electrical device which has improved resistance stability under service conditions, which comprises at least two electrodes, each of said electrodes being in physical and electrical contact with a conductive polymer composition, and in which, when said electrodes are connected to a source of electrical power, current passes between the electrodes through the conductive polymer composition, which process comprises contacting each of said electrodes with a conductive polymer composition by

(1) heating a thermoplastic electrically conductive polymer composition above its melting point;

(2) heating each electrode, in the absence of the conductive polymer composition, to a temperature above the melting point of the conductive polymer composition;

(3) bringing each electrode which has been heated in step (2), while it is at a temperature above the melting point of the conductive polymer composition, into direct physical contact with the molten conductive polymer composition prepared in step (1); and

(4) cooling each electrode and conductive polymer composition in contact therewith prepared in step (3),

whereby the contact resistance between each of the electrodes and the conductive polymer in contact therewith is reduced.

2. A process according to claim 1 wherein there is prepared a self-regulating strip heater comprising

(a) an elongate core of an electrically conductive polymer composition which comprises carbon black and exhibits PTC behavior;

(b) at least two longitudinally extending electrodes embedded in said elongate core parallel to each other; and

(c) an outer layer of electrically insulating composition,

which process comprises

(1) heating a thermoplastic electrically conductive polymer composition above its melting point;

(2) heating said electrodes, in the absence of the conductive polymer composition, to a temperature above the melting point of the conductive polymer composition;

(3) melt-extruding the molten conductive polymer composition over the electrodes, while each of the electrodes is at a temperature above the melting point of the conductive polymer composition, thereby forming an elongate extrudate of the electrically conductive composition with the electrodes embedded therein parallel to each other;

(4) cooling the electrode and conductive polymer composition in contact therewith; and

(5) forming an outer layer of an electrically insulating composition around the cooled extrudate of the conductive polymer composition.

42. A process for the preparation of an electrical device which has improved resistance stability under service conditions, which comprises at least two electrodes, each of said electrodes being in physical and electrical contact with a conductive polymer composition, and in which, when said electrodes are connected to a source of electrical power, current passes between the electrodes through the conductive polymer composition, which process comprises contacting each of said electrodes with conductive polymer composition by

***12** (1) heating a thermoplastic electrically conductive polymer composition above its melting point;

(2) heating each electrode, in the absence of the conductive polymer composition, to a temperature above the melting point of the conductive polymer composition;

(3) bringing each electrode heated in step (2) into direct physical contact with the molten conductive polymer composition prepared in step (1), the electrode, when it is first contacted by the molten conductive polymer composition, being at a temperature which is (i) above the melting point of conductive polymer composition, and (ii) below the temperature of the molten conductive polymer composition; and

(4) cooling each electrode and conductive polymer composition in

contact therewith prepared in step (3),
whereby the contact resistance between each of the electrodes and the conductive polymer in contact therewith is reduced.

75. A process for the preparation of a self-regulating strip heater comprising
(a) an elongate core of an electrically conductive polymer composition which comprises carbon black and exhibits PTC behavior;
(b) at least two longitudinally extending electrodes embedded in said elongate core parallel to each other; and
(c) an outer layer of electrically insulating composition,
which process comprises
(1) heating a thermoplastic electrically conductive polymer composition above its melting point, the conductive polymer composition comprising a polymer having at least 20% crystallinity as determined by X-ray diffraction and carbon black dispersed in said polymer;
(2) heating said electrodes, in the absence of the conductive polymer composition, to a temperature above the melting point of the conductive polymer composition;
(3) melt-extruding the molten conductive polymer composition over the electrodes, while each of the electrodes is at a temperature above the melting point of the conductive polymer composition, thereby forming an elongate extrudate of the electrically conductive composition with the electrodes embedded therein parallel to each other;
(4) cooling the electrodes and conductive polymer composition in contact therewith; and
(5) forming an outer layer of an electrically insulating composition around the cooled extrudate of the conductive polymer composition;
the conditions of the process being such that the heater has an average linearity ratio of less than 1.2.

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.

***13** 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 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 ascumulative 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 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

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