

The opinion in support of the decision being entered today was *not* written for publication and is *not* binding precedent of the Board.

Paper No. 55

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte DEEPAK R. PARIKH,
ROBERT S. CARDWELL and BRIAN W.S. KOLTHAMMER

Appeal No. 2001-0172
Application 08/932,771

ON BRIEF

Before WARREN, LIEBERMAN and KRATZ, *Administrative Patent Judges*.

WARREN, *Administrative Patent Judge*.

Decision on Appeal and Opinion

We have carefully considered the record in this appeal under 35 U.S.C. § 134, including the opposing views of the examiner, in the answer, and appellants, in the brief¹ and reply brief, and based on our review, find that we cannot sustain the grounds of rejections of appealed claims 1, 3, 4, 6 through 14, 21 through 24, 30 through 33² under 35 U.S.C. § 103(a) as being unpatentable over Stehling et al. (Stehling)³ taken with Stevens et al. (Stevens ‘815),⁴ LaPointe et al. (LaPointe), and Stevens et al. (Stevens ‘802) as further evidenced by the teachings of

¹ We have considered the brief filed November 11, 1999 (Paper No. 51).

² These are all of the claims in the application. See the amendments of December 23, 1998 (Paper No. 39) June 7, 1999 (Paper No. 47).

³ Stehling is referred to in the answer as “WO ‘414.”

Kaminsky et al. (Kaminsky), Speed et al. (Speed) and Gurevitch et al. (Gurevitch), and as being unpatentable over Stehling taken with Ewen et al (Ewen) Stevens '815, LaPointe, and Stevens '802 as further evidenced by the teachings of Kaminsky, Speed and Gurevitch.⁵

We find that, when considered in light of the written description in the specification as interpreted by one of ordinary skill in this art, *see, e.g., In re Hyatt*, 211 F.3d 1367, 1372, 54 USPQ2d 1664, 1667 (Fed. Cir. 2000); *In re Morris*, 127 F.3d 1048, 1054-55, 44 USPQ2d 1023, 1027 (Fed. Cir. 1997), *In re Zletz*, 893 F.2d 319, 321-22, 13 USPQ2d 1320, 1322 (Fed. Cir. 1989), the plain language of appealed claims 1 and 21 requires that the claimed processes for preparing “an ethylene polymer product” and “an ethylene/ α -olefin terpolymer product,” respectively, by preparing at least two interpolymers, the “homogeneous ethylene/ α -olefin interpolymer” of claim 1 and the “terpolymer” of claim 21, each by an activated constrained geometry (CG) catalyst composition which comprise at least one CG catalyst that has a different reactivity, based on the catalyst composition as a whole, from the at least one other CG catalyst composition, wherein the extent of the difference in reactivity between the CG catalyst compositions is not specified in the appealed claims. The recitation with respect to the catalysts constitute the only express process limitations, the other process limitations being those implied to produce the at least two interpolymers having the specified melting point in both claims and the specified comonomer content and the melt index in claim 21. The claims further include the step of “combining” or “recovering a mixture,” respectively, of the at least two interpolymers so as to obtain a “product” having the specified molecular weight distribution and the crystallization onset temperature.

We find that appellants state in the written description of the specification that [t]he homogeneous polymers and interpolymers of the present invention are herein defined as defined in USP 3,645,992, the disclosure of which is incorporated herein by

⁴ Stevens '815 is referred to in the answer as “EP '815.”

⁵ Answer, pages 4-11. The examiner added Kaminsky, Speed and Gurevitch to each of the grounds of rejection on the basis that these references had been referred to the original explanation of the grounds of rejection in the Office action of September 16, 1994 (Paper No. 16), which Office action has been referred to in this respect through the prosecution of the appealed claims. See, e.g., the Office action of January 25, 1999 (Paper No. 40). We note that appellants have submitted argument with respect to these three references in the reply brief (page 3). The examiner has withdrawn Stricklen from the second ground of rejection (answer, page 2).

reference. Accordingly, homogeneous interpolymers are those in which the comonomer is randomly distributed within a given interpolymers molecule and wherein substantially all of the interpolymers molecules have the same ethylene/comonomer ratio within that interpolymers, whereas heterogeneous interpolymers are those in which the interpolymers molecules do not have the same ethylene/comonomer ratio.

. . . .

The homogeneous polymers used to make the novel polymer products of the present invention can be ethylene homopolymers or, preferably, interpolymers of ethylene with at least one C₃-C₂₀ α -olefins and/or C₄-C₁₈ diolefins. The homogeneous interpolymers of the present invention can also be interpolymers of ethylene with at least one of the above C₃-C₂₀ α -olefins and/or diolefins. The term "interpolymer" is used herein to indicate a copolymer, or a terpolymer, or the like. That is, at least one other comonomer is polymerized with ethylene to make the interpolymers. . . .
[Specification, pages 4-5.]

In giving the claim terms and phrases the broadest reasonable interpretation consistent with this written description in the specification, *see generally, Morris, supra; Zletz, supra; In re Priest*, 582 F.2d 33, 37, 199 USPQ 11, 15 (CCPA 1978); *In re Prater*, 415 F.2d 1393, 1404-05, 162 USPQ 541, 550-51 (CCPA 1969), we determine that "an ethylene polymer product" and "an ethylene/ α -olefin terpolymer product" and the "homogeneous ethylene/ α -olefin interpolymers" and the "terpolymer" from which they are prepared encompasses a broad range of interpolymers wherein the comonomer is randomly distributed and substantially all of the interpolymers molecules have the same ethylene/comonomer ratio, and the "product" and the individual interpolymers have the physical characteristics specified in appealed claims 1 and 21.

The products specified in appealed claims 1 and 21 are blends in which the at least two specified interpolymers making up the product can be combined by mere "combining," that is, blending or mixing, in the specified amounts after polymerization in separate reactors in claim 1. In similar manner, the language "recovering a mixture" in claim 21 encompasses blending or mixing any amount of each of the polymers after polymerization in separate reactors, such as parallel reactors. The transitional term "comprising" in the preamble and with respect to the CG catalyst compositions in each of appealed claims 1 and 21, open the claims to include processes which contain other steps, materials and process conditions in making the specified "product" and the individual interpolymers, including catalyst compositions which include other components, including other types of catalysts than the CG catalyst defined in the claims. *See In*

re Baxter, 656 F.2d 679, 686-87, 210 USPQ 795, 802-03 (CCPA 1981) (“As long as one of the monomers in the reaction is propylene, any other monomer may be present, because the term ‘comprises’ permits the *inclusion* of other steps, elements, or materials.”).

Upon carefully reviewing the record on this appeal, we agree with appellants that the metallocene catalyst compositions of Stehling and Ewen would have been expected by one of ordinary skill in this art to prepare different ethylene based polymers and interpolymers than the CG catalyst containing compositions of Stevens ‘815.⁶ However, the examiner takes the position that it would have been obvious to one of ordinary skill in this art to prepare blends of the CG catalyst composition prepared polymers and interpolymers of Stevens ‘815 in order to obtain improved properties than provided by a single polymer in view of the teachings in Stehling to prepare blends by a number of different methods for this purpose (answer, page 9, lines 3-7) and of the teachings of Ewen to use a mixture of catalyst compositions to prepare blends (*id.*, page 10, lines 14-17).

There is no dispute that Stevens ‘815 discloses the same CG catalysts and activating cocatalysts in CG catalyst systems that are used in the CG catalyst compositions of the appealed claims (brief, pages 5-6), and indeed, appellants so acknowledge in the specification (pages 9-10).⁷ Indeed, we find that Stevens ‘815 would have taught one of ordinary skill in this art that the reactivity of the CG catalyst composition is dependent on the CG catalyst composition as a whole, including the chemical composition of the CG catalyst and the activating cocatalyst, and thus there is no indication that the reactivity of the CG catalyst composition is limited to a difference in the metal employed in the catalyst (e.g., page 2, line 43, to page 5, line 45, and page 6, line 27, to page 8, line 45). We further find that Stevens ‘815 discloses, as noted by appellants in the brief (pages 6-7), that the CG catalyst compositions disclosed therein “are capable of preparing novel olefin polymers having previously unknown properties due to their unique facile abilities to polymerize α -olefins, diolefins, hindered vinylidene aliphatic monomers, vinylidene

⁶ A discussion of LaPointe and Stevens ‘802 is not necessary to our decision. *See In re Kronig*, 539 F.2d 1300, 1302-04, 190 USPQ 425, 426-28 (CCPA 1976).

⁷ We find that the United States patent applications listed as priority documents by Stevens ‘815 are the same applications incorporated by reference in the specification (page 9), and particularly note, in this respect, application 06/545,403.

aromatic monomers *and mixtures thereof*” in “a process for preparing addition polymers, especially *homopolymers and copolymers* of olefins, diolefins, hindered aliphatic vinyl monomers, vinylidene aromatic monomers *and mixtures of the foregoing and to the resulting polymer products*” (page 2, lines 7-9 and 40-42; emphasis supplied). In this respect, Stevens ‘815 states that

“[a]ddition polymerizable monomers” include for example ethylenically unsaturated monomers, acetylenic compounds, conjugated or nonconjugated dienes, polyenes, carbon monoxide, etc. Preferred monomers include the C₂₋₁₀ α -olefins especially ethylene, propylene, isobutylene, 1-butene, 1-hexene, 4-methyl-1-pentene, and 1-octene. Other preferred monomers include styrene, halo- or alkyl substituted styrene, vinyl chloride, acrylonitrile, methyl acrylate, methylmethacrylate, tetrafluoroethylene, methacrylonitrile, vinylidene chloride, vinylbenzocyclobutane, and 1,4-hexadiene. [Page 5, lines 46-51.]

The reference discloses that “[t]he polymerization is usually conducted according to known techniques for Ziegler-Natta or Kaminsky-Sinn type polymerizations,” wherein “[a] catalytically effective amount of the present catalyst and cocatalyst are any amounts that successfully result in the formation of polymer. Such amounts may be readily determined by the routine experimentation by the skilled artisan” (page 8, lines 46-47 and 55-58). Stevens ‘815 further discloses that “[p]referred polymers additionally demonstrate properties of homogeneous polymers as defined in USP 3,645,992, ie. [sic] ethylene copolymers having substantially random comonomer distribution within a given molecule and substantially the same ethylene/comonomer ratio between molecules” (page 12, lines 42-44). The polymers and interpolymers can be characterized by their melt index (I₂) as determined by ASTM 1238 (pages 9, 12 and 20).

Stevens ‘815 exemplifies the homopolymerization of ethylene (e.g., Examples 3 and 7) and the copolymerization and terpolymerization of ethylene with a variety of comonomers, including α -olefins, using titanium and zirconium CG catalyst compositions, wherein the polymers have a melt index of <0.1 and above. See, e.g., Examples 1-7, 11-57, 59, 62, 63, 67, 68, 69, 71, 76, 80, 82, 84, 87, 89, 100, 102, 104, 105 and 106. The same polymerization procedures used in Examples 11-32, which employs titanium CG catalyst compositions, are followed in Examples 33-42, except that zirconium CG catalyst compositions are used and result in interpolymers having different melt indexes. The same polymerization procedures used in Example 80, which employs a titanium CG catalyst composition, are followed in Examples 33-

42, except that different titanium CG catalyst compositions are used and result in interpolymers having different melt indexes. Such results appear to indicate that the different CG catalyst compositions used each have a different reactivity since the polymerization parameters are the same. Compare the disclosure in appellants' specification at page 26, lines 28-33. In Example 102, terpolymers are prepared from ethylene, styrene and either butene or vinyl benzocyclobutane.

Based on the disclosure of Stevens '815, we find that one of ordinary skill in this art routinely following the teachings of the reference would have arrived at interpolymers having different properties by using CG catalyst compositions having different reactivity, and thus, would have practiced polymerization or interpolymerization processes resulting in polymers and interpolymers having a melt index and a comonomer content that fall in each of the processes specified in each of the steps of appealed claims 1 and 21. Indeed, not only are the CG catalysts and activating cocatalysts of CG catalyst compositions having different reactivity common to Stevens '815 and the appealed claims, as appellants acknowledge, but Stevens '815 also uses the same Ziegler-Natta or Kaminsky-Sinn type polymerization conditions as disclosed by appellants (specification, page 27, lines 15-18) to polymerize and interpolymerize the same monomers (*id.*, e.g., page 5, lines 12-23, and page 6, lines 3-12) to obtain the same ethylene interpolymers having a melt index, measured according to the same method set forth in the appealed claims, falling within the melt index range specified in the appealed claims, and wherein the ethylene interpolymers are disclosed to have substantially the same random comonomer distribution within a given molecule and substantially the same ethylene/comonomer ratio between molecules as disclosed and claimed by appellants, using the same common definitions provided in USP 3,645,992 (*id.*, page 4, line 30, to page 5, line 23).

In view of this evidence, we determine that the interpolymers formed with CG catalysts and activating cocatalysts in the CG catalyst compositions having different reactivity taught by Stevens '815 differs from the claimed polymerization processes encompassed by appealed claims 1 and 21 in two ways. First, in that the processes of Stevens '815 do not form *blends* of the interpolymers produced since there is no step of "combining" or "recovering a mixture" of polymers and interpolymers individual prepared by processes using different CG catalyst

compositions, even though the reference teaches that the polymers and interpolymers produced by CG catalyst compositions can be *blended* with synthetic and natural polymers, including polyethylene and ethylene/ α -olefin copolymers, in order to obtain products with improved properties. And, second, in that Stevens '815 does not teach that the interpolymers formed by the processes thereof have the melting points, molecular weight distribution and crystallization onset temperature specified in appealed claims 1 and 21.

With respect to the first difference, we find that appellants acknowledge that it was known in the art to prepare *blends* of polymers and interpolymers prepared from ethylene, with and without comonomers, citing both Ewen and Stehling as examples of such knowledge (specification, pages 2-3). Indeed, appellants state that “[m]any methods of polymerizing polymers and forming polymer *blends* to do specific jobs are disclosed in the literature” (*id.*, page 2, lines 22-24; emphasis supplied). According to appellants, Ewen “teaches the use of a homogeneous catalyst system comprising at least two different mono-, di- or tri-cyclopentadienyls and their derivatives of a Group 4b, 5b and 6b transition metal each having different reactivity ratios and aluminoxane” (*id.*, lines 24-29), while in Stehling “[t]he components are said to be prepared using metallocene catalyst systems known to provide narrow composition distributions and narrow molecular weight distributions,” wherein “[t]he desirable molecular weight and composition distributions are said to be obtained by blending different components or by polymerization of the blend components in the same or multiple reactors” (*id.*, page 3, lines 10-16).

We agree with appellants' characterization of Stehling and Ewen. We find that Stehling states that “[t]he blends of the present invention are prepared by blending the desired components in the desired proportions using conventional blending, techniques and apparatus Alternatively, the blends may be made by direct polymerization, without isolation of the blend components, using, for example, two or more catalysts in one reactor, or by using a single catalyst and two or more reactors in series or parallel” (page 18). We further find that the cyclopentadienyl containing metallocene catalyst compositions used by Stehling differ from the cyclopentadienyl containing CG catalyst compositions of Stevens '815 in that these single-site catalysts are bonded differently to the metal component, and polymerize different polymers and

interpolymers from ethylene and the same and similar comonomers (Stehling, e.g., pages 5-6 and 12-17; Stevens '815, e.g., page 5, lines 46-51).

We find that Ewen acknowledges that it was known in the art to “produce polymer blends by polymerizing two or more polymerizable materials in two or more reactors arranged in series” to produce a blend (col. 2, lines 3-10) and states that “[i]t is highly desirable to be able to readily and simply produce blends in a single reactor during which polyethylene and copolyethylene-alpha olefins are produced simultaneously . . . [to obtain] a uniform blending of the polymers and one can simply ‘tailor’ the polymers with respect to molecular weights, weight fraction and the like to obtain blends evidencing outstanding properties” (col. 2, lines 11-19). Ewen thus teaches that “[t]he reactor blends are obtained directly during a single polymerization process, i.e., the blends of this invention are obtained in a single reactor by simultaneously polymerizing ethylene and copolymerizing ethylene with an alpha-olefin . . . [which] can be employed in conjunction with other prior art blending techniques, for example the reactor blends produced in a first reactor can be subjected to further blending in a second stage by use of the series reactors” (col. 2, lines 30-44). Ewen further teaches that the “catalyst system for the polymerization of reactor blends . . . [comprises] at least two different metallocenes,” which contain a cyclopentadienyl moiety, and an activating cocatalyst (col. 2, line 45, to col. 3, line 5), and teaches that the “ratios of one metallocene to the second metallocene will be a function of both the chemical composition of the metallocenes as well as the blend being tailored., [sic] accordingly, the ratio of the two metallocene can vary greatly and, hence, is limited only for the purpose of producing the blends” (col. 3, lines 6-11). The “ratios” of the metallocenes are thus “reactivity ratios” and the “tailored blend” results from the reactivity ratio of the catalyst compositions employed (col. 5, line 11, to col. 6, line 20). The metallocene catalyst compositions of Ewen differ from the cyclopentadienyl containing CG catalyst compositions of Stevens '815 in the same manner as the cyclopentadienyl containing metallocene catalyst compositions used by Stehling, and polymerize different polymers and interpolymers from the same ethylene and alpha-olefin monomers (col. 3, lines 19-32).

Based on this substantial evidence, we find that, *prima facie*, one of ordinary skill in this art armed with the knowledge in the art that blends of ethylene based polymers and interpolymers

have improved properties over one of the polymers or interpolymers alone, as shown by Stevens '815 with ethylene based polymers produced with CG catalyst compositions and other polymers, and by Stehling and Ewen with ethylene based polymers prepared with metallocene catalyst compositions. Thus, *prima facie*, this person would have found in the combined teaching of Stehling and Stevens '815 and of Stehling, Stevens '815 and Ewen, the reasonable suggestion to form blends of the ethylene based polymers and interpolymers prepared with CG catalyst compositions having different reactivity disclosed in Steven '815 by modifying the processes of Stevens '815 to include a step or steps of combining or recovering ethylene based polymers and interpolymers selected to improve the properties of the polymer and interpolymer products by (1) mixing prepared polymers and interpolymers and/or (2) preparing at least two polymers and interpolymers in a common reactor, as known in the art as evinced by Stehling and Ewen, with Ewen showing that the reactivity ratio of the catalysts can control the blend formed, in the reasonable expectation of obtaining useful blends of the polymers and interpolymers taught by Stevens '815.

However, with respect to the second difference, we find that the examiner has not established on this record that the interpolymers that one of ordinary skill in this art would have routinely prepared with the CG catalyst compositions of Stevens '815 would have the physical properties required by appealed claims 1 and 21, or that one of ordinary skill in this art routinely following the teachings of Stevens '815 would have been led to employ process conditions set forth in this reference which would have led to interpolymers having the requisite properties (answer, page 8, lines 4-12).

On this record, we therefore agree with appellants (brief, pages 6-7 and 12; reply brief, page 3) that the examiner has not made out a *prima facie* case of obviousness in either ground of rejection.

The decision that we reach here is not contrary to the position this panel has taken in related Appeal No. 2000-1547 in application 08/950,491 (Paper No. 28), decided concurrently here, in which we affirmed the grounds of rejection of the appealed claims drawn to processes for preparing “an ethylene polymer product,” “an ethylene/alpha-olefin terpolymer product” and “an ethylene/alpha-olefin/diene interpolymer product” utilizing at least two of the same CG catalyst

compositions under 35 U.S.C. § 103(a) as being obvious over the combined teachings of Stehling and Stevens '815 and Stehling, Stevens '815 and Ewen. We point out that the difference between the claims involved in Appeal No. 2000-1547 and those of the present appeal is that the former set of claims specified at most the melt index and comonomer content of the individual interpolymers and the "combined" and "recovered mixture" while here, appealed claims 1 and 21 specify additional physical properties which have not been established on the present record to be possessed by the interpolymers produced by the processes of Stevens' 815.

The examiner's decision is reversed.

Reversed

