

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

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES

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*Ex parte* JAMES CHARLES BOHLING  
MARLIN KENNETH KINZEY,  
JOHN JOSEPH MAIKNER and  
JAMES FRANKLIN TATE, JR.

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Appeal 2006-1219  
Application 10/636,148  
Technology Center 1700

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Decided: October 27, 2006

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Before GARRIS, WALTZ, and TIMM, *Administrative Patent Judges*.  
GARRIS, *Administrative Patent Judge*.

DECISION ON APPEAL

This is a decision on an appeal which involves claims 1 through 6 and 8 through 10.

We REVERSE.

Independent claims 1, 6, and 10 are representative of the subject matter on appeal and are set forth below:

1. A crosslinked polymeric bead comprising a polymer having from 0.5 mole percent to 2 mole percent crosslinker; wherein said bead has a diameter no greater than 200  $\mu\text{m}$ , no void spaces having a diameter greater than 5  $\mu\text{m}$ , and less than 5 weight percent of organic extractables.

6. A method for producing a lightly crosslinked polymeric bead having no void spaces having a diameter greater than 5  $\mu\text{m}$ ; said method comprising steps of:

(a) preparing a suspension polymerization mixture in a vessel; said mixture comprising: (i) a monomer mixture comprising at least one vinyl monomer and 0.5 mole percent to 2 mole percent of at least one crosslinker; and (ii) from 0.25 mole percent to 1.5 mole percent of at least one free radical initiator;

(b) removing oxygen from the suspension polymerization mixture and the vessel by introducing an inert gas for a time sufficient to produce an atmosphere in the vessel containing no more than 5 percent oxygen;

(c) allowing the monomer mixture to polymerize; and

(d) washing the bead with an aprotic organic solvent.

10. A lightly crosslinked polymeric bead having no void spaces having a diameter greater than 5  $\mu\text{m}$ ; said bead produced by a method comprising steps of :

(a) preparing a suspension polymerization mixture in a vessel; said mixture comprising: (i) a monomer mixture comprising at least one vinyl monomer and 0.5 mole percent to 2 mole percent of at least one crosslinker; and (ii) from 0.25 mole percent to 1.5 mole percent of at least one free radical initiator;



obviousness. *See In re Oetiker*, 977 F.2d 1443, 1445, 24 USPQ2d 1443, 1444 (Fed. Cir. 1992). Accordingly, we will not sustain the Examiner's rejection on this record for the reasons set forth below.

Meitzner is directed to a polymeric bead and the method of preparing it (col. 1, ll. 7-8; col. 6, ll. 9-12). Meitzner's polymeric beads "are valuable as absorbents for organic fluids. They are also valuable for the separation of mixtures of organic fluids" (col. 1, ll. 10-12). Meitzner's polymeric beads are made via suspension polymerization where droplets of the monomer or monomer mixture are suspended in a medium in which the monomer or monomer mixture is substantially insoluble (col. 5, ll. 63-66) in substantially anaerobic conditions (col. 6, ll. 2-31), allowing the monomer mixture to polymerize to form polymeric beads (col. 6, ll. 9-11) and separating the polymeric beads from the suspending medium (col. 6, ll. 11-12) by filtration and a water wash (col. 16, ll. 3-6).

Meitzner's monomer mixture can include a vinyl monomer, such as styrene (col. 7, ll. 7), a crosslinker, such as divinylbenzene (DVB), in the amount of 4-25 per cent by weight of monomers (col. 5, ll. 23-30), and a free radical initiator, such as peroxide (Example I; col. 6, ll. 33-37). In addition, Meitzner utilizes a precipitant to aid in separating the polymeric bead from the monomer phase (col. 4, ll. 63-66) and to form microscopic channels within the polymeric bead (col. 5, ll. 1-5). Meitzner discloses that his process "produce[s] copolymer [sic, copolymer] beads with a diameter ranging from about 0.35 to about 1.2 mm" (col. 10, ll. 6-8).

According to the Examiner, Meitzner "disclose[s] making cross-linked polystyrene beads by copolymerizing styrene with divinylbenzene by aqueous suspension polymerization in the virtual absence of oxygen . . . to

produce beads whose voids are . . . microscopic in size . . .” (Answer 3). The Examiner notes that “[w]hile the amount of divinylbenzene (DVB) monomer employed in the preferred embodiments is higher than the claimed amount of DVB . . . , [Meitzner] expressly teaches in column 7, lines 56 et seq. that it is well known in the art that degree of crosslinking, which is governed by the amount of crosslinker, ‘has a profound effect [o]n the physical properties of the product’” (*id.*). The Examiner contends that “it is notoriously well known in the art that a wide variety of physical properties of a polymer will greatly depend [on the] degree of crosslinking” (*id.*).

Thus, the Examiner concludes:

While those properties may be undesirable for one application, it . . . clearly may have advantages for different applications. Therefore, lowering the amount of crosslinking agent . . . in the invention disclosed by Meitzner to the amounts claimed by applicants, would have been clearly obvious for an ordinary artisan to achieve desired physical properties of a polymer depending of [sic, on] its end use since it is notoriously well known on [sic, in] the art that varying the amount of crosslinker “has a profound effect [o]n the physical properties of the product” [*id.*].

With respect to the claim limitation of the polymeric bead having “no void spaces having a diameter greater than 5  $\mu\text{m}$ ,” the Examiner notes that Meitzner “expressly discloses that it is well known in the art [ ]that all crosslinked polymers contain micropores” (Answer 4). According to the Examiner, Meitzner is directed to the “creation of microc[h]annels within the beads by adding a porogen or a precipitant” (*id.*). The Examiner contends that Meitzner teaches “that addition of the precipitant will result[ ] in creation of additional microchannels that will result in [a] decrease of

density and creation of reticular polymeric structure” (*id.*). The Examiner concludes:

While such a [microchannel] structure is a desired feature of the invention disclosed by Meitzner, elimination of an element along with its function would have been obvious for an ordinary artisan when this function[ ] id [sic, is] not desired. The reference further expressly discloses that polymers obtained without the porogen exhibit higher density (see table II), thus providing additional motivation of [sic, to] eliminate precipitants. Lowering DVB amount and eliminating the precipitant would inherently render the resulting beads, with the claimed physical characteristics as obtained by substantially the same process with substantially the same starting materials. The burden to show the differences in the claimed properties was shifted to the applicants, but no conclusive evidence to the contrary were [sic, was] ever presented on the record.

The invention as claimed, thus, would have been obvious for an ordinary artisan from the teaching of Meitzner [*id.*].

We note that Appellants argue:

Limitations of independent claims 1, 6 and 10 are not taught or suggested in Meitzner, namely that the polymeric bead has: (i) from 0.5 mole percent to 2 mole percent crosslinker (all claims); (ii) no void spaces having a diameter greater than 5  $\mu\text{m}$  (all claims); (iii) a diameter no greater than 200  $\mu\text{m}$  (claim 1); and (iv) less than 5 weight percent of organic extractables (claim 1) [Br. 5].

We begin with claim 10, directed to “[a] lightly crosslinked polymeric bead having no void spaces having a diameter greater than 5  $\mu\text{m}$ .”

The Examiner's position with respect to the claimed polymeric bead having no void spaces having a diameter greater than 5  $\mu\text{m}$  is that (1) Meitzner "expressly discloses that it is well known in the art [ ] that all crosslinked polymers contain micropores" (Answer 4); (2) Meitzner's "addition of the precipitant will result[ ] in creation of additional microchannels that will result in decrease of density and creation of reticular polymeric structure" (*id.*); and (3) "[l]owering DVB amount and eliminating the precipitant would inherently render the resulting beads, with the claimed physical characteristics as obtained by substantially the same process with substantially the same starting materials" (*id.*).

Appellants specifically argue:

Meitzner contains no disclosure at all related to beads with "no void spaces having a diameter greater than 5  $\mu\text{m}$ ." The final rejection first attempts to find a suggestion in Meitzner to omit the "precipitant" used to produce macroporous beads, and then the rejection asserts that this would result in a polymer "with no microchannels" [Br. 6].

The Examiner agrees with Appellants that Meitzner lacks disclosure of beads with "no void spaces having a diameter greater than 5  $\mu\text{m}$ " (Answer 6). However, the Examiner maintains that "the polymers disclosed in Meitzner are obtained by conventional suspension polymerization technique in the absence of oxygen and with the only difference of using the precipitant [and using differing amounts of DVB]" (*id.*).

The Examiner's contention that practicing Meitzner's process without the use of a precipitant and with lower amounts of DVB would inherently result in polymeric beads with "no void spaces having a diameter greater

than 5  $\mu\text{m}$ ” is based on (1) changes to patentee’s process which are driven by hindsight and (2) speculation as to the properties which would develop as a result of such changes. We note that the Examiner merely suggests the possibility that a person of ordinary skill in the art may eliminate the use of the precipitant and lower the amount of DVB in Meitzner’s process.

However, the fact that the prior art could have been modified in a manner consistent with Appellants’ claims would not have made the modification obvious unless the prior art suggested the desirability of the modification. *In re Gordon*, 733 F.2d 900, 902, 221 USPQ 1125, 1127 (Fed. Cir. 1984).

As correctly pointed out by the Appellants, “Meitzner contains no disclosure . . . related to beads with ‘no void spaces having a diameter greater than 5  $\mu\text{m}$ ’” (Br. 6). Appellants are also correct in arguing that “[Meitzner] in no way suggests that . . . [the precipitant] be omitted” (*id.*). We note that Meitzner clearly teaches that “the use of precipitant results in the formation of . . . [a] desirable [microchannel] structure” (col. 5, ll. 14-15). The Examiner also acknowledges the desirability of this feature in the bead of Meitzner (Answer 4). Thus, the Examiner’s contention that it would have been obvious to eliminate the precipitant is contrary to Meitzner’s express teaching that the use of precipitant results in a desirable structure.

We note that the Examiner’s contention that it would have been obvious to “lower[ ] the amount of crosslinking agent . . . disclosed by Meitzner to the amounts claimed by applicants . . . to achieve desired physical properties of a polymer depending of its end use” (Answer 3) is also contrary to the teachings of Meitzner for reasons further explained below.

The Examiner's conclusion of obviousness is not supported by the prior art and is based on a retrospective view of inherency that can not substitute for some teaching or suggestion in the prior art which supports the proposed modification of the prior art. *See In re Newell*, 891 F.2d 899, 901, 13 USPQ2d 1248, 1250(Fed. Cir. 1989).

For these reasons, we can not sustain the rejection of independent claim 10 under 35 U.S.C. § 103(a) as being unpatentable over Meitzner.

We now address independent claim 6, which is directed to a method of making Appellants' polymeric bead and recites the step of "preparing a suspension polymerization mixture in a vessel; said mixture comprising: (i) a monomer mixture comprising at least one vinyl monomer and 0.5 mole percent to 2 mole percent of at least one crosslinker; and (ii) from 0.25 mole percent to 1.5 mole percent of at least one free radical initiator."

Both the Appellants and the Examiner agree that Meitzner does not teach the claimed amount of crosslinker (Br. 5; Answer 3.). However, the Examiner contends

[Meitzner] expressly teaches in column 7, line 56 et seq. that it is well known in the art that degree of crosslinking, which is governed by the amount of crosslinker, "has a profound effect [o]n the physical properties of the product." Indeed, it is notoriously well known in the art that a wide variety of physical properties of a polymer will greatly depend [on the] degree of crosslinking [*id.*].

Based on this, the Examiner concludes:

[L]owering the amount of crosslinking agent . . . disclosed by Metzner to the amounts claimed by applicants, would have been clearly obvious for an ordinary artisan to achieve desired physical

properties of a polymer depending of [sic, on] its end use since it is notoriously well known on [sic, in] the art that varying the amount of crosslinker “has a profound effect [o]n the physical properties of the product” [*id.*].

Appellants argue that “Meitzner . . . teaches use of a minimum crosslinker level of 4 to 6%, with a maximum of 25% (Col. 5, lines 20-30) [and that] Meitzner fails to suggest, or even to mention any crosslinker level below 4%”<sup>1</sup> (Br. 5). Appellants further argue:

Meitzner's general disclosure that varying crosslinking will result in a change in properties hardly amounts to a suggestion of the specific range "from 0.5 mole percent to 2 mole percent crosslinker," much less a suggestion even to vary properties in a direction that could result in Applicants' invention. Meitzner contains no guidance as to the optimum ranges of crosslinker that would achieve the beads claimed by Applicants; rather, the disclosure is, at most, an invitation to experiment with crosslinker level [*id.*].

In the “Response to Argument” section of the Answer, the Examiner replies:

[I]t is clearly within the capabilities and very basic skills of an ordinary polymer chemist [to vary the amount of crosslinker] in order to modify the final physical properties of the resulting polymer in a known and predictable way, absent showing of

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<sup>1</sup> We note that the claim refers to the amounts of crosslinker used as based on mole percent while Meitzner’s amounts are based on weight percent (col. 10. ll. 14-21). In reviewing the record, we find no attempt by the Examiner to convert Meitzner’s weight percent to mole percent for a proper comparison of the amounts.

unexpected results that can be clearly attributed to the claimed degree of crosslinking. No such unexpected results are presented on the record [Answer 6].

The Examiner's argument suggests that the amount of crosslinker is a result effective variable that can be optimized to Appellants' claimed range by the person with ordinary skill in the art. There is long standing legal authority to support the general proposition that it would have been obvious to determine an optimum or workable value of an art recognized, result effective variable. *See In re Woodruff*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936-37 (Fed. Cir. 1990); *In re Boesch*, 617 F.2d 272, 276, 205 USPQ 215, 219 (CCPA 1980); *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955). However, the predecessor to our reviewing court stated:

[W]hile it may ordinarily be the case that the determination of optimum values for the parameters of a prior art process would be at least prima facie obvious, that conclusion depends upon what the prior art discloses with respect to those parameters. Where, as here, the prior art disclosure suggests the outer limits of the range of suitable values, and that the optimum resides within that range, and where there are indications elsewhere that in fact the optimum should be sought within that range, the determination of optimum values outside that range may not be obvious [*In re Sebek*, 465 F.2d 904, 907, 175 USPQ 93, 95 (CCPA 1972)].

In this case, the Examiner has acknowledged that "Meitzner . . . does not expressly disclose the claimed amount of the crosslinker, and, in fact, the preferred embodiments of Meitzner call for at least 4 % of crosslinker" (Answer 5). Meitzner notes that "using a sulfonated styrene-divinylbenzene

copolymer, the process of the present invention is appreciably less effective below about 4% to 6% divinylbenzene content in the copolymer than it is at higher divinylbenzene levels” (col. 5, ll. 23-27). Thus, as argued by Appellants, Meitzner appears to teach away from using levels of crosslinker below 4% (Br. 6). Meitzner also states that “[w]ith this specific system, preferred effects are obtained with a divinylbenzene content of from about 8% to about 25%, based on the weight of the monomer mixture” (col. 5, ll. 27-30). This suggests that an optimum value should be sought within that range and not outside the range. *Sebek*, 465 F.2d at 907, 175 USPQ at 95.

Furthermore, the Examiner’s motivation to modify the level of crosslinker in Meitzner is predicated on “achiev[ing] desired physical properties of a polymer depending of [sic, on] its end use” (Answer 3). The Examiner has pointed to no section of Meitzner that teaches or suggests an end use where 0.5 mole percent to 2 mole percent of at least one crosslinker would be desirable. For this reason and in light of Meitzner’s express teaching that levels below the 4% crosslinker lower limit “are appreciably less effective” (col. 5, l. 25), we must presume that the Examiner’s aforementioned obviousness conclusion is based upon impermissible hindsight.

Based on the above, we are unpersuaded by the Examiner’s contentions that it would have been obvious to a person with ordinary skill in the art to modify the process of Meitzner by “lowering the amount of crosslinking agent . . . disclosed by Meitzner to the amounts claimed by applicants . . . to achieve desired physical properties of a polymer depending of [sic, on] its end use” (Answer 3).

Claims 8 and 9 ultimately depend from independent claim 6 and, therefore, stand or fall with claim 6.

Accordingly, we can not sustain the rejection of claims 6, 8 and 9 under 35 U.S.C. § 103(a) as being unpatentable over Meitzner for the reasons discussed above.

We now direct our attention to independent claim 1.

Like claim 10, claim 1 recites a crosslinked polymeric bead having “no void spaces having a diameter greater than 5  $\mu\text{m}$ .” We have already addressed the Examiner’s contentions regarding this claim limitation and have found them unpersuasive for reasons given above.

In addition, Claim 1 also recites that the crosslinked polymeric bead is to have “a diameter no greater than 200  $\mu\text{m}$ ” and “less than 5 weight percent of organic extractables.”

Appellants argue that “[t]hese limitations [a bead diameter no greater than 200  $\mu\text{m}$  and less than 5 weight percent of organic extractables] . . . are not suggested by Meitzner, and . . . they are not even mentioned in the final rejection, or the first rejection, [and that] the Office has not met its burden of demonstrating that the prior art teaches or suggests all the limitations of claim 1” (Br. 6).

The Examiner responds:

[C]ontrary to the applicants['] allegations . . . , those limitations were addressed in the first office action and the reasons for rejections stated in the first office action were incorporated in the final office action. Moreover, the original office action provided reasonable basis why the claimed limitations are inherently met by the product disclosed in Meitzner and shifted the burden to the applicants to provide clear evidence to the contrary [Answer 7].

We have reviewed the first Office action mailed August 19, 2004 and are unable to find any reasonably specific, coherent statements addressing the claim 1 limitations regarding a crosslinked polymeric bead having “a diameter no greater than 200  $\mu\text{m}$ ” and “less than 5 weight percent of organic extractables.”

With respect to the claim limitation of the bead diameters, Meitzner discloses producing “copolymer [sic, copolymer] beads with a diameter ranging from about 0.35 [or 350 $\mu\text{m}$ ] to about 1.2 mm [or 1200  $\mu\text{m}$ ]” (col. 10, ll. 3 to 9). Given the fact that Meitzner expressly teaches bead diameters substantially outside Appellants’ claimed upper diameter limit of 200  $\mu\text{m}$ , there is no apparent reason (and the Examiner certainly has not proffered one) as to why a person with ordinary skill in the art would have modified the teaching of Meitzner to produce beads with diameters of “no greater than 200  $\mu\text{m}$ .”

With respect to the claim 1 limitation that the crosslinked polymeric bead is to have “less than 5 weight percent of organic extractables,” we note that Meitzner is silent as to the amount of organic extractables present in the polymeric bead. It follows that there appears to be no reason (and the Examiner offers none) as to why one of ordinary skill in the art would modify the teaching of Meitzner to produce beads with “less than 5 weight percent of organic extractables,”

Finally, the Examiner’s obviousness position regarding these claim features is unacceptable to the extent it is impermissibly based on a retrospective view of inherency as explained above. *Newell*, 891 F.2d at 901, 13 USPQ2d at 1250.

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Claims 2 through 5 ultimately depend from independent claim 1 and, therefore, stand or fall with claim 1.

Accordingly, we also can not sustain the obviousness rejection of claims 1 through 5.

#### CONCLUSION

The decision of the Examiner is reversed.

REVERSED

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