

The opinion in support of the decision being entered today was not written for publication in a law journal and is not binding precedent of the Board.

Paper No. 21

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte HUBERRUS KRONER, WOLFGANG KLANIG,
BRADLEY RONALD MORRISON, RAINER KLOSTERMANN,
HOLGER SCHOPKE and WALTER KASTENHUBER

Appeal No. 2002-0865
Application No. 08/940,996

ON BRIEF

Before KIMLIN, PAK and OWENS, Administrative Patent Judges.

KIMLIN, Administrative Patent Judge.

DECISION ON APPEAL

This is an appeal from the final rejection of claims 2-6 and 11-18. Claim 11 is illustrative:

11. A process for preparing homo- or copolymers of at least one of the polymerizable monomers of the group consisting of styrene, butadiene, vinyl chloride, vinyl acetate, vinylidene chloride, alkyl (meth)acrylate (meth)acrylic acid, (meth)acrylonitrile and (meth)acrylamide in an emulsion polymerization technique at at least 40°C in the presence of a dispersing auxiliary and of a free-radical polymerization initiator, which comprises preparing the polymer, at least 85% by weight of which is formed from one or more of these monomers, in the following states, where

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- a) in a first stage water is added as a solvent which is inert in the reaction, and dispersing auxiliaries, seed and a first portion of monomer(s) are added if desired,
- b) in a second stage initiator is added, and
- c) in a third stage the remainder or all of the monomer(s) is added directly or in emulsion form and in the presence of further water and, if desired, further dispersing auxiliary or other auxiliaries,

it also being possible to operate the stages a) and b) or b) and c) as a single stage, and

wherein the process further comprises

in at least one of stages a) to c), moving the reaction mixture in its dispersion form by means of an external circuit which leads from and back to the reaction vessel and comprises at least one low-shear pump selected from the group consisting of nonclogging pumps which operate in accordance with the vortex principle, displacement pumps, monopumps and disc flow pumps and at least one heat exchanger having an essentially laminar flow profile, and

carrying out polymerization at from 40 to 120°C.

The examiner relies upon the following references as evidence of obviousness:

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|--------------------|-----------|---------------|
| Bush et al. (Bush) | 4,273,904 | Jun. 16, 1981 |
| Fan et al. (Fan) | 4,727,110 | Feb. 23, 1988 |

Appellants' claimed invention is directed to a process for polymerizing monomers of the recited groups via emulsion polymerization wherein the reaction mixture is moved away from and back to the reaction vessel through a low-shear pump and a heat exchanger having an essentially laminar flow profile.

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Appealed claims 2-6 and 11-18 stand rejected under 35 U.S.C. § 103 as being unpatentable over Bush in view of Fan.

We have thoroughly reviewed the respective positions advanced by appellants and the examiner. In so doing, it is our opinion that the examiner has failed to establish a prima facie case of obviousness for the claimed subject matter. Accordingly, we will not sustain the examiner's rejection.

The examiner's rejection begins on shaky ground when she states that Bush provides motivation to combine the two cited references by explaining that "**under elevated temperatures and high shear fields** monomer emulsion can break down quite readily resulting in phase separation . . . [which] would inevitably lead to formation of gels. (see col. 1, lines 56, 68, col. 2, lines 1-3)" (page 5 of Answer, second paragraph).¹ As properly noted by appellants, the paragraph bridging columns 1 and 2 of Bush fails to mention any breakdown of emulsion under elevated temperatures and high shear fields. Indeed, the paragraph bridging columns 1 and 2 of Bush reads as follows:

Another problem in the commercial production of homopolymers and copolymers of vinyl and vinylidene halides is the formation of undesirable polymer buildup

¹ The examiner may have mistook the Fan disclosure for that of Bush.

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on the inner surfaces of the polymerization reactor or vessel. This buildup interferes with heat transfer and decreases productivity and adversely affects polymer quality. It must be removed at considerable reduction in production time and if not removed, more polymer buildup occurs rapidly on that already present resulting in a hard, insoluble crust. Accordingly, it is not only desirable to have an emulsion polymerization process in which vinyl resins are produced that have the properties of eliminating bloom in finished articles made therefrom, or at least reducing the bloom to a minimum, but also in which polymer buildup on the inner surfaces of the reactor is substantially reduced or eliminated.

Secondly, the examiner has not responded to appellants' argument that Fan, the secondary reference, is directed to water-in-oil emulsions whereas appellants, and Bush, are directed to oil-in-water emulsions. The examiner has not explained why the process of Fan, which is directed to a water-in-oil emulsion polymerization that may include a conventional cooling recirculation loop, would have been applicable to the oil-in-water emulsion polymerization of Bush, who fails to mention a recirculation loop.

Also, we can hardly disagree with appellants that Fan's solution to emulsion breakdown under the influence of a high shear field, particularly at elevated temperatures, is to first form a small amount of polymer in the emulsion to obtain a shear

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stable emulsion, and thereafter complete the polymerization process. Fan specifically discloses the following:

Due to the fact that the emulsion is rendered shear-stable, any convenient polymerization procedure may then be employed without the danger of gel formation. For example, the emulsion may be polymerized and cooled by circulating at least part of the emulsion during polymerization through a circulating loop outside of the polymerization apparatus to remove the heat generated during the polymerization reaction [column 2, lines 44-52].

While Fan goes on to disclose that "[a]ny conventional apparatus may be used to provide the external heat exchange loop" (column 6, lines 54-56), the examiner has not established on this record that such conventional apparatus would include the presently claimed low-shear pump and heat exchanger having an essentially laminar flow profile. While such a pump and heat exchanger may have been known in the art, and appellants do not assert otherwise, the examiner has not established that one of ordinary skill in the art would have considered using this type of apparatus in the conventional closed circulating loop taught by Fan. Accordingly, it is our judgment that the examiner has not established that it would have been prima facie obvious for one of ordinary skill in the art, based on Fan's disclosure relating to a water-in-oil emulsion polymerization, to employ a low-shear pump and heat exchanger having an essentially laminar flow

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profile in a recirculation loop for the polymerization process of Bush.

This application is remanded to the examiner in order to make the following factual and legal findings. First, the examiner should determine whether the appealed claims are sufficiently broad to embrace a process wherein a small amount of polymerization occurs in steps (a) and (b), which may be a single stage, as disclosed in Fan. Since appellants' stages (a) and (b) involve a reaction mixture of monomer, water, dispersing auxiliaries, seed and initiator, and recirculation may only occur during the third stage which adds the remainder of the monomer, it would seem that a polymerization process wherein a small amount of polymer is formed in the combined first and second stages is within the scope of the appealed claims. Also, inasmuch as appellants acknowledge that "the prior art teaches that under the influence of high shear fields (as would occur when pumping through an external circuit), in particular at elevated temperatures, a monomer emulsion can break down and that polymerization of such an unstable monomer would lead to the undesirable formation of gels" (page 5 of Brief, second paragraph), the examiner should determine whether it would have been obvious for one of ordinary skill in the art to use the

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presently claimed low-shear pump and heat exchanger having an essentially laminar flow profile in the recirculation loop of Fan. Furthermore, it should be established on this record whether the admittedly known breakdown of an emulsion under the influence of high shear fields, particularly at elevated temperatures, was known to apply to both oil-in-water emulsions and water-in-oil emulsions. These inquiries and findings may lead to the conclusion that processes within the scope of the appealed claims would have been obvious to one of ordinary skill in the art in view of the state of the admitted prior art and Fan.

In conclusion, based on the foregoing, the examiner's decision rejecting the appealed claims is reversed. Also, the application is remanded to the examiner for the reasons set forth above.

This application, by virtue of its "special" status, requires immediate action by the examiner. See the Manual of Patent Examining Procedure, § 708.01(D) (8th ed., Aug. 2001). It

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is important that the Board of Patent Appeals and Interferences
be informed promptly of any action affecting the appeal in this
case.

REVERSED AND REMANDED

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| EDWARD C. KIMLIN |) | |
| Administrative Patent Judge |) | |
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| CHUNG K. PAK |) | BOARD OF PATENT |
| Administrative Patent Judge |) | APPEALS AND |
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| TERRY J. OWENS |) | |
| Administrative Patent Judge |) | |

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