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D E C I S I O N
of 9 January 2001

Case Number: T 0076/98 - 3.3.3

Application Number: 93850130.1

Publication Number: 0581749

IPC: B29C 33/64

Language of the proceedings: EN

Title of invention:
Mold release composition and method of coating a mold core

Applicant:
TSE INDUSTRIES, INC., et al

Opponent:
-

Headword:
-

Relevant legal provisions:
EPC Art. 84

Keyword:
"Claims - clarity (yes) - support by description (yes)"
"Inventive step - non-obvious combination of features"

Decisions cited:
-

Catchword:
-

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Case Number: T 0076/98 - 3.3.3

D E C I S I O N
of the Technical Board of Appeal 3.3.3
of 9 January 2001

Appellant: TSE INDUSTRIES, INC.
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Decision under appeal: **Decision of the Examining Division of the European Patent Office posted 2 September 1997 refusing European patent application No. 93 850 130.1 pursuant to Article 97(1) EPC.**

Composition of the Board:

Chairman: C. Gérardin
Members: C. Idez
A. Lindqvist

Summary of Facts and Submissions

I. European patent application No. 83 850 130.1, filed on 14 June 1993, claiming US priorities of 21 July 1992 (US 917772) and 5 April 1993 (US 43038) and published under No. 0 581 749, was refused by a decision of the Examining Division issued on 2 September 1997. The decision was based on a set of Claims 1 to 15 filed on 5 March 1997, Claim 1 reading as follows:

"An aqueous mold release composition for use in coating compression and injection molding core surfaces comprising by weight about:

3% methyl triethoxy silane,
1.8% deca methyl cyclopenta siloxane,
1.6% octa methyl cyclotetra siloxane,
0.6 dodeca methyl cyclo hexa siloxane,
1.5% mixture of synthetic ethoxylated amines
and nonyl or octyl phenol derivative surfactants,
3.0% ethanol and
88.5% water."

The set of claims also comprised (a) further independent claims directed to an aqueous mold release composition formulated according to the same pattern, (b) dependent claims related to preferred embodiments of one or the other of these aqueous mold release compositions, and (c) process claims concerning methods of forming a semi-permanent mold release surface on a mold core.

II. Although the ground for the refusal of the application was lack of inventive step, the Examining Division also expressed its views on other requirements as follows:

(i) The claims on file complied not only with the requirements of Article 123(2) EPC, but also with the requirement of unity of invention, since the independent composition and method claims were all linked through the common concept of adding a minimum amount of lower alkyl alcohol in addition to that formed during hydrolysis.

(ii) Novelty over D1: JP-A-5433642, which had been considered in the form of corresponding patent abstract of Japan, volume 3, No. 63 (C47), 30 May 1979, was acknowledged on the basis of (a) particular amounts of lower alkyl alcohol which were higher than those obtained during hydrolysis of the alkoxy silane, (b) different surfactants or mixtures thereof, and (c) the selection of particular silanes.

(iii) In the absence of any comparative experimental data the technical problem underlying the application could only be defined as the provision of alternative aqueous mold release compositions. These, however, represented nothing more than the result of a routine laboratory practice, since (a) neither the silanes, which had to be regarded as arbitrary selections within commercially available products, (b) nor the replacement of the known fluorine surfactant by a mixture of other commercially available surfactants, (c) nor the mere addition of alcohols could be considered as inventive features.

III. On 31 October 1997 the Appellant (Applicant) filed a

Notice of Appeal against the above decision, the prescribed fee being paid on the same day.

The Statement of Grounds of Appeal filed on 30 December 1997 was accompanied by numerous experimental data which had been incorporated in a new description and in additional drawing sheets. These data were deemed to demonstrate an improvement over the prior art mold release compositions and, thereby, support an inventive step.

IV. Following a communication issued on 30 October 2000 annexed to the summons to oral proceedings, in which numerous points were addressed by the Board, the Appellant submitted a complete translation into English of D1 on 11 December 2000 and filed an amended set of claims on 2 January 2001.

V. During oral proceedings held on 9 January 2001 the preliminary discussion of the wording of these claims led the Appellant to withdraw that request and to file the following set of five claims:

"1. An aqueous mold release composition for use in coating compression and injection molding core surfaces comprising a mixture by weight of

0.5 to 12% a silane selected from the group consisting of methyl triethoxy silane, methyl trimethoxy silane, vinyl triethoxy silane, vinyl trimethoxy silane, Gamma-ureidopropyltrialkoxy silane, where the alkoxy group has one to three carbon atoms, Gamma-glycidoxypropyltrimethoxy octyltriethoxy

silane, Gamma-aminopropyltriethoxy silane, Gamma-isocyanatopropyltriethoxy tetraethoxysilane, Gamma-methacryloxypropyl trimethoxysilane, Beta- (3,4-epoxycyclohexyl) ethyltrimethoxy silane, Gamma-mercaptopropyltrimethoxy silane, and vinyl-tris (2-methoxyethoxy) silane,

1 to 8%	a multi functional polydimethyl siloxane emulsified polymer which is a mixture of deca methyl cyclopenta siloxane, octa methyl cyclotetra siloxane and dodeca methyl cyclohexa siloxane
0.1 to 2.5%	substituted nonyl and/or octyl phenol derivative surfactant,
0.05 to 4.0%	fluoroalkyl non-ionic surfactant,
0.1 to 2.5%	synthetic ethoxylated amine surfactant,
0.1 to 12.5%	silanol terminated polydimethyl siloxane having a molecular weight from 400 to 310,000,
0.5 to 8%	lower alkyl alcohol, wherein the alkyl has 1-3 carbon atoms,
70 to 97%	water, and
0.5 to 1%	a weak acid to maintain the pH between 4.5 to 5.5

2. The aqueous mold release composition according to

claim 1 wherein the molecular weight of the silanol terminated polydimethylsiloxane is about 1000.

3. The aqueous mold release composition according to claim 1 wherein the composition comprises by weight about:

3.4% methyl triethoxy silane,

1.8% deca methyl cyclopenta siloxane,

1.6% octo methyl cyclotetra siloxane,

0.6% dodeca methyl cyclo hexa siloxane,

1.5% non-ionic fluorinated alkyl ester surfactant,

0.3% synthetic ethoxylated amine surfactant,

0.5% substituted nonyl and octyl phenol derivative surfactant,

3.0% silanol terminated polydimethyl siloxane having a molecular weight between 400 and 310,000,

2.6% ethanol

1.0% acetic acid, and

33.7% distilled water.

4. A method of forming a semi-permanent mold release surface on a mold core comprising cleaning the core surfaces, heating both sides of the core surfaces to about 160°C (320°F) and spraying the mold core with the

aqueous composition according to claim 1.

5. A method according to claim 4, wherein the aqueous composition contains at least 90% water."

To support the patentability of both the mold release composition and the method of forming a semi-permanent mold release surface on a mold core the Appellant (a) relied on the experimental data previously submitted to justify a definition of the technical problem in positive terms and (b) argued that the now required combination of features was not obvious in the light of the teaching of D1.

VI. The Appellant requested that the decision under appeal be set aside and a patent be granted on the basis of Claims 1 to 5 as filed during oral proceedings.

Reasons for the Decision

1. The appeal is admissible.

2. The wording of the claims complies with the requirements of Article 123(2) EPC.

2.1 Claim 1 can be regarded as the combination of the introductory clause as originally formulated with (i) the general "composition II" disclosed on page 3, line 16 to page 4, line 15, (ii) the definition of the multifunctional polydimethyl siloxane emulsified polymer according to original Claim 14, and (iii) the additional alternative "substituted nonyl and octyl phenol derivative surfactant" mentioned in "composition II" (cf. page 5, lines 13 to 25).

2.2 Dependent Claims 2 and 3 correspond to original Claims 8 and 10.

2.3 The method Claim 4 combines the general process features according to original Claim 16 with the aqueous composition according to present Claim 1 to which it is now related.

2.4 The feature of "at least 90% water" in dependent Claim 5 results from original Claim 1, wherein the aqueous mold release composition was defined as comprising a mixture of less than 10% by weight of silane, siloxane and surfactant compatible therewith.

3. These claims also comply with the various requirements of Article 84 EPC.

First, the composition according to Claim 1 corresponds to the definition of composition II also referred to as "My composition" in the paragraph "Summary of the Invention" bridging pages 2 and 3. Similarly, the feature "and/or" in the definition of the substituted phenol derivative surfactant ensures that the alternatives "and" as well as "or", both disclosed under the heading "composition II" (cf. page 4, line 6 resp. page 5, line 19), are now encompassed in Claim 1. Both amendments aim thus at a better correspondence between claims and description (requirement of support).

Secondly, the general term "multifunctional polydimethyl siloxane emulsified polymer" is now defined as being the mixture of three specific organosiloxane compounds (requirement of clarity).

Thirdly, the use of the dependent form in both the composition claims and the method claims avoids unnecessary repetitions (requirement of conciseness).

4. It is also evident that no objection arises having regard to the requirement of unity of invention, since the presence of a single independent composition claim and a single method claim to which it is related brings to light the single general concept underlying the present application, namely (i) the presence of three organosilicon compounds, e.g. a silane, a multifunctional polydimethyl siloxane and a silanol terminated polydimethyl siloxane, (ii) the use of three surfactants, e.g. a substituted nonyl and/or octyl phenol derivative, a non-ionic fluoroalkyl compound and a synthetic ethoxylated amine, and (iii) the addition of a lower alkyl alcohol.

5. Document D1, now considered in the form of the complete translation submitted on 11 December 2000 (cf. point IV above), describes a composition for a release agent comprising a thermal curing type silicone resin emulsion (A) and a fluorine-based surfactant (B) (cf. Claim).

According to a typical embodiment, the thermal curing type silicone resin emulsion (A) is a composition comprising (1) 100 parts by weight of a silanol polydisubstituted siloxane, (2) 0.1 to 10 parts by weight of an organoalkoxysilane or organoalkoxysiloxane, and (3) 0.1 to 10 parts by weight of an organometallic compound as the curing catalyst (cf. page 3, paragraphs 3 to 6; page 4, paragraph 9). The compounds (1) and (2) exemplified (cf. page 4, paragraph 2 and 3) fall under the definition of the

corresponding ingredients of the claimed composition.

By coating the above composition (A) + (B) on a release base material and carrying out thermal curing, it is possible to impart a blocking prevention effect of the base material itself and a superior release property with respect to an adhesive material (cf. page 6, paragraph 5).

6. As explained by the Appellant during oral proceedings, these prior art compositions do not disclose the combination of compositional features required in the application in suit.

First, there is no mention of a multifunctional polymethyl siloxane emulsified polymer as defined in Claim 1.

Secondly, although the fluorine-based surfactant (B) is broadly defined in that it encompasses non-ionic, anionic, cationic and amphoteric compounds which may even comprise ethoxy groups and nitrogen atoms (cf. page 5, paragraph 2), this cannot be equated with the combination of (a) a substituted nonyl and/or octyl phenol derivative surfactant, (b) a fluoroalkyl non-ionic surfactant, and (c) a synthetic ethoxylated amine surfactant, as required in Claim 1.

A third difference concerns the lower alkyl alcohol. There is no addition at all in D1 of any alcohol, at most the formation of minor amounts thereof due to hydrolysis of the silanes.

In view of these essential differences the requirement of novelty must be regarded as met.

7. The application in suit concerns a mold release composition and a method of coating a mold core.

7.1 Such a composition as well as a method of coating a release base material are disclosed in D1 which the Board, like the Examining Division and the Appellant, regards as the closest state of the art. Emphasis is laid in particular on the superior release property (cf. page 6, paragraph 5). However, as explained in the introduction of the application in suit (cf. page 2, first full paragraph), in spite of that promising statement these prior art mold release compositions suffer in fact from a number of shortcomings; in particular, they tend to be toxic and the molds have to be recoated frequently.

7.2 In the light of these shortcomings the technical problem underlying the application in suit may thus be seen in the provision of a environmentally friendly mold release composition that will permit more releases, in practice more than twenty releases, of molded elastomer for transfer, compression and injection molding.

7.3 According to the application in suit this problem is solved by a mold release composition comprising three organosilicon compounds, three surfactants and a lower alkyl alcohol, as specified in Claim 1.

7.4 The experimental data on file, e.g. Examples IX and X of the application as originally filed and the test report submitted as an annex to the Statement of Grounds of Appeal, provide evidence that the two aspects of the above defined problem are effectively solved. On the one hand, commercial compositions within

the terms of Claim 1 afford a number of releases far superior to prior art compositions which, like in D1, are cured with an organometallic compound; on the other hand, the addition of a lower alkyl alcohol is compatible with the above environmental requirements.

8. It remains to be decided whether this solution is obvious to a person skilled in the art having regard to the state of the art.

8.1 The factors envisaged in D1 to optimize the film-forming properties and the release properties comprise rather the addition of a specific polymer ingredient, the solid content of the silicone resin and the concentration of the resin in the coating solution than modifications of the components of the composition (cf. page 6, paragraphs 2 and 3). Regarding the definition of the silicone resin emulsion, the only alternative possibilities mentioned concern the substituents along the organopolysiloxane chain, e.g. ethyl or phenol radical (cf. page 3, paragraph 4) or even vinyl radical (cf. paragraph bridging pages 3 and 4); in the latter case the silicone resin emulsion (A) has to be slightly adjusted in that it comprises (1') a vinyl substituted organopolysiloxane, (2') an organopolysiloxane having at least three Si-H couplings within the same molecule, and (3') a platinum compound as the curing catalyst.

Thus, whatever the organopolysiloxane chosen, condensation type or addition type, there is no reason to depart from an essential aspect of the teaching of that citation, which involves the use of a specific curing catalyst. Since furthermore that citation does not suggest the combination of silicone compounds and surfactants required in the application in suit, let

alone the addition of a lower alkyl alcohol, it is evident that it cannot by itself render obvious the claimed subject-matter.

8.2 The Board has also examined the other documents of the search report and has come to the conclusion that they would not lead, whether in isolation or in combination with D1, a skilled person to consider a combination of composition features as now required.

8.3 For these reasons it can be concluded that the subject-matter of Claim 1 does not arise in an obvious manner from the prior art and that, consequently, it involves an inventive step.

8.4 The same applies to dependent composition Claims 2 and 3, which concern preferred embodiments of the composition according to Claim 1, as well as to method Claims 4 and 5, which are directed to the advantageous use of that composition.

9. Although the claims satisfy the various requirements of the EPC, a patent cannot be granted according to the Appellant's request because of the major amendments required in the description following the new wording of the claims. The case has thus to be remitted to the Examining Division for adaptation of the description.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The case is remitted to the Examining Division with the order to grant a patent on the basis of Claims 1 to 5 filed during the oral proceedings, after any necessary consequential amendment of the description.

The Registrar: The Chairman:

E. Görgmaier C. Gérardin