

The opinion in support of the decision being entered today was not written for publication and is not binding precedent of the Board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. 15

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte ATSUSHI IKEZAWA AND
TETSUJI YAMAGUCHI

Appeal No. 1999-1808
Application 08/826,305

ON BRIEF

Before KIMLIN, JEFFREY T. SMITH, and MOORE, Administrative Patent Judges.

MOORE, Administrative Patent Judge.

DECISION ON APPEAL

This is an appeal under 35 U.S.C. § 134 from a final rejection of claims 1, 2, and 16. Claim 15 has been canceled; claims 4 - 6 and 9 - 14 are withdrawn from consideration; and claims 3, 7 and 8 are allowed.

CLAIMS

The subject matter on appeal is claimed as follows:

1. An aqueous coating agent comprising:
 - a hydrophilic resin
 - a solid lubricating agent comprising MoS_2 and at least one antimony sulfide selected from the group consisting of Sb_2S_3 and Sb_2S_5 ; wherein the weight ratio of MoS_2 to antimony sulfide is from 1:0.05 to 1:1.2; and
 - water;

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wherein the weight ratio of the solid lubricating agent to the hydrophilic resin is from 0.7:1 to 3:1.

2. The aqueous coating agent of claim 1 wherein the weight ratio of MoS₂ to antimony sulfide is from 1:0.2 to 1:0.5.

16. The aqueous coating agent of claim 1 wherein the weight ratio of the solid lubricating agent to the hydrophilic resin is from 0.9:1 to 2.5:1.

THE REFERENCES

In rejecting the appealed claims under 35 U.S.C. §103, the Examiner relies on the following references:

3,873,458	Parkinson	Mar. 25, 1975
4,303,537	Laeppele et al. (Laeppele)	Dec. 1, 1981
5,432,211	Morita et al. (Morita)	Jul. 11, 1995
Japanese Patent Application	7-34030 (Dai-Nippon JP)	Feb. 3, 1995
European Patent Application	0 687 715 A2 (Dai-Nippon EP)	Dec. 20, 1995

Vlasyuk et al., "Electrodeposition of Protective and Antifriction Polymeric Coatings from Aqueous Media," Ukrainskii Khimicheskii Zhurnal, Vol. 41, N o. 12 (1975), pages 1319 -1320 (Vlasyuk).

Nosov, M.I., "Lubricating Properties of Mixtures of Molybdenum Disulfide with Oxides and Sulfides of Antimony," Khim. Teknol. Topl. Masel., No. 7 (1978), pages 43 - 44 (Nosov).

THE REJECTION

Claims 1, 2, and 16 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Parkinson, Laeppele, Vlasyuk, Morita, Dai Nippon JP or Dai Nippon EP in view of Nosov.

SUMMARY OF DECISION

On consideration of the entire record, we affirm.

DISCUSSION

The Invention

The Appellants' invention relates to an aqueous coating agent for forming lubricating films suitable for prolonged use on sliding members of torque-transmitting parts utilized in, e.g. automotive drive and prime mover systems (Specification, page 1, lines 10 - 13). The coating agent includes a hydrophilic resin, a solid lubricating agent which is MoS_2 and at least one antimony sulfide (Sb_2S_3 or Sb_2S_5) and water. The weight ratio of MoS_2 to antimony sulfide is from 1:0.5 to 1:1.2 and the weight ratio of the lubricating agent to the hydrophilic resin is from 0.7 to 3. (Specification, page 2, lines 22-27).

The Rejection of Claims 1, 2, and 16 Under 35 U.S.C. § 103(a) Over Parkinson, Laepple, Vlasyuk, Morita, Dai-Nippon EP, or Dai-Nippon JP In View of Nosov

The Examiner has stated that Parkinson, Laepple, Vlasyuk, Morita, and Dai-Nippon (EP and JP) disclose aqueous coating agents comprising a hydrophilic resin and a solid lubricant of MoS_2 . (Examiner's Answer, page 3, lines 17-21). The Examiner further notes that both Laepple (column 2, lines 35-40) and Morita (column 2, lines 50-57 and columns 9-10, table I) disclose that the ratio of molybdenum disulfide and hydrophilic resin can be 0.9-4.3:1 and 0.7-4.0:1 respectively (Examiner's Answer, page 4, lines 1-6).

The Examiner states that the claimed antimony sulfide in the recited weight ratio of from 0.83-20:1 is not recited, but asserts that Nosov discloses the addition of Sb_2S_3 to MoS_2 in a weight ratio of MoS_2 : Sb_2S_3 of from 2.3-9:1, concluding that it would have been obvious to employ the Sb_2S_3 of Nosov with the MoS_2 of the other references in

order to improve the durability, tribological activity, and lubrication of the coatings (Examiner's Answer, page 5, lines 1-3).

In response, the Appellants contend that although "the prior art appears combinable in a manner that will yield the claimed invention, this fact alone does not make the resultant combination obvious" (Appeal Brief, page 7, lines 7-9). More specifically, the Appellants argue that the cited prior art lacks "both the requisite (i) motivation or suggestion to make the proposed combination and (ii) reasonable expectation of success" (Appeal Brief, page 7, lines 13 - 15).

As the Appellants have conceded the combination of the cited prior art yields the claimed invention, we will primarily direct our attention to the issues the appellant has argued in the Brief: whether there is the requisite motivation or suggestion in the art to make the combination, and whether one of ordinary skill in the art would have had a reasonable expectation of success of the combination.

To support the motivation for his case of obviousness, the Examiner points specifically to Nosov, page 2, Table 2 and page 3, Table 3, stating that a "direct comparison between a coating with MoS₂ alone and ones with both MoS₂ and Sb₂S₃ exhibit improved durability, tribochemical activity and lubrication for the combination of MoS₂ and Sb₂S₃." (Examiner's Answer, page 5, lines 7 - 10).

The Appellants take issue with this characterization, stating that "Nosov is ... silent regarding the use of Sb₂S₅ in combination with MoS₂. Rather, Nosov teaches, *inter alia*, a mixture of solid lubricants consisting solely of MoS₂ and Sb₂S₃. Nosov does not suggest adding Sb₂S₃ to an aqueous coating comprising a hydrophilic resin, MoS₂,

and water to produce a lubricant having improved lubricating properties.” (Appeal Brief, page 8, lines 5 - 10).

We disagree. The Appellants miss the point of the combination of Nosov with the remaining references, and unduly narrowly read the disclosure of Nosov. Nosov states that he was exploring the properties of solid lubricants by applying them on a surface as a powder without a binder to avoid side effects (see page 1, paragraph 2). Nosov taught one of ordinary skill in the art at the time the invention was made to modify molybdenum disulfide lubricants with antimony sulfide (see, e.g. the title and page 1, last sentence).

Nosov also teaches that, under appropriate conditions, the addition of antimony sulfides to molybdenum disulfides will result in improved durability (page 3, paragraph 2, line 5) and improved lubrication (page 3, paragraph 3, line 2). Finally, Nosov discloses the addition of Sb_2S_3 to MoS_2 in a weight ratio of $MoS_2:Sb_2S_3$ of from 2.3-9:1¹. Thus, we conclude that the teaching of Nosov is sufficient to teach that solid molybdenum disulfide lubricating agents can be improved, in a variety of binder systems, by incorporating an antimony disulfide.

Laepple taught the inclusion of (a) water, (b) a solid lubricant including a majority of molybdenum disulfide, and (c) an acrylic resin binding agent in the recited amounts of MoS_2 : hydrophilic resin of 0.9-4.3:1 (Laepple, column 2, lines 35-52). Accordingly, we conclude that there is substantial evidence to support the Examiner's prima facie case of obviousness for claims 1, 2, and 16.²

¹Claim 1 recites a molybdenum disulfide:antimony sulfide ratio of from 1:0.05 to 1:1.2, which corresponds to 20:1 - 0.84:1; claim 2 recites a narrower ratio of 1:0.2 - 1:1.2, which corresponds to 5:1 - 0.84:1.

² The rejection cites numerous references, each in combination with Nosov; we select Laepple to discuss.

The Appellants have also asserted that there is no reasonable expectation of success that an aqueous coating including molybdenum disulfide, a hydrophilic resin, water and antimony sulfide will successfully produce a coating agent that forms a lubricating film having enhanced lubrication properties. (Appeal Brief, page 7, lines 20-24). The only support for this statement is found in the Appeal Brief, page 9, lines 6-22, wherein the Appellants state:

Clearly, the influence of a hydrophilic resin on the lubricating properties of MoS_2 and SbS_3 is entirely unpredictable. The mere fact that Sb_2S_3 interacts with MoS_2 in a powdered form to produce a lubricant having enhanced lubricating properties does not give rise to a reasonable expectation that Sb_2S_3 will interact similarly with MoS_2 in an aqueous coating agent further comprising a substantial amount of a hydrophilic resin. In fact, Nosov anticipated the unpredictable effects of binders (i.e. a resin) on the properties of solid lubricants and, accordingly, limited his study to lubricant coatings in the form of finely dispersed powders. Specifically, Nosov states:

Although such coatings are less durable, they are extremely useful for studying the properties of solid lubricants because they allow the elimination of certain side effects caused by binders, fillers, and several other technological factors. (Appeal Brief, page 9, lines 6-22).

We note that nowhere does Nosov actually state that the effects of binders are unpredictable. Rather, what Nosov is stating is that he is isolating the active elements in the composition to provide a true comparison illustrating the benefits of antimony sulfide. We conclude that Nosov intended his results to transcend any one particular binder system, and was not implying that binders were so unpredictable that he had to remove them from the system. He was simply reducing clutter and excess variables to illustrate the benefits of the antimony sulfides in a solid lubricant system.

We therefore conclude that one of ordinary skill in the art would have had a reasonable expectation of success in including the Nosov molybdenum disulfide - antimony sulfide system in an aqueous coating system such as Laepple.

Summary of Decision

The rejection of claims 1, 2 and 16 under 35 U.S.C. §103 is affirmed.

Time Period for Response

No time period for taking any subsequent action in connection with this appeal may be extended under 37 CFR § 1.136(a).

AFFIRMED

EDWARD C. KIMLIN
Administrative Patent Judge

JEFFREY T. SMITH
Administrative Patent Judge

JAMES T. MOORE
Administrative Patent Judge

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DOW CORNING CORPORATION CO1232
2200 W. SALZBURG ROAD
PO BOX 994
MIDLAND, MI 48686-0994