

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. 19

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte ROBERT M. CAMPION, CHUONG Q. DAM,
KENNETH W. HALL, and WILLIAM J. RODIER

Appeal No. 2002-1464
Application No. 09/213,710

ON BRIEF

Before COHEN, ABRAMS, and McQUADE, Administrative Patent Judges.
COHEN, Administrative Patent Judge.

DECISION ON APPEAL

This is an appeal from the final rejection of claims 1, 2 and 4 through 41. Claim 3 stands objected to (section (3) of Paper No. 18). These claims constitute all of the claims in the application.

Appellants' invention pertains to a fuel injector assembly, a method for increasing a boundary lubricity value at the interface of a low alloy steel substrate reciprocatably positioned in contacting relation to an injector body of a hydraulically actuated fuel injector assembly, a component of a

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fuel injection system, and a component in a fuel injection system. A basic understanding of the invention can be derived from a reading of exemplary claims 1, 15, 24, and 33, respective copies of which appear in "APPENDIX A" of the "RE-SUBMITTED" brief (Paper No. 17).

As evidence of obviousness, the examiner has applied the documents listed below:

Djordjevic	Re. 34,956	May 30, 1995
Tsuchiya et al (Tsuchiya)	4,426,162	Jan. 17, 1984
Little	5,673,618	Oct. 7, 1997
Young	5,773,734	Jun. 30, 1998

The following rejections are before us for review.

Claims 1, 2, 4 through 7, 11 through 14, and 24 through 32 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Djordjevic in view of Tsuchiya and Young.

Claims 1, 8 through 10, and 33 through 41 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Djordjevic in view of Tsuchiya and Little.

Claims 15 through 23 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Djordjevic in view of Tsuchiya, Young, and Little.

The full text of the examiner's rejections and response to the argument presented by appellants appears in the answer (Paper No. 18), while the complete statement of appellants' argument can be found in the brief (Paper No. 17).

OPINION

In reaching our conclusion on the obviousness issues raised in this appeal, this panel of the board has carefully considered appellants' specification¹ and claims, the applied teachings,² and the respective viewpoints of appellants and the examiner. As a consequence of our review, we make the determinations which follow.

¹ We note that, in the "Background of the Invention" section of appellant's specification (page 4), there is a discussion of a related art technique of using titanium nitride (TiN) coatings (of unspecified thickness) on fuel injector plungers to reduce wear. Additionally, we make reference to the "Examples" section of the specification (pages 19 and 20) which compare a baseline plunger with coated plungers. No mention is made of plunger material or coating thickness.

² In our evaluation of the applied prior art, we have considered all of the disclosure of each document for what it would have fairly taught one of ordinary skill in the art. See In re Boe, 355 F.2d 961, 965, 148 USPQ 507, 510 (CCPA 1966). Additionally, this panel of the board has taken into account not only the specific teachings, but also the inferences which one skilled in the art would reasonably have been expected to draw from the disclosure. See In re Preda, 401 F.2d 825, 826, 159 USPQ 342, 344 (CCPA 1968).

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We do not sustain any of the obviousness rejections on appeal for the reasons given below.

Appellants' independent claims 1, 15, 24, and 33 read as follows.

1. A fuel injector assembly comprising:

an injector body defining a cylindrical bore;

a fuel injector plunger being positioned within the cylindrical bore, said fuel injector assembly being hydraulically actuated and reciprocated by moving said fuel injector plunger between an open position and a closed position, said fuel injector plunger being made from a low alloy steel substrate and having a coating thereon;

said coating having a pre-established thickness, said pre-established thickness being in the range of between about 0.5 and 5.0 microns and being composed of a deposited primary coating.

15. A method for increasing a boundary lubricity value at the interface of a low alloy steel substrate reciprocatably positioned in contacting relation to an injector body of a hydraulically actuated fuel injector assembly comprising:

preparing a fuel plunger being made of a low alloy steel substrate;

depositing a primary coating on said low alloy steel substrate using a low temperature physical deposition process said coating having a pre-established thickness, said pre-established thickness being in the range of between about 0.5 and 5.0 microns.

24. A component of a fuel injection system comprising:

a low alloy steel substrate;

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a coating on said low alloy steel substrate, said coating selected from the group consisting of chromium nitride, zirconium nitride, molybdenum nitride, titanium-carbon-nitride, or zirconium-carbon-nitride;

wherein said component is adapted to be exposed to a fluid within said fuel injection system and said component is further movable within said fuel injection system relative to an adjacent component within said fuel injection system.

33. A component in a fuel injection system comprising:

a low alloy steel substrate;

a coating on said low alloy steel substrate, said coating selected from the group consisting of titanium containing diamond like carbon, chromium containing diamond like carbon, or tungsten containing diamond like carbon;

wherein said component is adapted to be exposed to a fluid within said fuel injection system and said component is further movable within said fuel injection system relative to a second component.

In the respective rejections, a patent to Djordjevic is proposed to be modified based upon the teachings of Tsuchiya and Young, the teachings of Tsuchiya and Little, and the teachings of Tsuchiya, Young, and Little.

The patent to Djordjevic discloses a fuel injection pump (Fig. 3) with a pump body and plungers being made of a suitable, wear resistant steel alloy. The Tsuchiya reference teaches a low alloy steel sleeve 4 between a bearing and a journal portion of a rotor (Fig. 1). The Young patent discloses a piston ring or

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engine part with a base layer of chromium and chromium nitride surface layer to improve durability, wear, and scuff resistance (column 1, lines 20 through 36). The patent to Little teaches tungsten carbide as a wear resistance layer for a screw press.

Simply stated, we share appellants' view that the claimed subject matter would not have been obvious based upon the teachings relied upon by the examiner. The patent to Djordjevic expressly discloses a plunger for a fuel injection pump that is fabricated from a wear resistant steel alloy. Clearly, Djordjevic lacks a teaching of the now claimed features of a low alloy steel substrate, a coating, and a coating thickness in the range of between about 0.5 and 5.0 microns. Considering the particular Djordjevic teaching and the distinct teachings of Tsuchiya, Young, and Little, we disagree with the examiner that these applied references, by themselves, would have been suggestive of reworking the Djordjevic plunger as proposed to yield the claimed subject matter. As we see it, only reliance upon impermissible hindsight would have enabled one to selectively apply the references before us to achieve the claimed invention. For the preceding reasons, each of the examiner's obviousness rejections cannot be sustained.

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The decision of the examiner is reversed.

REVERSED

IRWIN CHARLES COHEN)	
Administrative Patent Judge)	
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)	BOARD OF PATENT
NEAL E. ABRAMS)	APPEALS
Administrative Patent Judge)	AND
)	INTERFERENCES
)	
)	
)	
JOHN P. McQUADE)	
Administrative Patent Judge)	

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APJ COHEN

APJ McQUADE

APJ ABRAMS

DECISION:

Prepared By:

DRAFT TYPED: 16 Nov 04

FINAL TYPED: