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Paper 11
Entered: March 8, 2018

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

DYNAENERGETICS US, INC. and
DYNAENERGETICS GMBH & CO. KG,
Petitioner,

v.

GEODYNAMICS, INC.,
Patent Owner.

Case IPR2017-02008
Patent 8,220,394 B2

Before BEVERLY M. BUNTING, TIMOTHY J. GOODSON and ROBERT J. SILVERMAN, *Administrative Patent Judges.*

SILVERMAN, *Administrative Patent Judge.*

DECISION
Denying Institution of *Inter Partes* Review
37 C.F.R. § 42.108

I. INTRODUCTION

Petitioner filed a Petition (Paper 1, "Pet.") requesting *inter partes* review of claims 1–6, 11–26, and 28 (the "challenged claims") of U.S. Patent No. 8,220,394 B2 (Ex. 1001, "the '394 patent"). Patent Owner filed a Preliminary Response to the Petition. Paper 8 ("Prelim. Resp.").

We have authority under 35 U.S.C. § 314, which provides that an *inter partes* review may not be instituted "unless . . . there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition." We decide whether to institute an *inter partes* review on behalf of the Director. Upon consideration of the Petition and Patent Owner's Preliminary Response, and for the reasons explained below, we determine that Petitioner has not demonstrated that there is a reasonable likelihood that the challenged claims are unpatentable. Accordingly, we do not institute an *inter partes* review of any of the challenged claims of the '394 patent.

A. Related Matters

The parties state that Patent Owner is asserting the '394 patent in a civil action in the U.S. District Court for the Eastern District of Texas, *GeoDynamics, Inc. v. DynaEnergetics US, Inc.*, Civil Action No. 2:17-cv-00371. Pet. 6; Paper 4, 2. The parties do not list any related proceedings before the Board.

B. The '394 Patent (Ex. 1001)

The '394 patent relates to a reactive shaped-charge liner for a perforator used in oil and gas well completions. Ex. 1001, Abstract, 1:5–7. The process of carrying out a completion involves providing a flow path between the well bore and the surrounding formation (also known as the production zone). *Id.* at 1:11–14. Typically, such a flow path is formed

with the use of a perforator that employs a shaped charge of energetic material in the process of perforation — i.e., creating an opening in the casing of the well bore that extends into the formation. *Id.* at 1:15–20. The '394 patent provides the following description of a shaped-charge perforator:

> A shaped charge is an energetic device made up of a housing within which is placed a typically metallic liner. The liner provides one internal surface of a void, the remaining surfaces being provided by the housing. The void is filled with an explosive which, when detonated, causes the liner material to collapse and be ejected from the casing in the form of a high velocity jet of material. This jet impacts upon the well casing creating an aperture, the jet then continues to penetrate into the formation itself, until the kinetic energy of the jet is overcome by the material in the formation. The liner may be hemispherical but in most perforators is generally conical. The liner and energetic material are usually encased in a metallic housing.

Id. at 1:29–41.

Figure 1 of the '394 patent is reproduced below:

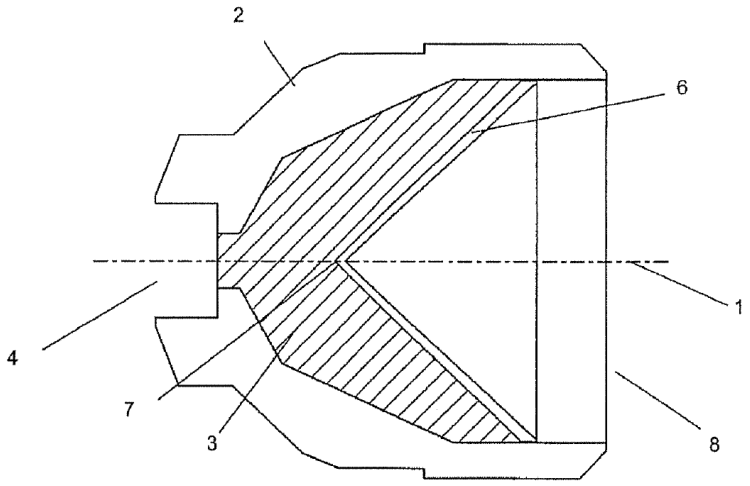

Figure 1 is a cross-sectional view of a shaped charge that includes a substantially cylindrical housing 2, a liner 6 that fits closely in the open end

8 of the cylindrical housing 2, and high explosive material 3 within the volume enclosed between the housing and the liner. *Id.* at 7:7–16. Typically, a detonator or detonator transfer cord is located in recess 4 and is used to initiate the high explosive material. *Id.* at 7:16–20.

The '394 patent states that one aspect of the invention is to provide a liner material that is capable of an exothermic reaction upon activation of the explosive material, which can provide thermal energy — in addition to the kinetic energy of the jet — that can be directed into the target substrate and may help to further distress and fracture the completion, so as to improve fluid outflow. *Id.* at 2:31–35, 50–60, 4:5–7, 6:6–8, 54–60. Another benefit of the reactive liner is that the liner material may be consumed, such that there is no slug of liner material left in the hole formed by the perforation. *Id.* at 8:8–11. Such an exothermic reaction of the liner can be achieved with a stoichiometric (molar) mixture of at least two metals which are capable upon activation of the shaped charge liner to produce an intermetallic product and heat. *Id.* at 2:61–3:3. The preferred metal-metal compositions identified in the '394 patent are the combinations of nickel with aluminum and palladium with aluminum. *Id.* at 3:45–48. Further, according to the '394 patent, the liners give particularly effective results when the two metals are provided in "proportions calculated to give an electron concentration of 1.5, that is a ratio of 3 valency electrons to 2 atoms such as in NiAl or PdAl." *Id.* at 3:52–56, 7:27–36. The '394 patent states that testing has shown NiAl to give particularly good results. *Id.* at 7:46–47.

Another aspect of the invention is the use of a further metal, in the liner, which is considered to be inert and does not participate in the exothermic reaction when the shaped charge is activated. *Id.* at 5:43–46.

The addition of inert metal provides additional mechanical strength to the liner and increases the penetrative power of the jet. *Id.* at 5:49–51, 55–59. Tungsten and copper have high density and ductility, which makes them desirable materials for this purpose. *Id.* at 5:51–55.

C. Illustrative Claim

Of the challenged claims, claims 1 and 28 are independent. Claims 2–6 and 11–26 depend, directly or indirectly, from claim 1. Claim 1 is representative of the challenged claims, and is reproduced below (with line breaks and indentations added):

> 1. A reactive, oil and gas well shaped charge perforator comprising
>
> a liner and an associated shaped charge,
>
> whereby the liner is a green compacted particulate composition formed from a powder mixture comprising at least two metal elements, and
>
> whereby the liner is reactive such that the at least two metal elements will undergo an intermetallic alloying reaction to give an exothermic reaction upon activation of the associated shaped charge, and
>
> in which the at least two metal elements are provided in respective proportions calculated to give an electron concentration of 1.5, and
>
> wherein the composition further comprises at least one further inert metal,
>
> wherein the at least one further inert metal is not capable of an exothermic reaction with the at least two metal elements upon activation of the shaped charge liner.

Ex. 1001, 7:64–8:10.

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