

Appl. No. : 11/615,539 Confirmation No. 1057
Applicant(s): Stuart N. Milligan et al. Examiner: Boyle, Robert C.
Filed : 12/22/2006 TC/A.U.: 1796
Docket No. : 34249US
For: Drag Reduction of Asphaltenic Crude Oils

Commissioner for Patents
P.O. Box 1450
Alexandria VA 22313-1450

AFFIDAVIT UNDER 37 CFR 1.132

I Ray L. Johnston state as follows:


1. I am over 18 years of age and competent to make this Affidavit.
2. I am a citizen of the United States and a resident of Ponca City, Oklahoma.
3. I have been employed by ConocoPhillips Company since 1980 where my current position is Senior Principal Engineer in the Specialty Products division.
4. My educational background includes a Bachelors of Science in Chemical Engineering and a Masters of Chemical Engineering from Oklahoma State University.
5. I currently have four pending patents and eleven issued patents with the United States Patent and Trademark Office.
6. I have authored four peer reviewed publications and in the past two years presented at three international conferences in the area of heavy oil and pipeline technologies.
7. I am a named inventor in the above identified pending patent application.
8. This currently pending patent application provides a method of introducing a drag reducing polymer into a liquid hydrocarbon wherein the liquid hydrocarbon has an asphaltene content of at least 3 weight percent and an API gravity of less than about 26° to thereby produce a

treated liquid hydrocarbon wherein the viscosity of the treated liquid hydrocarbon is not less than the viscosity of the liquid hydrocarbon prior to treatment with the drag reducing polymer.

9. The limitations put forth by our patent application of a liquid hydrocarbon has an asphaltene content of at least 3 weight percent and an API gravity of less than about 26° to place the liquid hydrocarbon in the range of “heavy crude oils” as known by one skilled in the art.
10. Heavy crude oil differs from medium crude oil and light crude oil due to specific characteristics such as viscosity, density, and asphaltene content. Furthermore the specific characteristics of heavy, medium and light crude oil means that drag reducers that work for one type of crude oil would not work for other types of crude oils.
11. ConocoPhillips uses LPTM 100 Flow Improver as a drag reducer specifically for light crude oil. LPTM100 Flow Improver does not work as effectively as a drag reducer for medium crude oil and does not work in heavy crude oil due to the different crude oil characteristics. ConocoPhillips uses LPTM 300 and LPTM 400 Flow Improvers as drag reducers specifically for medium crude oil. LPTM300 and LPTM400 Flow Improver do not work as effectively in light crude oil and do not work in heavy crude oil due to the different crude oil characteristics. ConocoPhillips uses ExtremePowerTM Flow Improver as a drag reducer specifically for heavy crude oil and this flow improver does not work very effectively as a drag reducer for light or medium crude oil due to the different crude oil characteristics.
12. Current science teaches that it would not be possible to create a drag reducer that works equally effective for light, medium and heavy crude oil as the vastly different chemical differences in the different types of crude oil prevent that from occurring.
13. When testing drag reducers for capable use in heavy crude oil, it is necessary to test the drag reducers in the actual heavy crude oil due to the presence of asphaltenes and high viscosity of the heavy crude oil. Likewise, it is not practical to test drag reduction in heavy crude oil in the laboratory. Actual testing of drag reducers in heavy crude oil must take place in the field in large diameter pipelines due to the high viscosity of heavy crude oil and the requirement for turbulence.

14. Inaoka tested his drag reducer in xylene and kerosene, therefore one skilled in the art would realize that he only enabled the ability of his drag reducer to operate in light or low viscosity oil.
15. Prior to the invention of ConocoPhillips ExtremePower™ drag reducer, in 2006, heavy crude oil was scientifically thought to be impossible to effectively drag reduce in pipelines due to the high viscosity and asphaltene content and resultant lack of sufficient turbulence within the pipeline.
16. One skilled in the art, prior to 2006, would not have considered any drag reducer capable of operating in heavy crude oil. Therefore, any mention of effective crude oil drag reduction prior to 2006 only meant use of a drag reducer in light or medium crude oil.
17. I further declare that all statements made herein of my own knowledge are true; all statements made on information or belief are believed to be true; and these statements are made with the knowledge that willful, false statements and the like so made are punishable by fine, imprisonment, or both, under § 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of this application or any patent issuing thereon.

Respectfully submitted,

By 
Ray L. Johnston

Date: August 13, 2010