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**DeSantis et al.**

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(54) **LUBRICANT COMPOSITIONS COMPRISING EPOXIDE COMPOUNDS**

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See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

| | | | | |
|---|---|---|---|---|
| 2,636,862 | A | | 4/1953 | Watson |
| 2,665,254 | A | | 1/1954 | Coppock |
| 2,684,943 | A | | 7/1954 | Baker |
| 2,734,032 | A | | 2/1956 | Coppock |
| 3,264,216 | A | | 8/1966 | Rockett |
| 3,619,423 | A | | 11/1971 | Galletti et al. |
| 3,637,507 | A | | 1/1972 | Gentit |
| 3,723,320 | A | | 3/1973 | Herber et al. |
| 3,769,221 | A | | 10/1973 | Burnous |
| 3,932,290 | A | | 1/1976 | Koch et al. |
| 3,941,708 | A | * | 3/1976 | Gentit et al. ..... 252/78.5 |
| 3,951,837 | A | | 4/1976 | Sheratte |
| 3,983,046 | A | | 9/1976 | Sheratte |
| 4,206,067 | A | * | 6/1980 | MacKinnon ..... 252/75 |
| 4,244,829 | A | | 1/1981 | Coupland et al. |
| 4,248,726 | A | | 2/1981 | Uchinuma et al. |
| 4,267,064 | A | | 5/1981 | Sasaki et al. |

(Continued)

FOREIGN PATENT DOCUMENTS

| | | | |
|---|---|---|---|
| CN | 102959065 | A | 3/2013 |
| EP | 0460309 | B1 | 8/1995 |

(Continued)

OTHER PUBLICATIONS

EIC Search Review Sep. 24, 2014.*

(Continued)

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(57) **ABSTRACT**

A lubricant composition including an epoxide compound is disclosed. An additive package including the epoxide compound is also disclosed. The epoxide compound of the lubricant composition acts to improve compatibility of the lubricant composition with a fluoropolymer seal and improve the total base number of the lubricant composition.

**10 Claims, No Drawings**