

Title (en)  
HYDRAULIC DELAY TOE VALVE METHOD

Title (de)  
VERFAHREN FÜR HYDRAULISCHES VERZÖGERUNGSSPITZENVENTIL

Title (fr)  
PROCÉDÉ DE CLAPET À PIED DE RETARD HYDRAULIQUE

Publication  
**EP 3219906 A1 20170920 (EN)**

Application  
**EP 17165433 A 20160823**

Priority  
• US 201514840473 A 20150831  
• EP 16185314 A 20160823

Abstract (en)  
An apparatus and method for providing a time delay in injection of pressured fluid into a geologic formation. In one aspect the invention is a toe valve activated by fluid pressure that opens ports after a predetermined time interval to allow fluid to pass from a well casing to a formation. The controlled time delay enables casing integrity testing before fluid is passed through the ports. This time delay also allows multiple valves to be used in the same well casing and provide a focused jetting action to better penetrate a concrete casing lining.

IPC 8 full level  
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**E21B 43/20** (2013.01 - CN); **E21B 34/14** (2013.01 - CN EP US); **E21B 2200/06** (2020.05 - EP)

Citation (applicant)  
US 6763892 B2 20040720 - KASZUBA FRANK [CA]

Citation (search report)  
• [X] US 2014251619 A1 20140911 - GEORGE KEVIN R [US], et al  
• [X] CA 2892128 A1 20150724 - GEODYNAMICS INC [US]  
• [A] US 8267178 B1 20120918 - SOMMERS MICHAEL T [US], et al  
• [A] US 2012279723 A1 20121108 - HOFMAN RAYMOND [US], et al

Designated contracting state (EPC)  
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR

Designated extension state (EPC)  
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**EP 3138993 A2 20170308; EP 3138993 A3 20170419; EP 3138993 B1 20210120**; CA 2939553 A1 20170228; CA 2939553 C 20231003;  
CN 106481309 A 20170308; CN 106481309 B 20210507; EP 3219906 A1 20170920; EP 3219906 B1 20191009

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**EP 16185314 A 20160823**; CA 2939553 A 20160822; CN 201610780139 A 20160830; EP 17165433 A 20160823