



(12) **United States Patent**
McAlister et al.

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(54) **INTEGRATED FUEL INJECTOR IGNITERS CONFIGURED TO INJECT MULTIPLE FUELS AND/OR COOLANTS AND ASSOCIATED METHODS OF USE AND MANUFACTURE**

F02M 43/04; F02M 53/043; F02D 19/0694;
F02B 17/005
See application file for complete search history.

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(57) **ABSTRACT**

Embodiments of injectors configured for adaptively injecting multiple different fuels and coolants into a combustion chamber, and for igniting the different fuels, are disclosed herein. An injector according to one embodiment includes a body having a first end portion and a second end portion. The injector further includes a first flow channel extending through the body, and a second flow channel extending through the body that is separate from the first flow channel and electrically isolated from the first flow channel. The first flow channel is configured to receive a first fuel, and the second flow channel is configured to receive at least one of a second fuel and a coolant. The injector further comprises a valve carried by the body that is movable between a closed position and an open position to introduce at least one of the second fuel and the coolant into a combustion chamber.

9 Claims, 4 Drawing Sheets

