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Gerty

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(54) **MIXER FOR PULSED EGR**

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This patent is subject to a terminal disclaimer.

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F01N 3/00	(2006.01)

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See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

3,776,207	A *	12/1973	Simko	F02M 25/073	123/568.12
4,056,933	A *	11/1977	Nohira	F02M 25/0749	60/313
5,987,884	A *	11/1999	Kibe	F02B 37/00	60/286
6,220,233	B1	4/2001	Pierpont		
6,425,381	B1 *	7/2002	Rammer	F02M 25/0796	60/605.2

(Continued)

FOREIGN PATENT DOCUMENTS

DE	9421145 U1 *	5/1995	.....	F02M 25/0707
DE	102004015108 A1 *	10/2005	.....	F02M 25/0749

(Continued)

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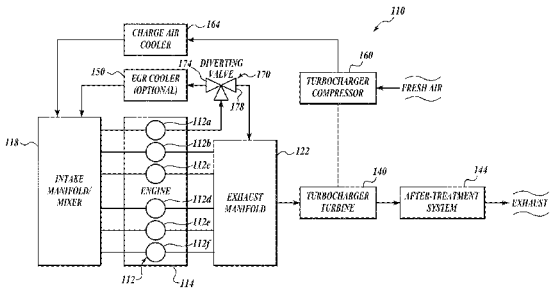
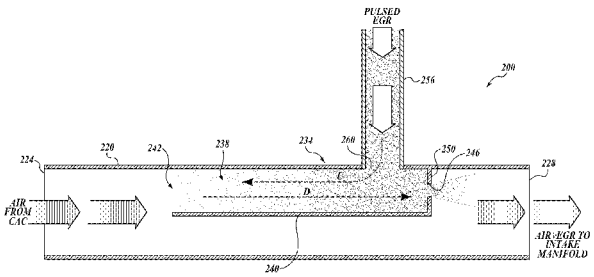
(57) **ABSTRACT**

A mixer for pulsed exhaust gas recirculation (EGR) includes a fresh intake air conduit having an inlet opening configured to be placed into fluid communication with a fresh intake air source, an EGR pocket having an upstream opening in fluid communication with an upstream air source and a downstream opening in fluid communication with the fresh intake air conduit, and an EGR conduit configured to introduce pulsed EGR into the EGR pocket.

20 Claims, 6 Drawing Sheets