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(12) United States Patent
Baker et al.**(10) Patent No.: US 9,750,726 B2**
(45) Date of Patent: Sep. 5, 2017**(54) COMBINATIONS OF A MUSCARINIC
RECEPTOR ANTAGONIST AND A BETA-2
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U.S.C. 154(b) by 0 days.**(21) Appl. No.: 14/970,945****(22) Filed: Dec. 16, 2015****(65) Prior Publication Data**

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B65D 75/36 (2006.01)**(52) U.S. Cl.**CPC **A61K 31/439** (2013.01); **A61K 9/0075**
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45/06 (2013.01); **B65D 75/36** (2013.01)**(58) Field of Classification Search**CPC **A61K 2300/00**; **A61K 31/138**; **A61K**
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(56) References Cited

U.S. PATENT DOCUMENTS

6,537,983 B1 3/2003 Biggadike et al.
6,759,398 B2 7/2004 Biggadike
6,878,698 B2 4/2005 Biggadike et al.
7,101,866 B2 9/2006 Biggadike et al.
7,361,787 B2 4/2008 Box et al.
7,439,393 B2 10/2008 Box et al.
7,488,827 B2 2/2009 Laine et al.7,498,440 B2 3/2009 Laine et al.
7,629,335 B2 12/2009 Biggadike et al.
7,776,895 B2 8/2010 Box et al.
7,982,067 B2 7/2011 Box et al.
8,183,257 B2 5/2012 Laine et al.
8,309,572 B2 11/2012 Laine et al.
RE44,874 E 4/2014 Box et al.
2009/0029901 A1 1/2009 Wood-Kaczmar
2009/0298742 A1 12/2009 Roche et al.
2011/0269970 A1 11/2011 Box et al.
2012/0309725 A1 12/2012 Baker et al.
2014/0113888 A1 4/2014 Crater
2015/0313841 A1 11/2015 Jones

FOREIGN PATENT DOCUMENTS

WO WO 03/024439 A1 3/2003
WO 2004110404 A1 12/2004
WO WO 2005/037280 A1 4/2005
WO WO 2005/046636 A1 5/2005
WO WO 2005/104745 A2 11/2005
WO 2005115462 A1 12/2005
WO 2005115464 A1 12/2005
WO 2005115465 A1 12/2005
WO 2005115466 A1 12/2005
WO 2005115467 A1 12/2005
WO WO 2005/115463 A1 12/2005
WO 2006062883 A2 6/2006
WO 2006062931 A2 6/2006
WO 2007012871 A1 2/2007
WO 2007068896 A1 6/2007
WO 2008012338 A2 1/2008
WO 2008021142 A2 2/2008
WO 2009036243 A1 3/2009
WO 2010038086 A2 4/2010
WO 2010072354 A1 7/2010
WO WO 2010/097114 A1 9/2010
WO WO 2010/097115 A1 9/2010
WO 2011067212 A1 6/2011
WO 2012168160 A1 12/2012
WO 2012168161 A1 12/2012

OTHER PUBLICATIONS

Jones P., *Aclidinium Bromide Twice Daily for the Treatment of
Chronic Obstructive Pulmonary Disease: A Review*, Adv. Ther.
(2013), vol. 30, No. 4, pp. 354-368.Laine, et al. *Journal of Medicinal Chemistry*, 52(8): 2493-2505
(2009).

U.S. Appl. No. 12/353,436, filed Jan. 14, 2009.

U.S. Appl. No. 13/401,890, filed Feb. 22, 2012.

Fluticasone Drug information Online, Jun. 4, 2009.

Aaron, S. et al., "Tiotropium in Combination with Placebo,
Salmeterol, or Fluticasone-Salmeterol for Treatment of Chronic
Obstructive Pulmonary Disease. A Randomized Trial," *Annals of
Internal Medicine*, pp. 545-556, W-144, vol. 148 (8), Apr. 17, 2007
American College of Physicians.Biggadike, K., "Letter" *Clin. Resp. J.* 5:3, 183-184 (2011) Print.

(Continued)

Primary Examiner — Jean Cornet**(74) Attorney, Agent, or Firm** — James P. Riek; R. Steve
Thomas; William R. Majarian**(57) ABSTRACT**Combinations of a muscarinic acetylcholine receptor
antagonist and a beta 2 agonist for inhaled administration via
the nose or mouth, and methods of using them are provided.**17 Claims, No Drawings**