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**Burnside et al.**

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(54) **ORAL PULSED DOSE DRUG DELIVERY SYSTEM**

(75) Inventors: **Beth A. Burnside**, Bethesda; **Xiaodi Guo**, Derwood; **Kimberly Fiske**, Bethesda; **Richard A. Couch**, Chevy Chase; **Donald J. Treacy**, Annapolis, all of MD (US); **Rong-Kun Chang**, Hockessin, DE (US); **Charlotte McGuinness**, Bethesda; **Edward M. Rudnic**, North Potomac, both of MD (US)

(73) Assignee: **Shire Laboratories, Inc.**, Rockville, MD (US)

(\*) Notice: This patent issued on a continued prosecution application filed under 37 CFR 1.53(d), and is subject to the twenty year patent term provisions of 35 U.S.C. 154(a)(2).

Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

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(51) **Int. Cl.**<sup>7</sup> ..... **A61K 9/16**

(52) **U.S. Cl.** ..... **424/494; 424/472; 424/480**

(58) **Field of Search** ..... 424/494, 457, 424/471, 472, 480, 497, 461, 462, 470, 458, 459, 460, 468, 482

(56) **References Cited**

**U.S. PATENT DOCUMENTS**

4,723,958	2/1988	Pope et al. ....	604/890.1
4,871,549	10/1989	Ueda et al. .	
4,891,230	1/1990	Geoghegan et al. ....	424/461

(List continued on next page.)

**FOREIGN PATENT DOCUMENTS**

87/00044 1/1987 (WO) .  
90/09168 8/1990 (WO) .

**OTHER PUBLICATIONS**

Conte, et al., "Press-coated tablets for time-programmed release of drugs," *Biomaterials*, 14(13):1017-1023 (1993).  
Gazzaniga, et al., "Time-dependent oral delivery systems for colon targeting," *S.T.P. Pharma Sciences*, 5(1):83-88 (1995).

Gazzaniga, et al., "Oral Chronotropic Drug Delivery Systems: Achievement of Time and/or Site Specificity," *Eur. J. Pharm. Biopharm*, 40(4):246-250 (1994).

Pozzi, et al., "The Time Clock system: a new oral dosage form for fast and complete release of drug after a predetermined lag time," *Journal of Controlled Release*, 31:99-108 (1994).

Walia, et al., "Preliminary Evaluation of an Aqueous Wax Emulsion for Controlled-Release Coating," *Pharmaceutical Development and Technology*, 3(1):103-113 (1998).

Wilding, et al., "Gastrointestinal Transit and Systemic Absorption of Captopril from a Pulsed-Release Formulation," *Pharmaceutical Research*, 9(5):654-657 ((1992).

Xin Xu and Pink I. Lee, "Programmable Drug Delivery from an Erodible Association Polymer System," *Pharmaceutical Research*, 10(8):1144-1152 (1993).

*Primary Examiner*—Diana Dudash

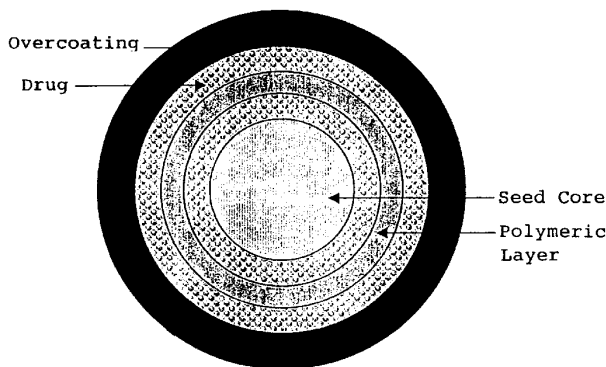
*Assistant Examiner*—Alysia Berman

(74) *Attorney, Agent, or Firm*—Elliot M. Olstein; Raymond J. Lillie

(57) **ABSTRACT**

A multiple pulsed dose drug delivery system for pharmaceutically active amphetamine salts, comprising an immediate-release component and an enteric delayed-release component wherein (1) the enteric release coating has a defined minimum thickness and/or (2) there is a protective layer between the pharmaceutically active amphetamine salt and the enteric release coating and/or (3) there is a protective layer over the enteric release coating. The product can be composed of either one or a number of beads in a dosage form, including either capsule, tablet, or sachet method for administering the beads.

**24 Claims, 8 Drawing Sheets**



U.S. PATENT DOCUMENTS

				5,229,131	7/1993	Amidon et al. ....	424/451
				5,275,819	1/1994	Amer et al. ....	424/408
4,894,240	1/1990	Geoghegan et al. ....	424/497	5,364,620	11/1994	Geoghegan et al. ....	424/497
4,902,516	2/1990	Korsatko et al. ....	424/497	5,395,628	3/1995	Noda et al. ....	424/490
4,917,899	4/1990	Geoghegan et al. ....	424/461	5,407,686 *	4/1995	Patel et al. ....	424/468
5,002,776	3/1991	Geoghegan et al. ....	424/497	5,474,786 *	12/1995	Kotwal et al. ....	424/472
5,011,692	4/1991	Fujioka et al. ....	424/426	5,616,345	4/1997	Geoghegan et al. ....	424/497
5,011,694	4/1991	Nuernberg et al. ....	424/464	5,840,329	11/1998	Bai .....	424/458
5,051,262	9/1991	Panoz et al. ....	424/468				
5,093,200 *	3/1992	Watanabe et al. ....	428/407				
5,226,902	7/1993	Bae et al. ....	604/892.1				

\* cited by examiner

FIG. 1

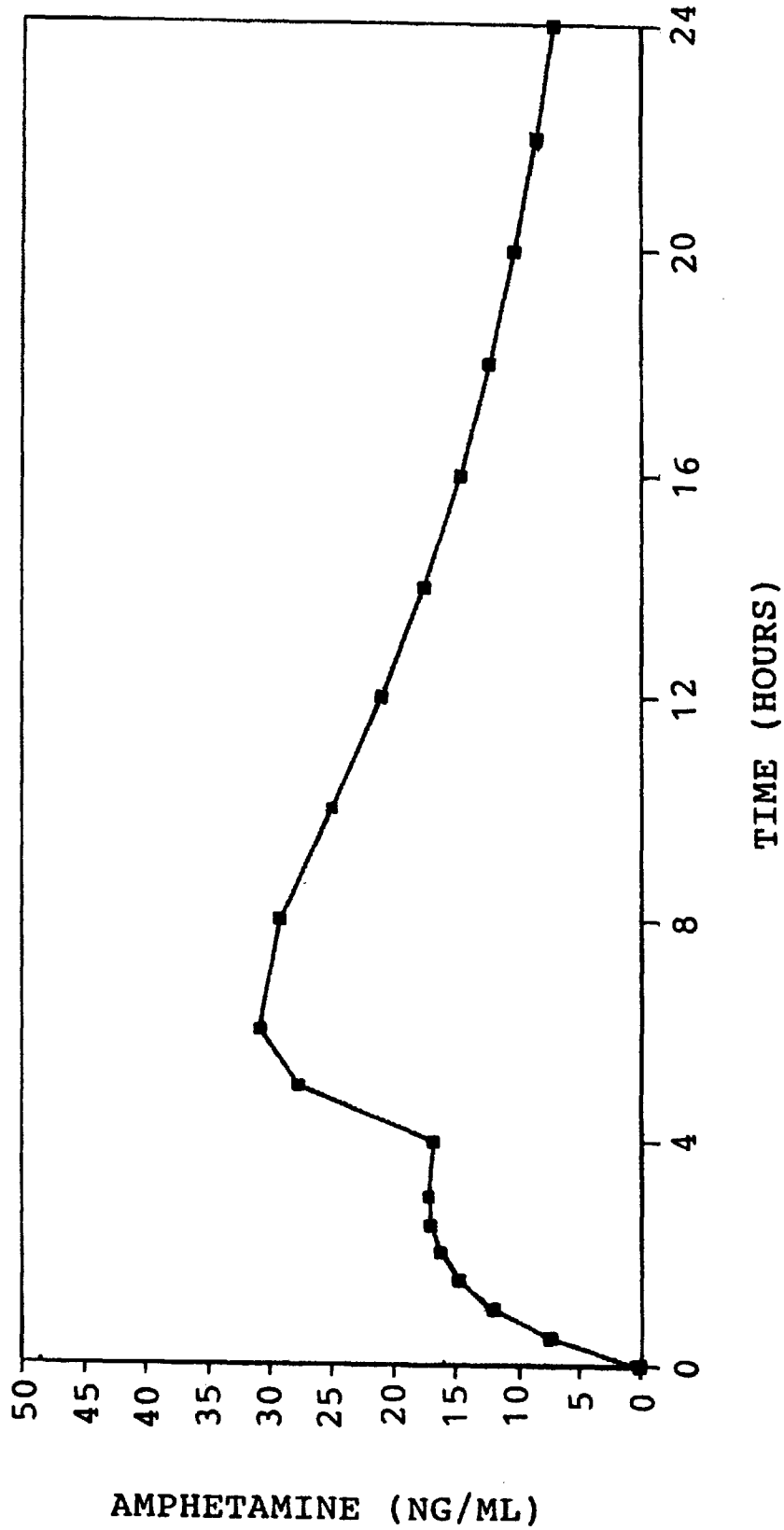


FIG. 2A

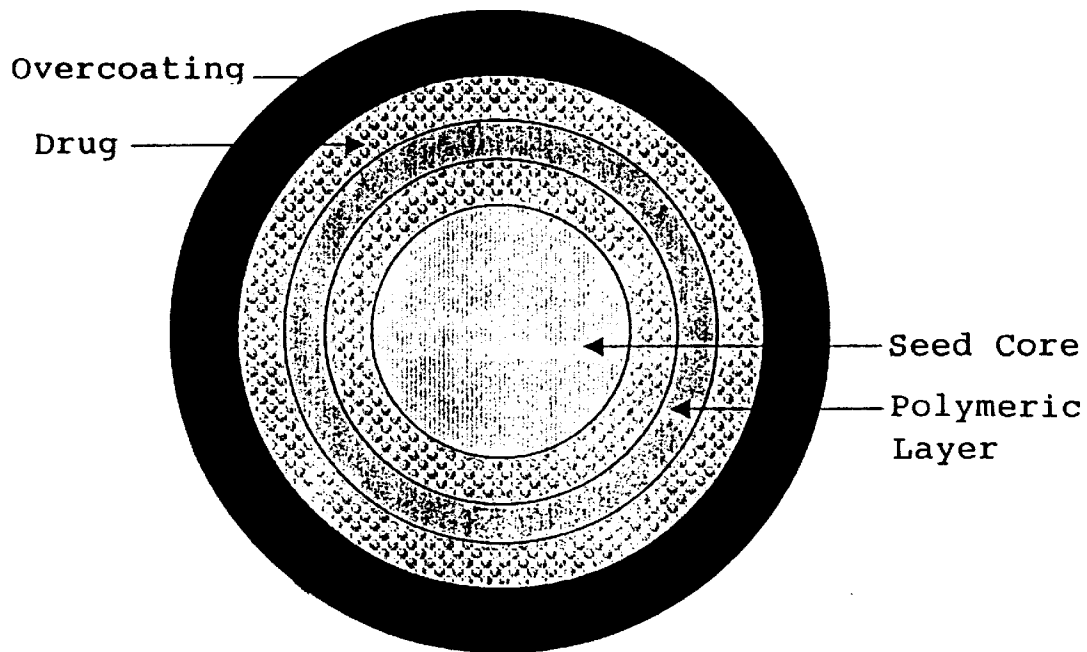
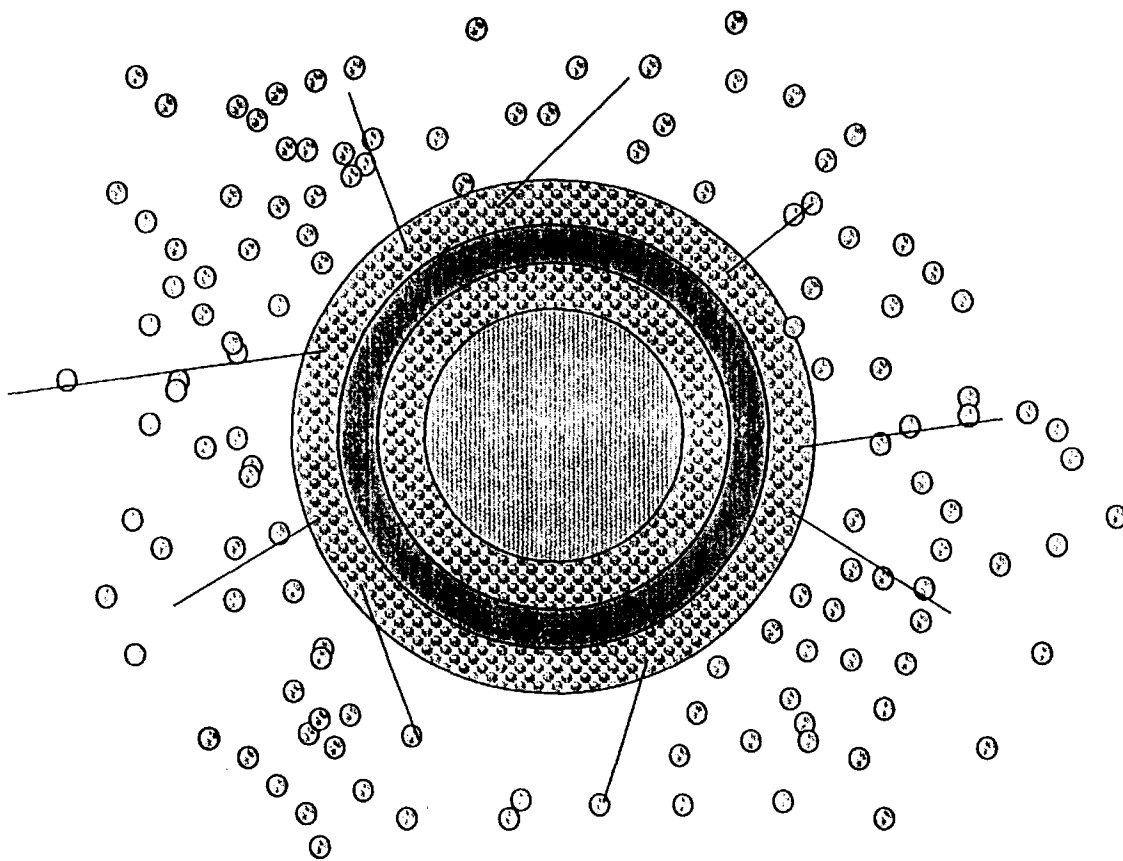


FIG. 2B



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