

[54] DRUG-DELIVERY SYSTEM

- [75] Inventor: **Alejandro Zaffaroni**, Atherton, Calif.
- [73] Assignee: **Alza Corporation**, Palo Alto, Calif.
- [22] Filed: **June 2, 1970**
- [21] Appl. No.: **42,786**

**Related U.S. Application Data**

- [63] Continuation-in-part of Ser. Nos. 812,116, April 1, 1969, and Ser. No. 864,175, Oct. 6, 1969.

- [52] U.S. Cl. .... **128/260**
- [51] Int. Cl. .... **A61m 5/00**
- [58] Field of Search ..... 128/260, 130, 268; 3/1; 424/19; 206/.5, 84; 236/6, 60

**References Cited**

**UNITED STATES PATENTS**

3,630,200	12/1971	Higuchi.....	128/260
3,598,122	4/1969	Zaffaroni .....	128/268
3,577,512	5/1971	Shepherd et al.....	424/21
2,736,682	2/1956	Hermelin .....	424/19
3,518,340	6/1970	Raper .....	264/251
3,039,933	6/1962	Goldman .....	424/19
3,093,831	6/1963	Jordan .....	3/1
3,432,592	3/1969	Speiser.....	424/19

**OTHER PUBLICATIONS**

Lehmann, "Acrylic Resin Coatings for the Manufacture of Depot Preparation of Drugs," *Drugs Made in Germany*, Vol. 10, 1967, pp. 115-118.  
 Lehmann, et al., "Permeable Acrylic Resin Varnishes for the Production of Depot Dosage Forms Part 2: Coating of Granules and Pellets, Production of Skeleton Tablets" (First Installment), *Die Pharmazeutische Industrie*, Vol. 31, No. 5, 1969 pp. 319-322.  
 Lehmann, et al., "Permeable Acrylic Resin Varnishes for the Production of Depot Dosage Forms Part 2: Coating of Granules and Pellets, Production of Skeleton Tablets" (Second Installment), *Die Pharmazeutische Industrie*, Vol. 31, No. 6, 1969, pp. 409-412.  
 Kratochvil et al., "Sustained Release Hormonal Preparations," *Steroids*, Vol. 15, No. 4, April 1970, pp. 505-511.

*Primary Examiner*—G. E. McNeill  
*Attorney, Agent, or Firm*—Edward L. Mandell; Thomas E. Ciotti; Paul L. Sabatine

[57] **ABSTRACT**

Drug-delivery system for releasing drug at a controlled rate for a prolonged period of time is formed from a solid inner matrix material having solid particles of drug dispersed therethrough. Surrounding the inner matrix is an outer polymeric membrane, insoluble in body fluids. Both the inner matrix material and the outer polymeric membrane are permeable to passage of the drug by diffusion but the drug diffuses through the outer polymeric membrane at a lesser rate so that passage through the polymeric membrane is the drug release rate controlling step.

**11 Claims, 3 Drawing Figures**

