

- [54] **VOLUMETRIC PUMP WITH REPLACEABLE RESERVOIR ASSEMBLY**
- [76] Inventor: **Dean L. Kamen**, 46 Gage Rd., Bedford, N.H. 03102
- [21] Appl. No.: **551,851**
- [22] Filed: **Nov. 15, 1983**
- [51] Int. Cl.⁴ **A61M 37/00**
- [52] U.S. Cl. **604/155; 604/211; 604/224; 604/228; 604/245; 128/DIG. 12; 222/390**
- [58] **Field of Search** 604/155, 65, 67, 118, 604/151, 152, 154, 208, 211, 213, 218, 224, 228, 230, 245, 110; 128/DIG. 12; 222/390

4,108,177	8/1978	Pistor	604/155
4,126,132	11/1978	Portner et al.	128/214 F
4,142,524	3/1979	Jassawalla et al.	128/214 F
4,150,672	4/1979	Whitney et al.	128/214 F
4,191,187	3/1980	Wright	128/218 A
4,258,866	3/1981	Bergman	222/390
4,269,185	5/1981	Whitney et al.	128/214 F
4,300,554	11/1981	Hessberg et al.	128/218 A
4,320,757	3/1982	Whitney et al.	128/214 F
4,326,517	4/1982	Whitney et al.	128/214 F
4,342,311	8/1982	Whitney et al.	128/214 F
4,367,738	1/1983	Legendre et al.	604/110
4,391,272	7/1983	Staempfli	604/110
4,399,712	8/1983	Oshikubo et al.	604/155
4,465,475	8/1984	Madorf et al.	604/155
4,493,704	1/1985	Beard et al.	604/154

[56] **References Cited**

U.S. PATENT DOCUMENTS

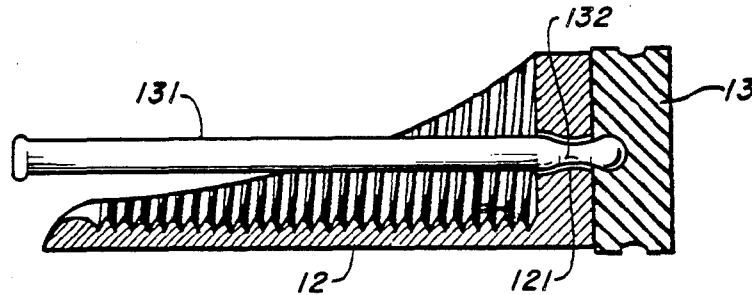
996,128	6/1911	Payne et al. .	
2,602,446	8/1952	Glass et al.	128/218
2,627,270	2/1953	Glass	604/155
2,627,999	2/1953	Swan	222/390
2,725,877	12/1955	Reiter et al.	604/224
2,734,504	2/1956	Crescas et al.	604/155
3,155,090	11/1964	Holter	128/2
3,156,236	11/1964	Williamson	128/2.05
3,395,704	8/1960	Frey et al.	604/154
3,456,649	7/1969	Jewett	128/214
3,623,474	11/1971	Hellman et al.	128/2 R
3,631,847	1/1972	Hobbs	128/2 R
3,701,345	10/1972	Hellman et al.	128/2 R
3,771,694	11/1973	Kaminski	128/DIG. 13
3,790,048	2/1974	Luciano et al.	604/211
3,811,442	5/1974	Maroth	128/218 R
3,812,843	5/1974	Wootten et al.	128/2 R
3,858,581	1/1975	Kamen	128/218 A
3,880,138	4/1975	Wootten et al.	128/2 A
3,886,938	6/1975	Szabo et al.	128/218 A
4,059,110	11/1977	Wuthrich et al.	128/218 A
4,073,321	2/1978	Moskowitz	604/208

Primary Examiner—Stephen C. Pellegrino
Assistant Examiner—Mark Rooney
Attorney, Agent, or Firm—Bromberg, Sunstein & McGregor

[57] **ABSTRACT**

An infusion pump has a removable reservoir including a piston and drive member. The drive member is an internally threaded elongated portion of the piston. A motor rotates a short drive screw, which engages the threads of the drive member to displace the piston in the reservoir. In one embodiment the piston is attached to the drive member by a severable central stem which breaks away to allow engagement with the drive screw. With the stem severed, the piston cannot be retracted, or the reservoir refilled. Other safety features are shown for locking the displaced piston in the reservoir. A digital metering system has a safety circuit to prevent dangerous failure modes of the rotation sensor and motor drive systems.

7 Claims, 17 Drawing Figures



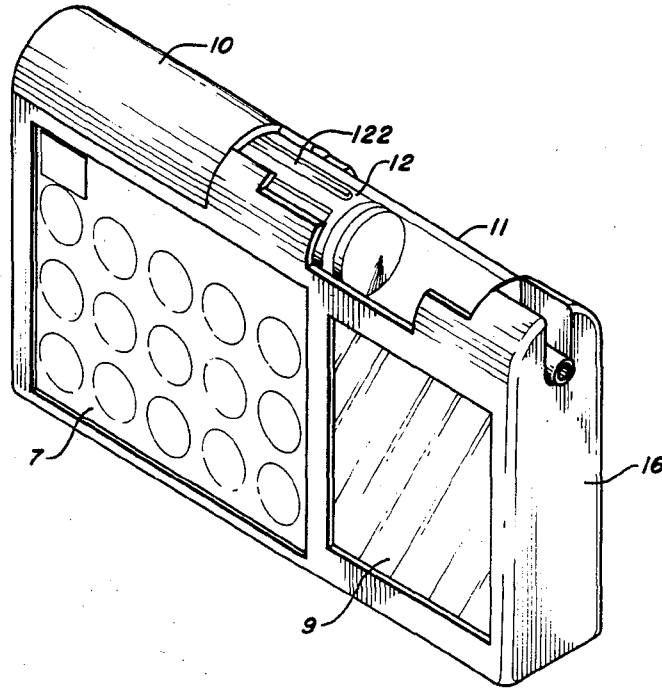


FIG. 1A

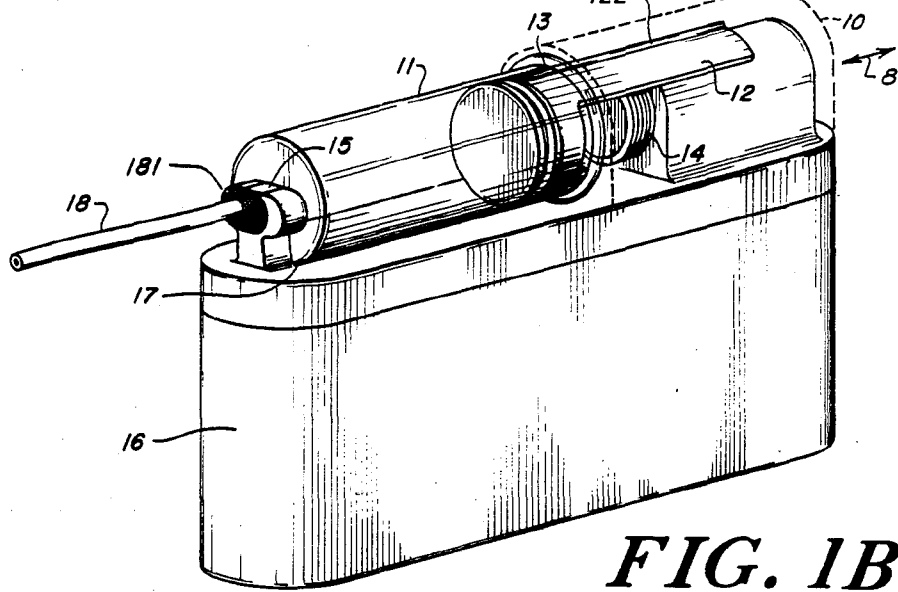


FIG. 1B

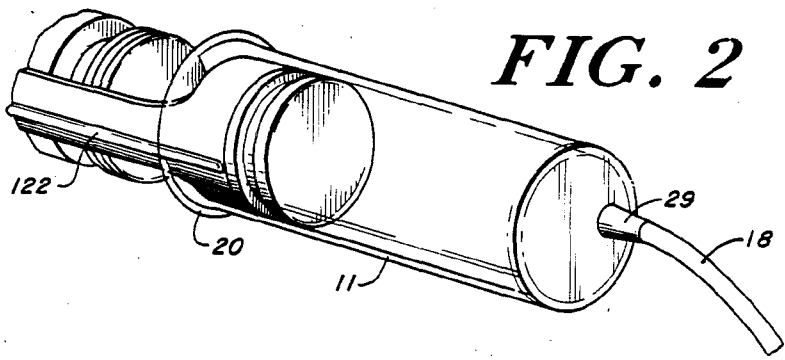


FIG. 2

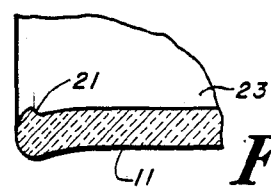


FIG. 2A

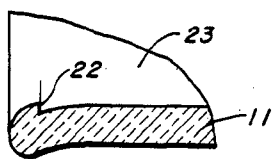


FIG. 2B

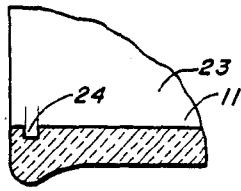


FIG. 2C

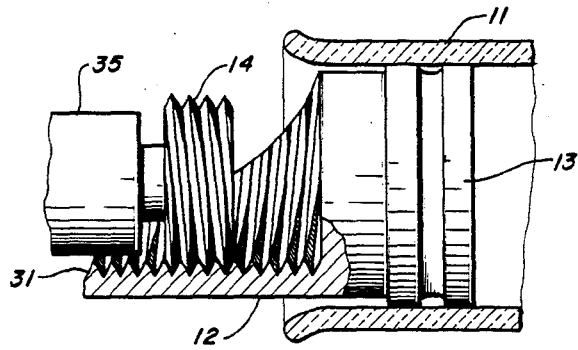


FIG. 3

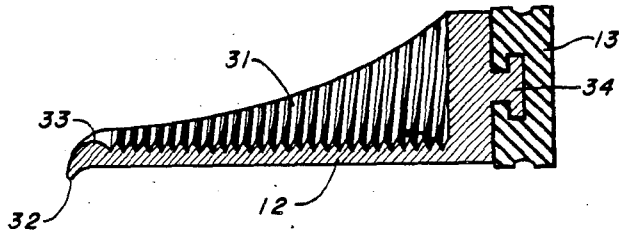


FIG. 3A

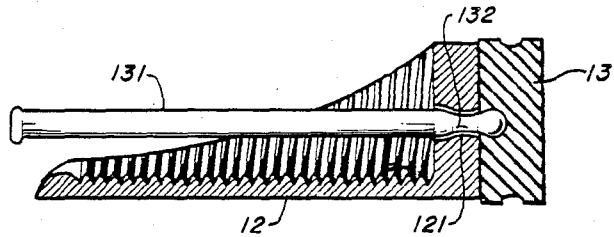


FIG. 3B

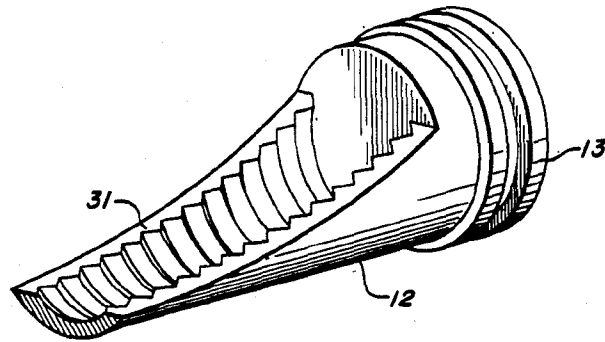


FIG. 4



FIG. 5A

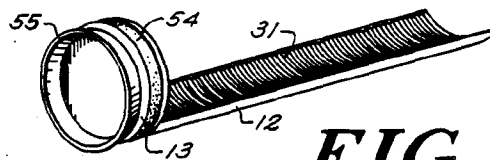


FIG. 5B

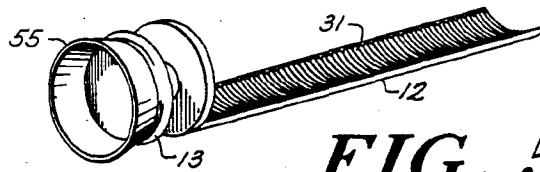


FIG. 5C

Explore Litigation Insights

Docket Alarm provides insights to develop a more informed litigation strategy and the peace of mind of knowing you're on top of things.

Real-Time Litigation Alerts



Keep your litigation team up-to-date with **real-time alerts** and advanced team management tools built for the enterprise, all while greatly reducing PACER spend.

Our comprehensive service means we can handle Federal, State, and Administrative courts across the country.

Advanced Docket Research



With over 230 million records, Docket Alarm's cloud-native docket research platform finds what other services can't. Coverage includes Federal, State, plus PTAB, TTAB, ITC and NLRB decisions, all in one place.

Identify arguments that have been successful in the past with full text, pinpoint searching. Link to case law cited within any court document via Fastcase.

Analytics At Your Fingertips



Learn what happened the last time a particular judge, opposing counsel or company faced cases similar to yours.

Advanced out-of-the-box PTAB and TTAB analytics are always at your fingertips.

API

Docket Alarm offers a powerful API (application programming interface) to developers that want to integrate case filings into their apps.

LAW FIRMS

Build custom dashboards for your attorneys and clients with live data direct from the court.

Automate many repetitive legal tasks like conflict checks, document management, and marketing.

FINANCIAL INSTITUTIONS

Litigation and bankruptcy checks for companies and debtors.

E-DISCOVERY AND LEGAL VENDORS

Sync your system to PACER to automate legal marketing.