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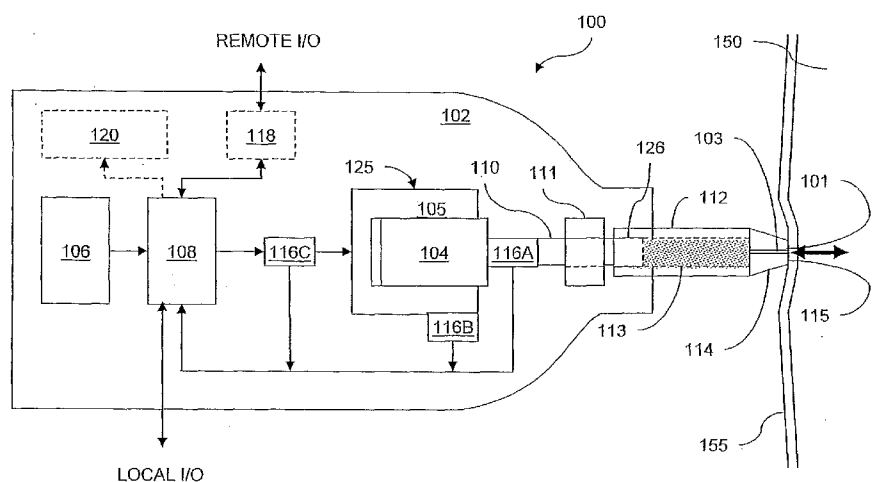
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(54) Title: CONTROLLED NEEDLE-FREE TRANSPORT



(57) Abstract: A needle-free transdermal transport device for transferring a substance across a surface of a biological body includes a reservoir for storing the substance, a nozzle in fluid communication with the reservoir and a controllable electromagnetic actuator in communication with the reservoir. The actuator, referred to as a Lorentz force actuator, includes a stationary magnet assembly and a moving coil assembly. The coil assembly moves a piston having an end portion positioned within the reservoir. The actuator receives an electrical input and generates in response a corresponding force acting on the piston and causing a needle-free transfer of the substance between the reservoir and the biological body. The magnitude, direction and duration of the force are dynamically controlled (e.g., servo-controlled) by the electrical input and can be altered during the course of an actuation cycle. Beneficially, the actuator can be moved in different directions according to the electrical input.

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