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(19) **United States**(12) **Patent Application Publication****Eisenberg et al.**(10) **Pub. No.: US 2006/0199992 A1**(43) **Pub. Date: Sep. 7, 2006**(54) **MAGNETIC STIMULATOR****Publication Classification**(76) Inventors: **Solomon R Eisenberg**, Newton, MA (US); **Daniel Mocanu**, Braila (RO)(51) **Int. Cl.**
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(52) **U.S. Cl.** **600/14**

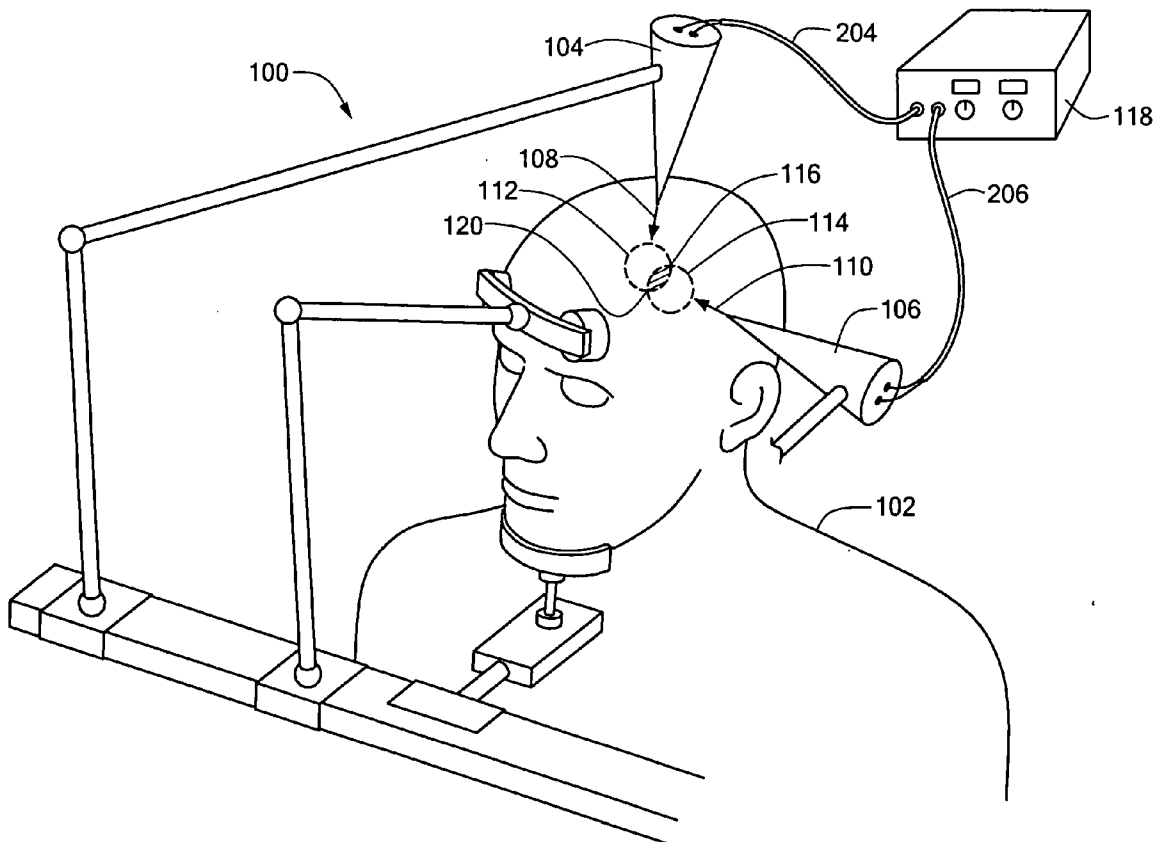
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LEBOVICI LLP
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BOSTON, MA 02109 (US)**(57) **ABSTRACT**

At least two coils deliver at least two time-varying magnetic fields to a target region within a body. The coils are oriented such that the magnetic fields create intersecting electric fields in the target region. The magnetic fields operate at different frequencies and thus produce a beat frequency signal where the electric fields intersect. The frequencies are chosen so a time-varying electric field, or a current induced by a time-varying magnetic field, alternating at the beat frequency would stimulate excitable tissue located in the target region. Some embodiments utilize a novel coil, which includes a first conductor and at least one second conductor electrically connected to the first conductor at a point. The second conductor extends from the point of connection with the first conductor to a location spaced from the first conductor. At least a portion of the second conductor adjacent the point of connection with the first conductor is non-parallel to the first conductor.

(21) Appl. No.: **10/549,965**(22) PCT Filed: **Mar. 16, 2004**(86) PCT No.: **PCT/US04/08007****Related U.S. Application Data**

(60) Provisional application No. 60/455,309, filed on Mar. 17, 2003.



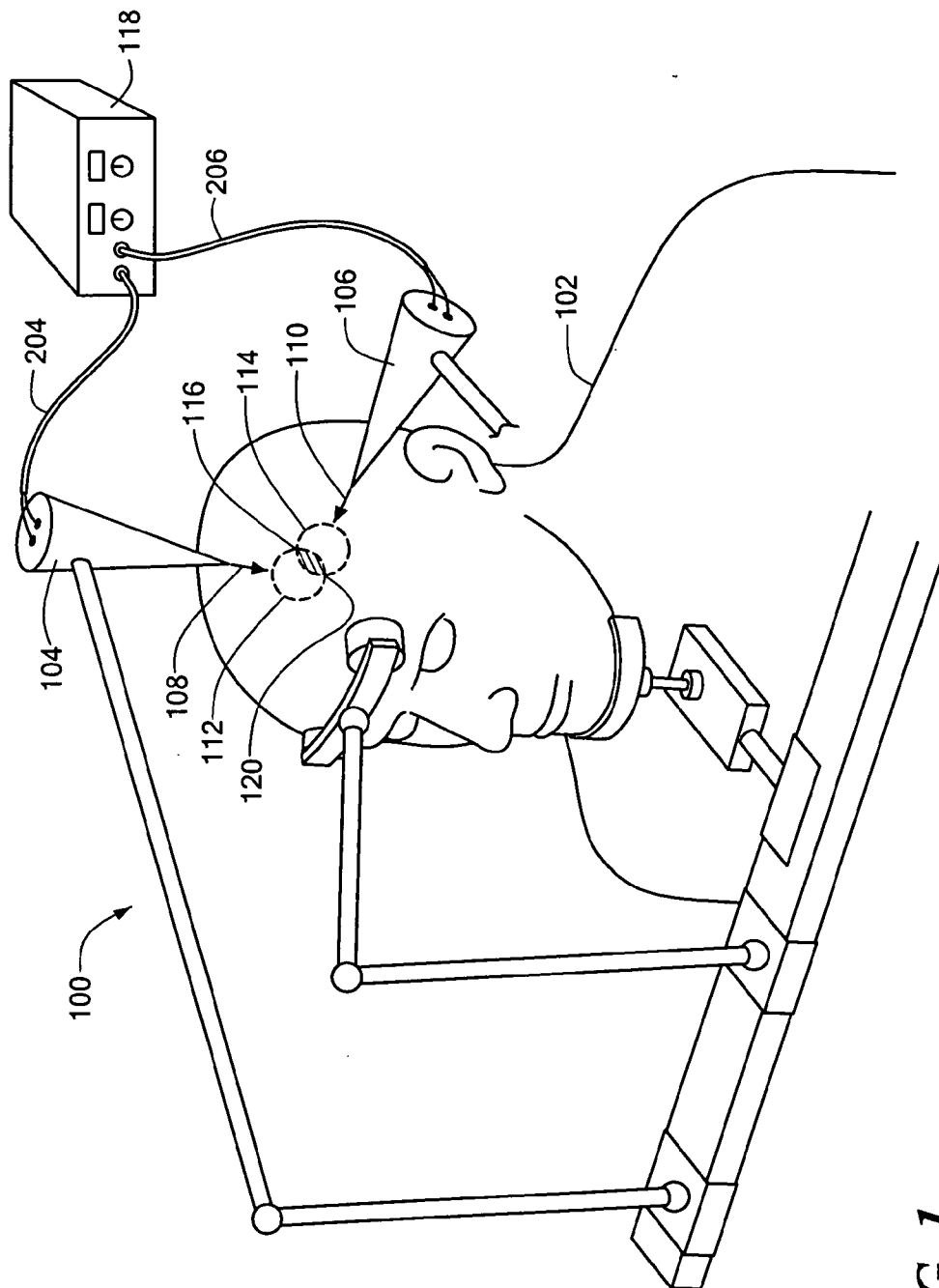


FIG. 1

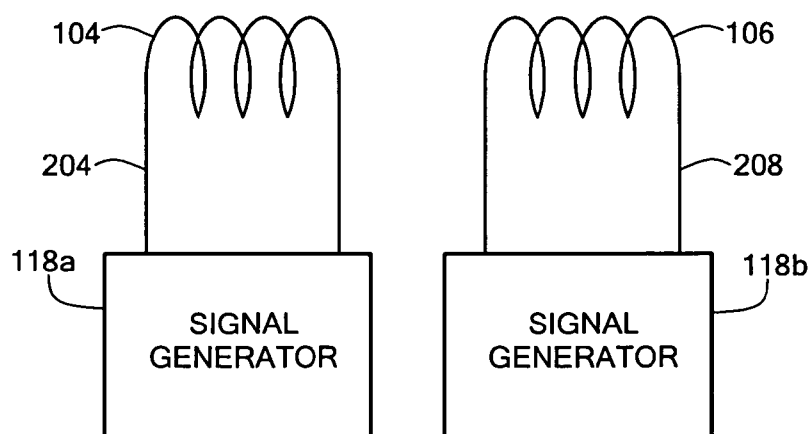


FIG. 2

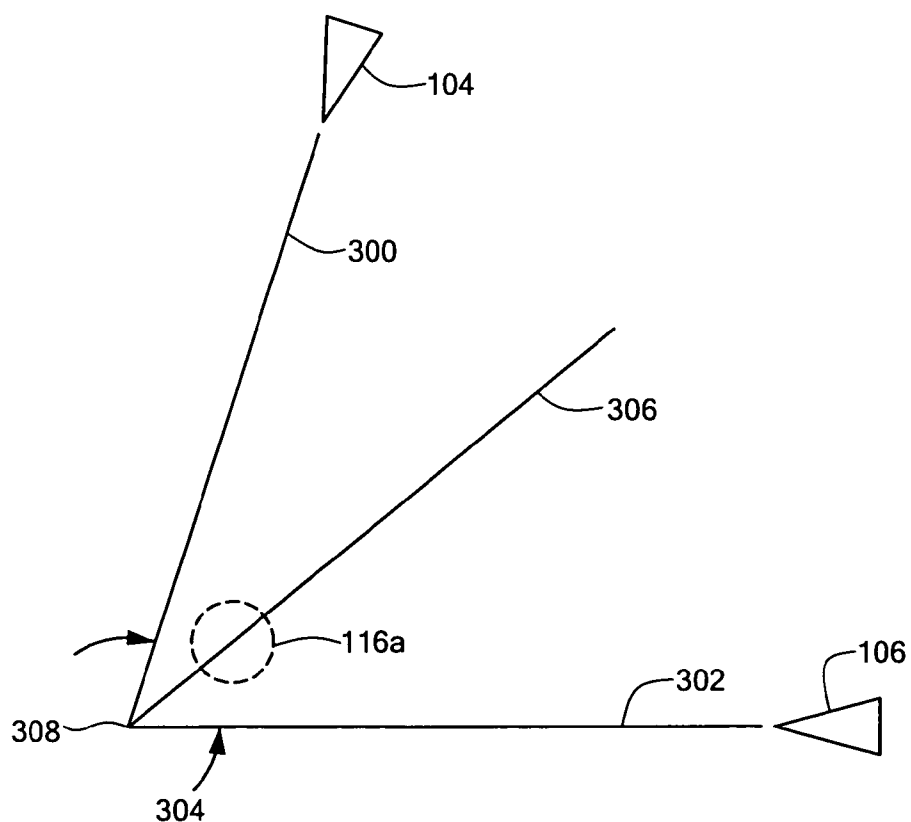


FIG. 3

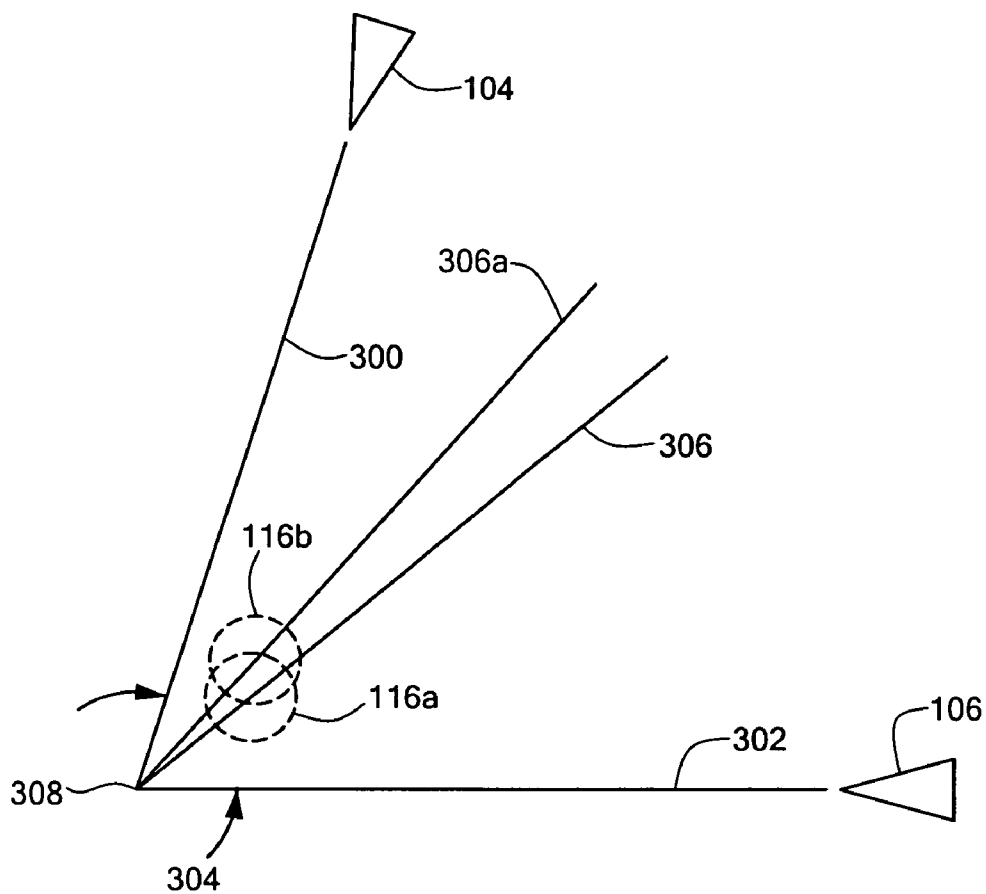


FIG. 4

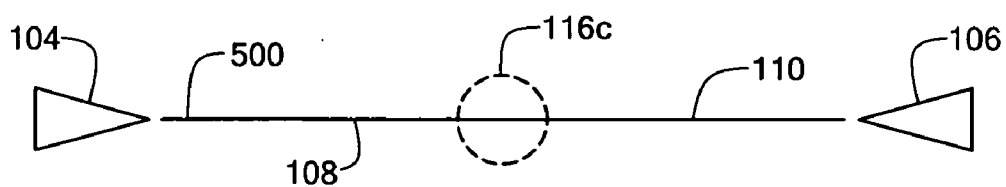


FIG. 5

FIG. 6

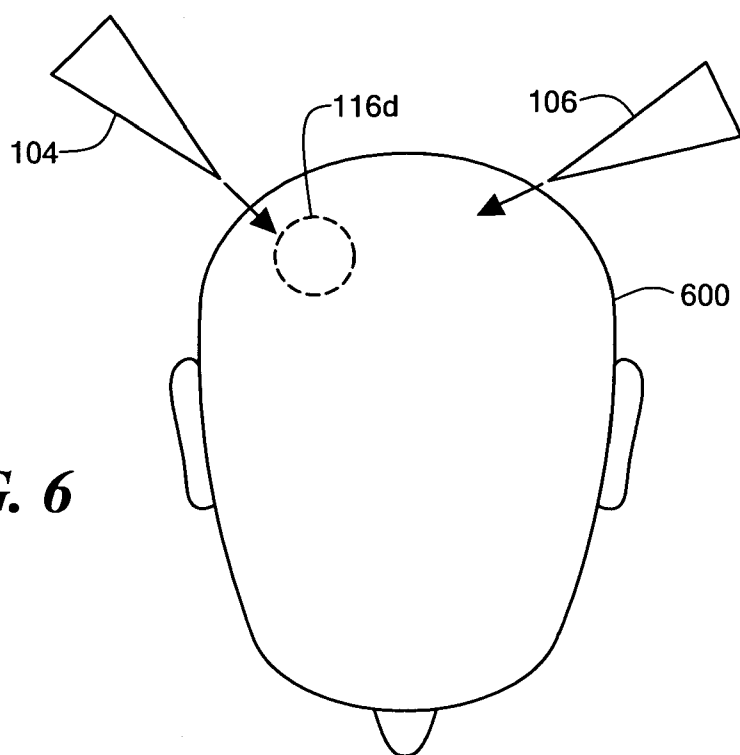
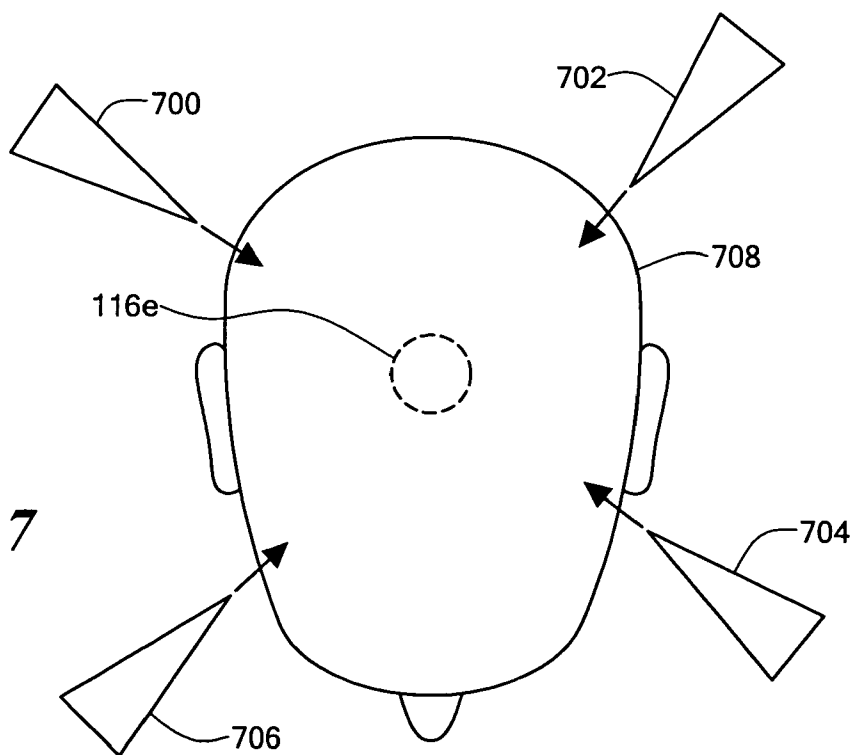


FIG. 7



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