

(12) **United States Patent**
Gerpheide et al.(10) **Patent No.:** **US 6,730,863 B1**
(45) **Date of Patent:** **May 4, 2004**(54) **TOUCHPAD HAVING INCREASED NOISE REJECTION, DECREASED MOISTURE SENSITIVITY, AND IMPROVED TRACKING**(75) Inventors: **George Gerpheide**, Salt Lake City, UT (US); **Brian Taylor**, Sandy, UT (US); **Daniel Lee**, Salt Lake City, UT (US)(73) Assignee: **Cirque Corporation**, Salt Lake City, UT (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 361 days.

(21) Appl. No.: **09/603,417**(22) Filed: **Jun. 22, 2000****Related U.S. Application Data**

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(51) Int. Cl.⁷ **G08C 21/00**; G06K 11/06(52) U.S. Cl. **178/18.02**; 178/20.02; 178/18.06; 345/174(58) **Field of Search** 345/173-179; 178/18.01, 18.02, 18.03, 18.05, 18.06, 18.07, 18.08, 19.01, 19.03, 20.01, 20.02, 20.03, 20.04(56) **References Cited****U.S. PATENT DOCUMENTS**

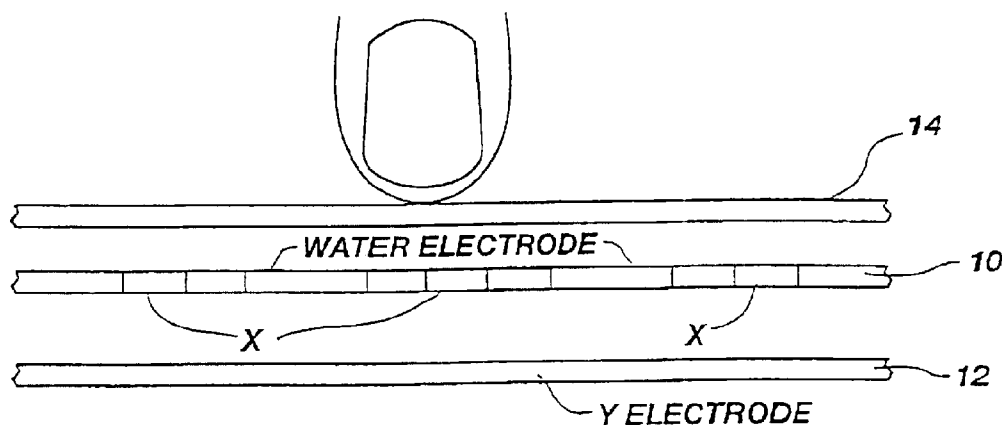
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Primary Examiner—Amr Ahmed Awad(74) *Attorney, Agent, or Firm*—Morris O'Bryant Compagni(57) **ABSTRACT**

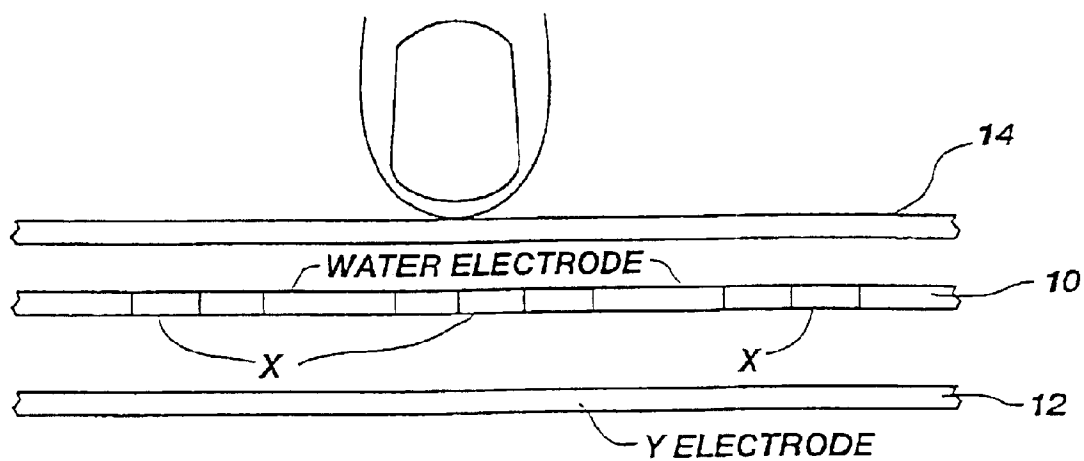
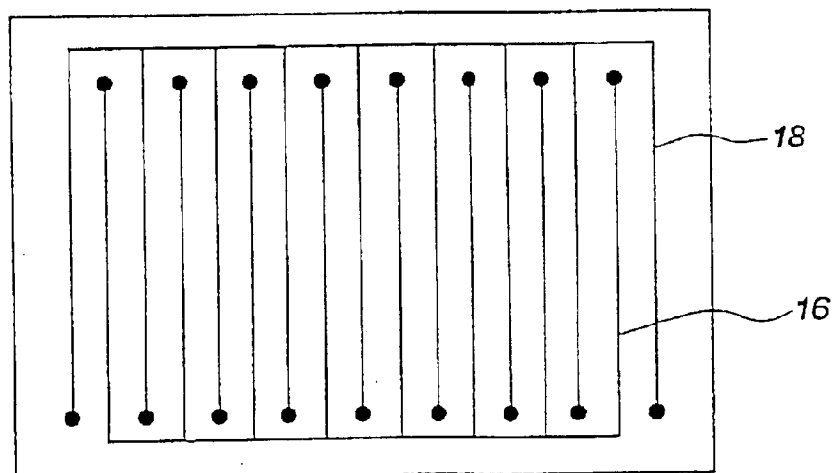
An improved touchpad and measurement circuitry for enabling input to a computer or other electronic device. The system includes an X electrode, a Y electrode, a common sensing electrode, and a "water" electrode, wherein these four separate electrodes can be implemented in various physical configurations to obtain the desired effects, wherein moisture and water droplets can be identified and compensated for so as not to interfere with the input of data, wherein noise rejection is achieved by using a time aperture filtering method, wherein an improved scanning technique focuses scanning around an identified input object, wherein an adaptive motion filter responds to the speed and acceleration of an object being tracked, and wherein the measurement circuitry has an increased dynamic range enabling the touchpad to operate with greater tolerances to manufacturing variances.

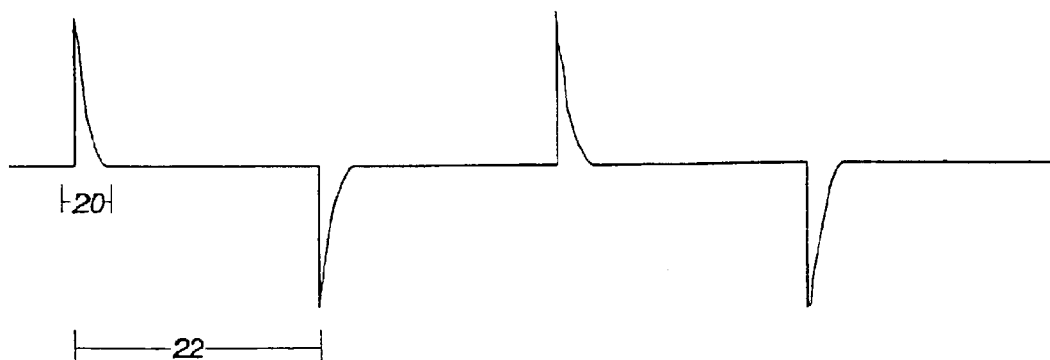
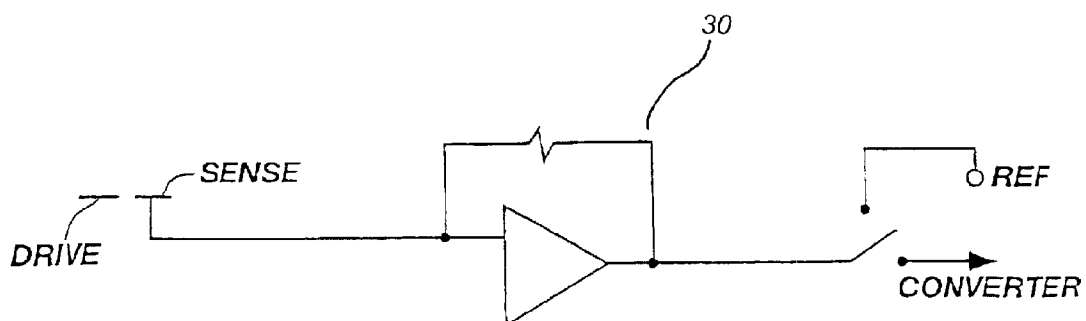
11 Claims, 3 Drawing Sheets

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*Fig. 1**Fig. 2*

*Fig. 3**Fig. 4*

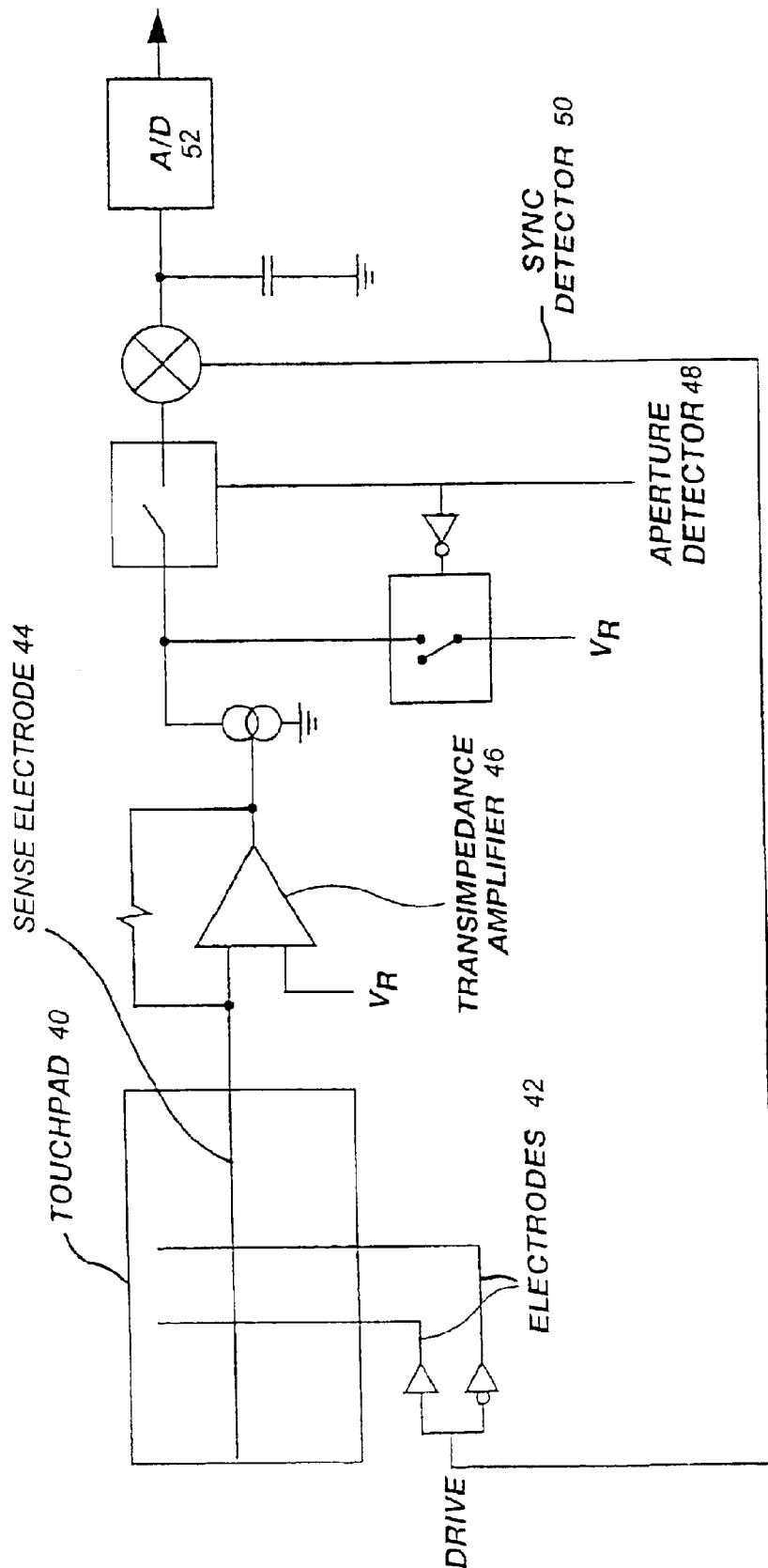


Fig. 5

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