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Faller et al.

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(54) **ROTARY CAM DRIVEN FREE FALL
DROPPING CHAMBER MECHANISM**

6,082,194 * 7/2000 Gladwin 73/382 G

* cited by examiner

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(57) **ABSTRACT**

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patent is extended or adjusted under 35
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An improved gravimeter mechanism includes a mass bal-
anced cam having mutually opposed camming surfaces for
controlling the free fall of a measuring mass. The cam is
attached to a camshaft which turns at a constant rate, the rate
being selected so that the drop time appropriate to achieve
lift-off of the dropped object together with the time required
to return to the start position equals the cam's rotational
period. The mutually opposed camming surfaces cooperate
to drive both a cart which supports a measuring mass and a
compensating mass which is built into the gravimeter
mechanism. The cam drives the cart, the measuring mass,
and the compensating mass so that the time varying reduction
in weight produced when the measuring mass is in free
fall is exactly compensated by the compensating mass which
is driven by the opposing camming surface. The opposing
camming surface is displaced from the lift off region of the
camming surface which drives the cart and measuring mass
by 180 degrees. The measuring mass contains a mirror
element of a Michelson interferometer, and the interferom-
eter produces a signal indicative of the rate of free fall,
which is directly proportional to the local gravity.

(21) Appl. No.: **09/442,734**

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Related U.S. Application Data

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1998.

(51) **Int. Cl.**⁷ **G01V 7/14**

(52) **U.S. Cl.** **73/382 R**

(58) **Field of Search** **73/382 R, 382 G**

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,461,914 * 10/1995 Zumberge et al. 73/382 R

8 Claims, 5 Drawing Sheets

