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(54) **PEDOMETER DEVICE AND STEP DETECTION METHOD USING AN ALGORITHM FOR SELF-ADAPTIVE COMPUTATION OF ACCELERATION THRESHOLDS**

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G01C 22/00 (2006.01)
(52) **U.S. Cl.** **702/160**
(58) **Field of Classification Search** 702/141, 702/150–154, 158, 160; 600/595; 73/490, 73/510
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,583,776 A		12/1996	Levi et al.	364/450
6,052,654 A		4/2000	Gaudet et al.	702/160
6,135,951 A		10/2000	Richardson et al.	600/300
6,826,477 B2	*	11/2004	Ladetto et al.	701/217
6,898,550 B1		5/2005	Blackadar et al.	702/182
2006/0020177 A1	*	1/2006	Seo et al.	600/300
2007/0073514 A1	*	3/2007	Nogimori et al.	702/160
2007/0143069 A1	*	6/2007	Pasolini et al.	702/160
2007/0198187 A1	*	8/2007	Pasolini et al.	701/220

FOREIGN PATENT DOCUMENTS

GB	2 359 890	9/2001

* cited by examiner

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(57) **ABSTRACT**

In a pedometer device for detecting and counting steps of a user on foot, an accelerometer sensor detects a vertical acceleration generated during the step. A processing unit, connected to the accelerometer sensor, processes an acceleration signal relating to the acceleration in order to detect the occurrence of a step, and in particular compares the acceleration signal with a first reference threshold. The processing unit automatically adapts the first reference threshold as a function of the acceleration signal. In particular, the processing unit modifies the first reference threshold as a function of an envelope of the amplitude of the acceleration signal.

30 Claims, 5 Drawing Sheets

FIG. 1

Fig.2

Fig.5

Fig.3

DETERMINATION OF ACCELERATION DATUM
CalAcc AND THRESHOLD ADAPTATION — 11,18

ACQUISITION OF
ACCELERATION SAMPLE Acc — 30

ELIMINATION OF D.C. COMPONENT
AND DETERMINATION OF CalAcc — 31

32

NO — CalAcc > Env+ — YES

34

$Env^+ = \alpha_1 * Env^+$
$(\alpha_1 < 1)$

33

$Env^+ = CalAcc$

35

NO — CalAcc < Env- — YES

$Env^- = \alpha_2 * Env^-$
$(\alpha_2 < 1)$

37

$Env^- = CalAcc$ — 36

$S^+ = \beta * Env^+$
$(\beta < 1)$ — 38

39

NO — $S^+ < S_1$ — YES — $S^+ = S_1$ — 40

$S^- = \beta * Env^-$
$(\beta < 1)$ — 41

42

NO — $S^- < S_2$ — YES — $S^- = S_2$ — 43

STOP
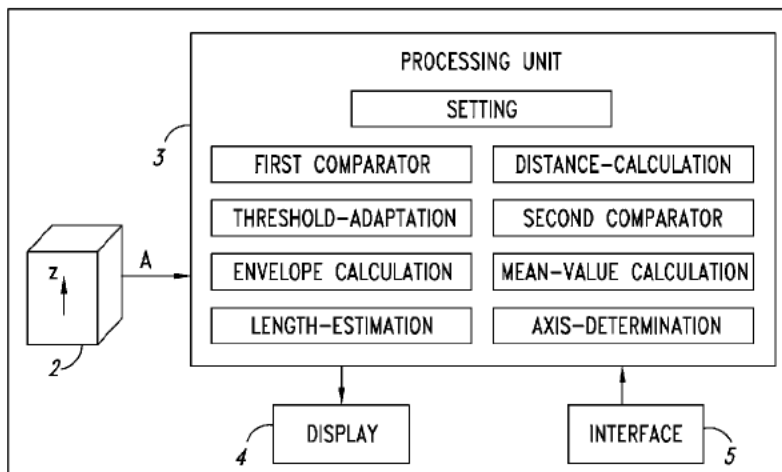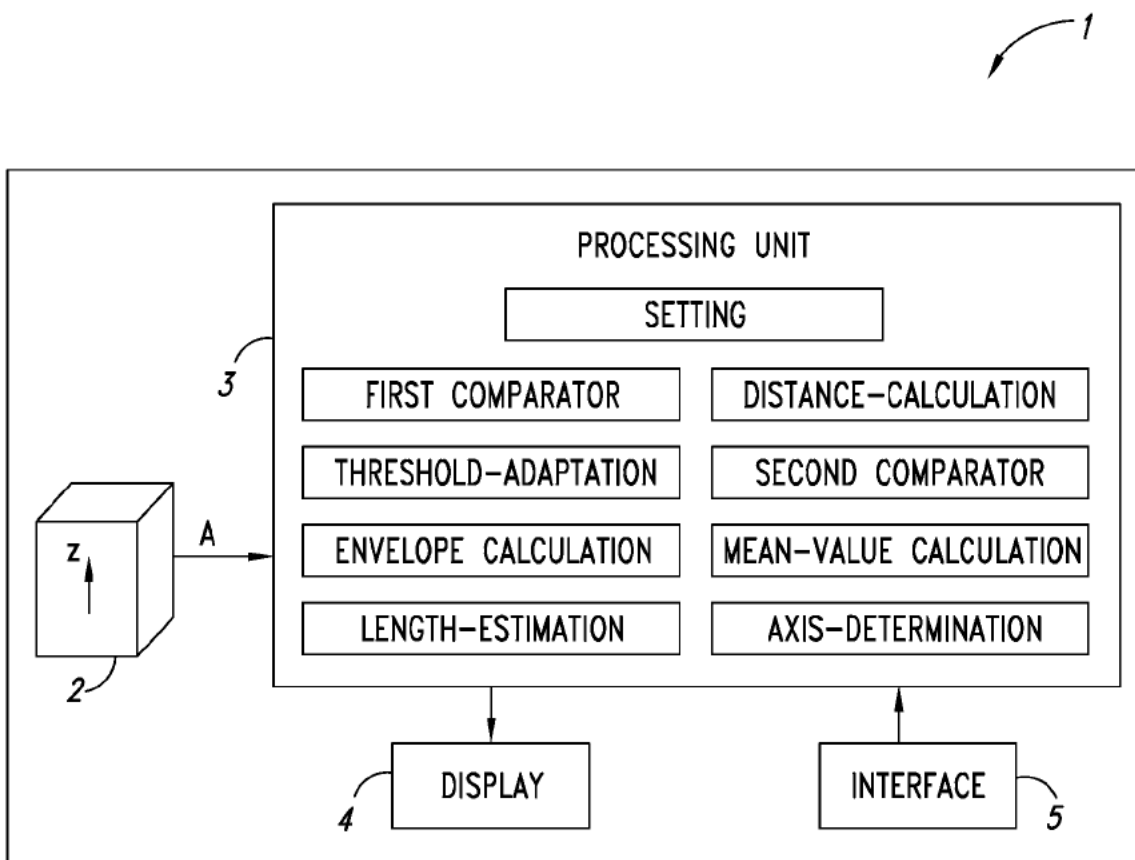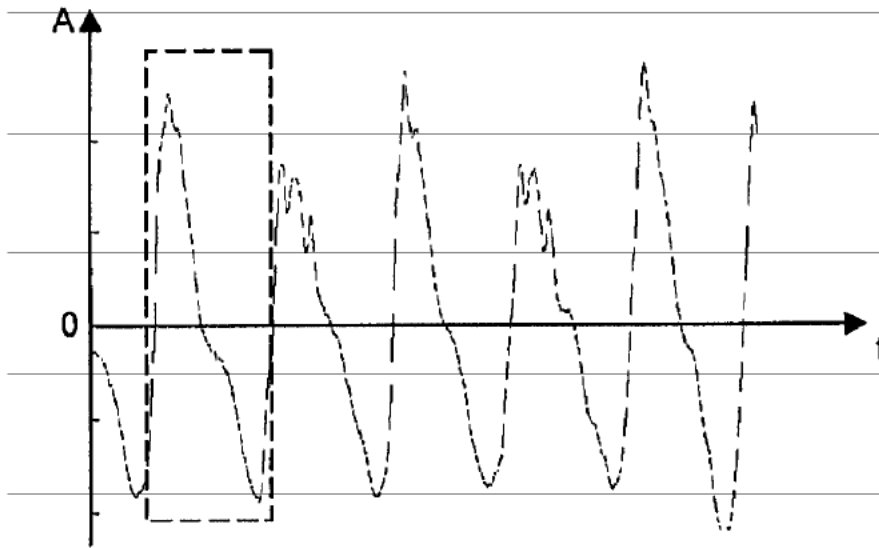
Fig.4

DOCKET ALARM
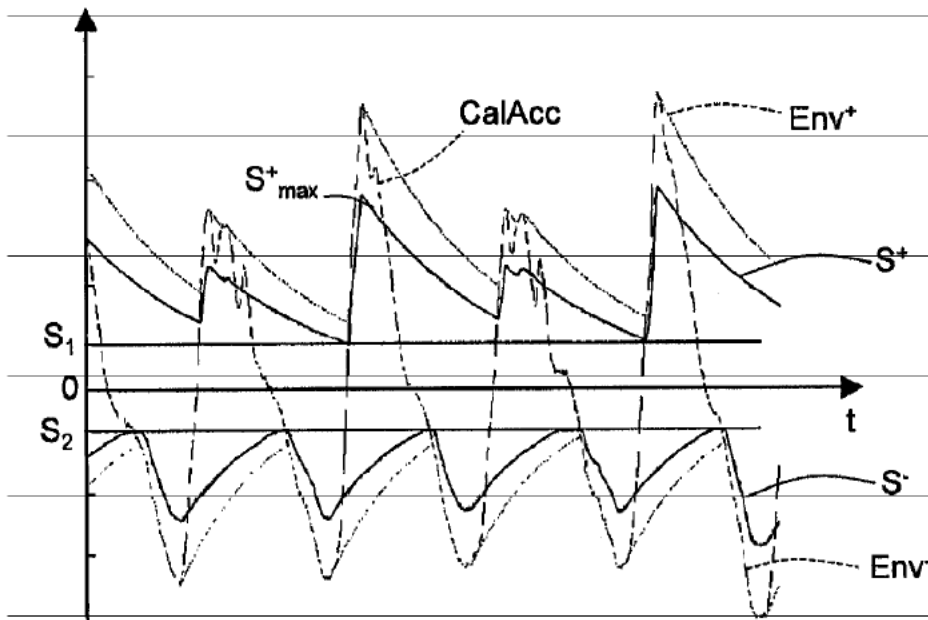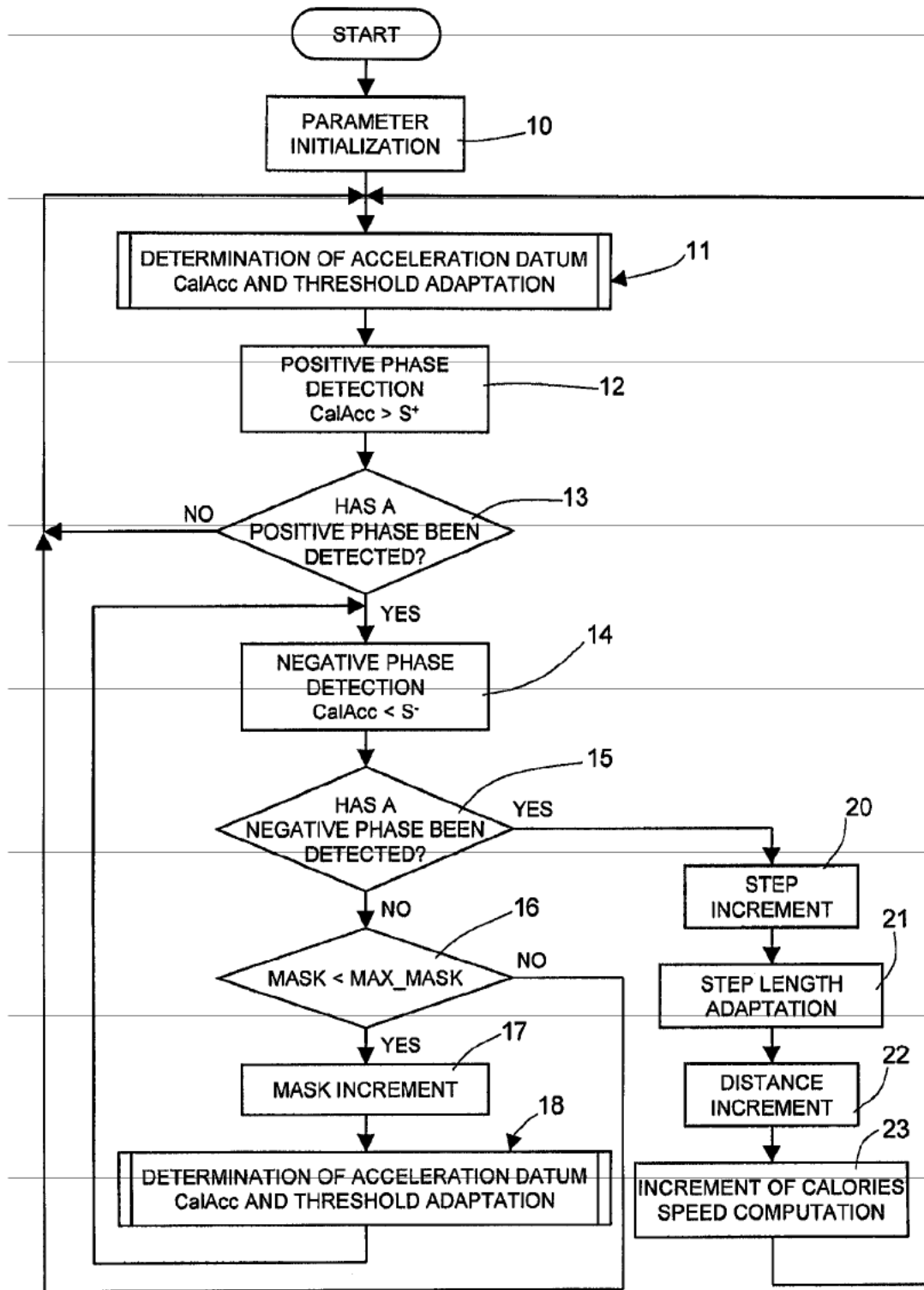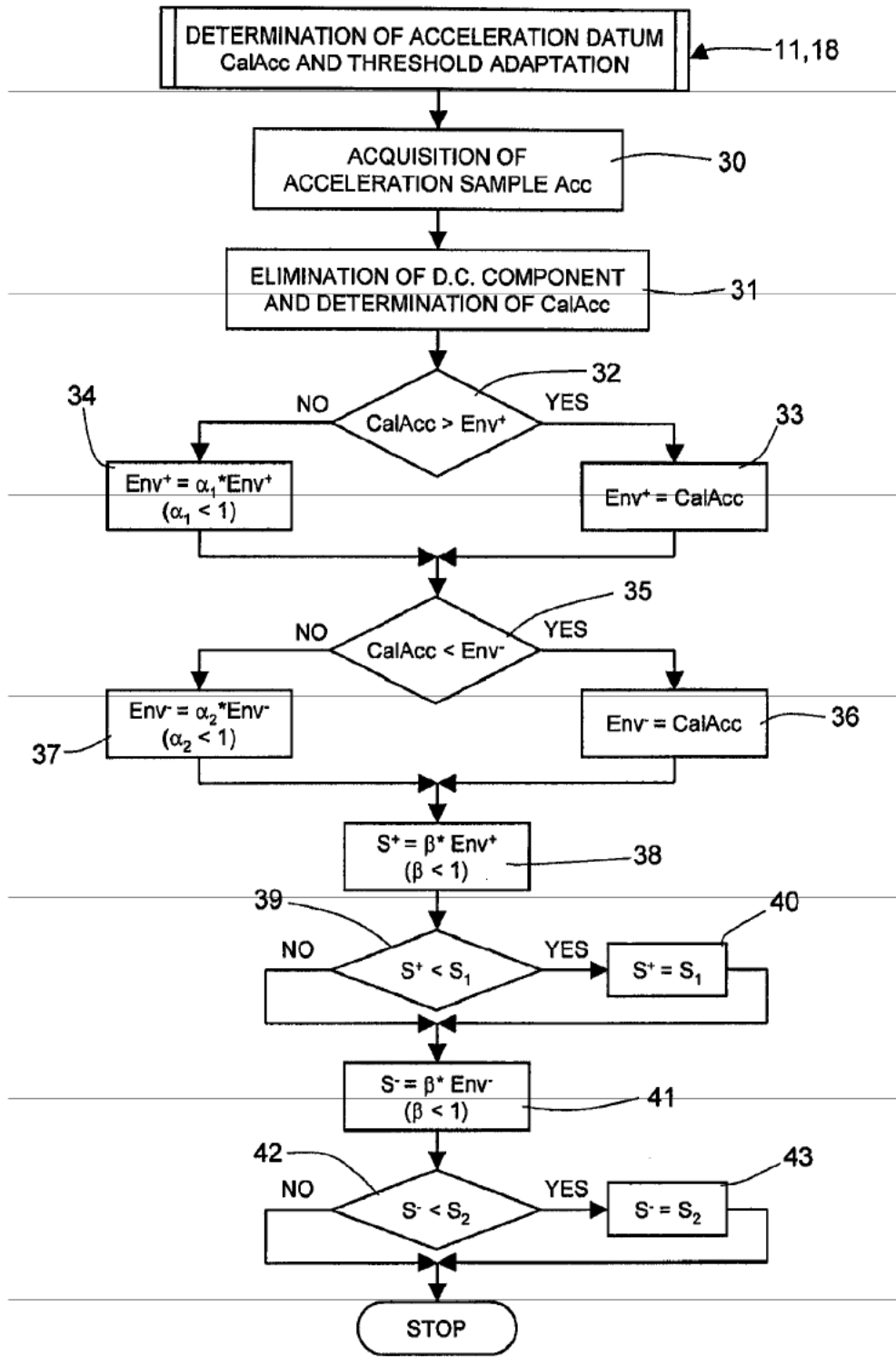
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