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Amano et al.

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(54) **PULSE WAVE EXAMINATION APPARATUS, BLOOD PRESSURE MONITOR, PULSE WAVEFORM MONITOR, AND PHARMACOLOGICAL ACTION MONITOR**

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(73) Assignee: **Seiko Epson Corporation**, Tokyo (JP)

(*) Notice: This patent issued on a continued prosecution application filed under 37 CFR 1.53(d), and is subject to the twenty year patent term provisions of 35 U.S.C. 154(a)(2).

Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

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(51) **Int. Cl.⁷** **A61B 5/02**

(52) **U.S. Cl.** **600/501; 600/500; 600/485**

(58) **Field of Search** **600/500, 501, 600/485, 486, 502**

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,623,933 * 4/1997 Amano et al. 600/500
5,755,229 * 5/1998 Amano et al. 600/500

FOREIGN PATENT DOCUMENTS

0 638 281 A1 2/1995 (EP) .
59-189830 10/1984 (JP) .
4-250132 9/1992 (JP) .
8-257000 10/1996 (JP) .
8-289876 11/1996 (JP) .
9-135819 5/1997 (JP) .
139440 8/1990 (TW) .
WO96 35368 11/1996 (WO) .

OTHER PUBLICATIONS

“Medical Diagnostics, vol. 1 (in Japanese)”, supervised by Akira Shibata, Mar., 10, 1995, Nishimura Shoten, pp401–409.

“Application of Wavelet Transformation to Wave Pulse of Living Body (in Japanese)”, Preprint of 15th Scientific Lectures on Biomechanism, (Japan), (1994), pp121–124.

* cited by examiner

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(57) **ABSTRACT**

An FFT treating section (40) carries out the frequency analysis of a pulse waveform MHj excluding a body movement component to yield pulse wave analysis data MKD and then a tidal wave-character extracting section (50) and a dirotic wave-character extracting section (60) yield a tidal wave-character data (TWD) and a dirotic wave-character data (DWD) showing the characteristics of a tidal wave and dirotic wave respectively. Then, a pulse condition judging section (70) yields pulse condition data (ZD) on the basis of this data (TWD, DWD) and in succession a notifying section (80) advises of the pulse condition of a subject.

61 Claims, 56 Drawing Sheets

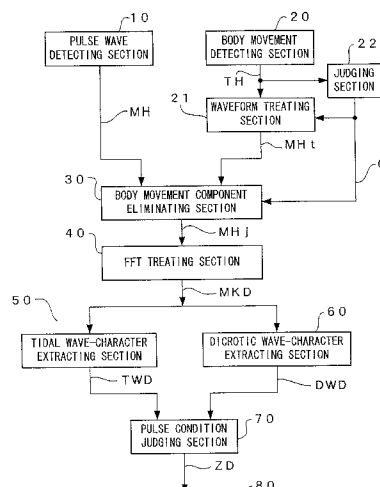


FIG. 1

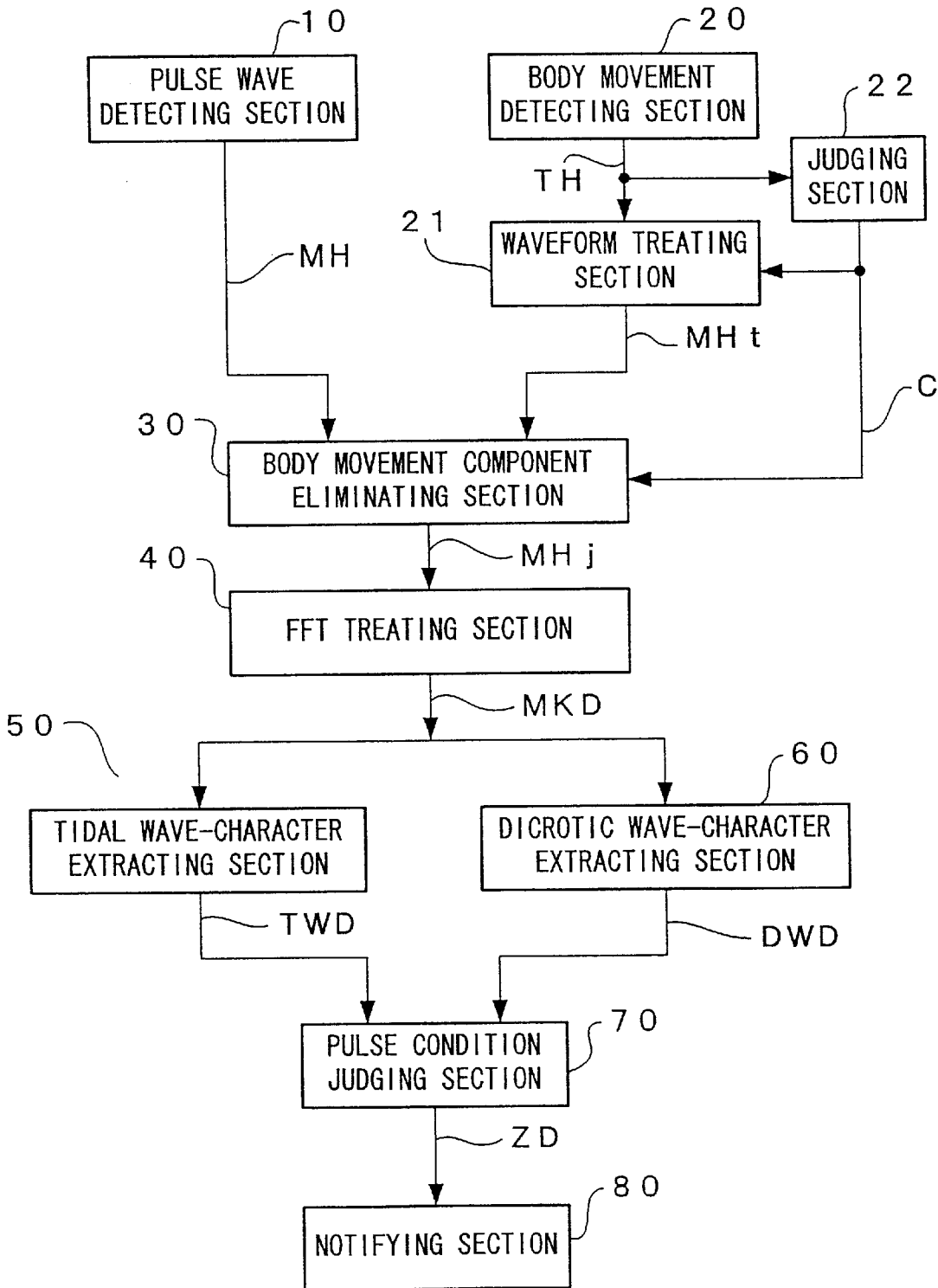


FIG. 2

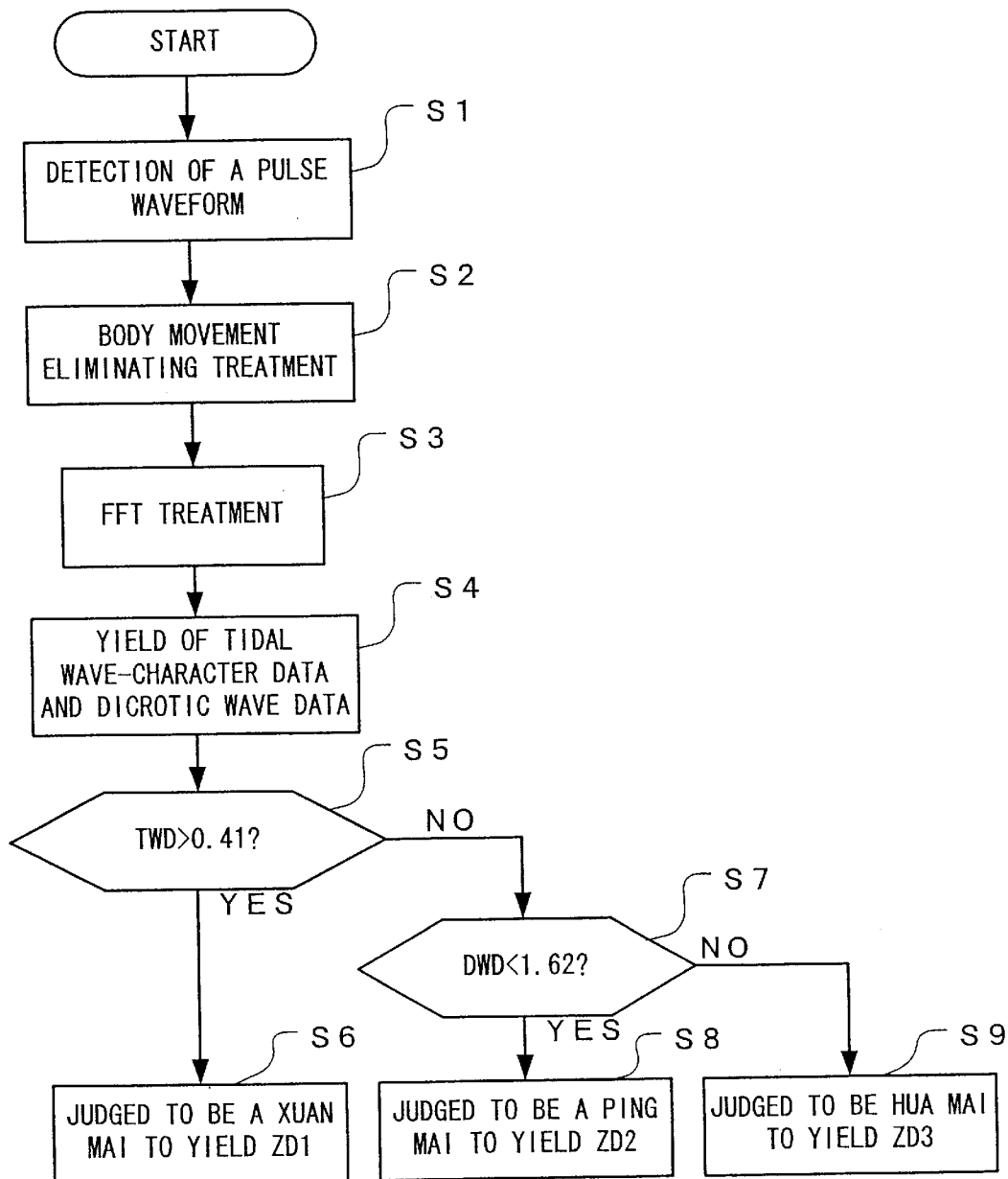
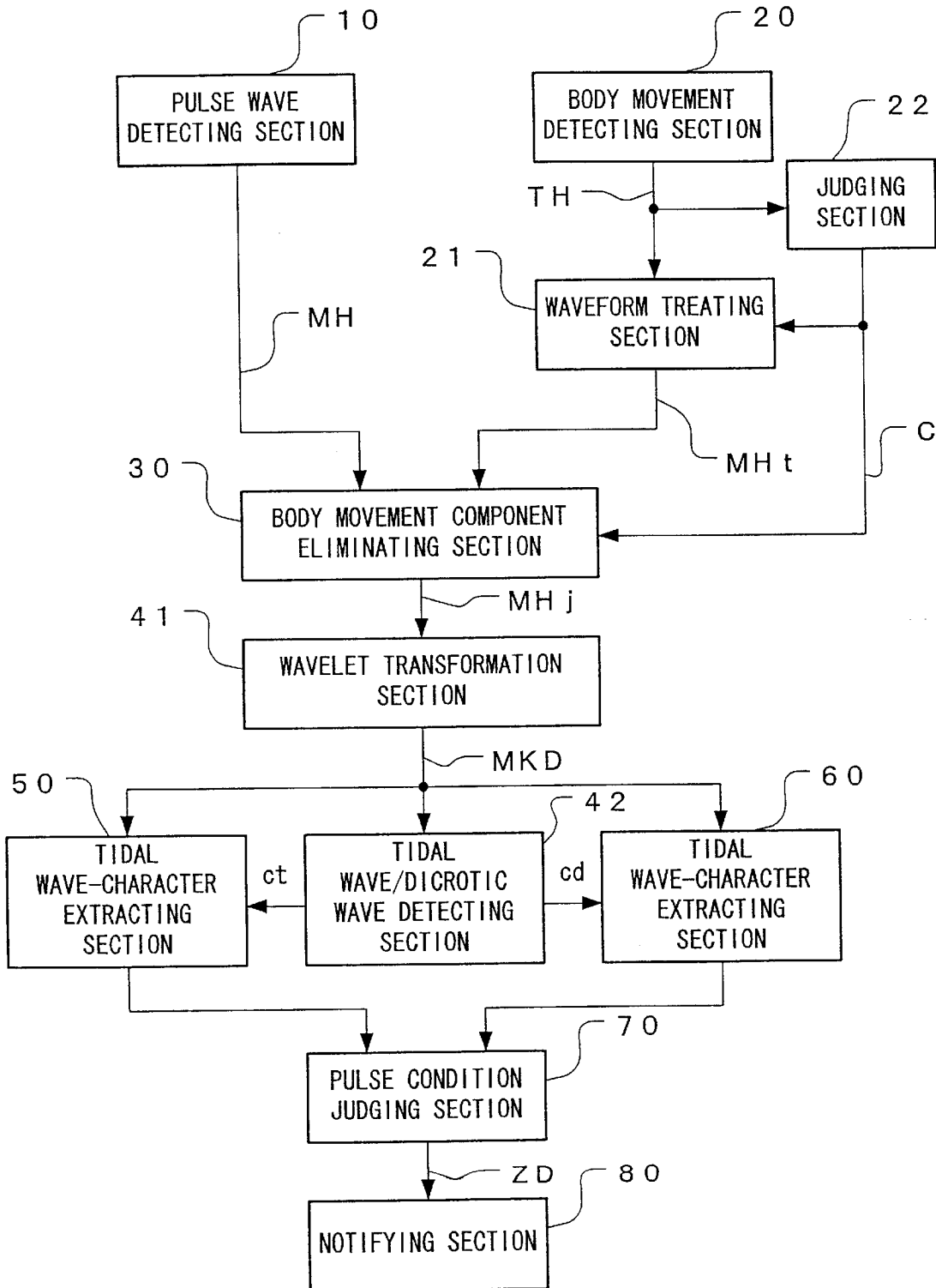
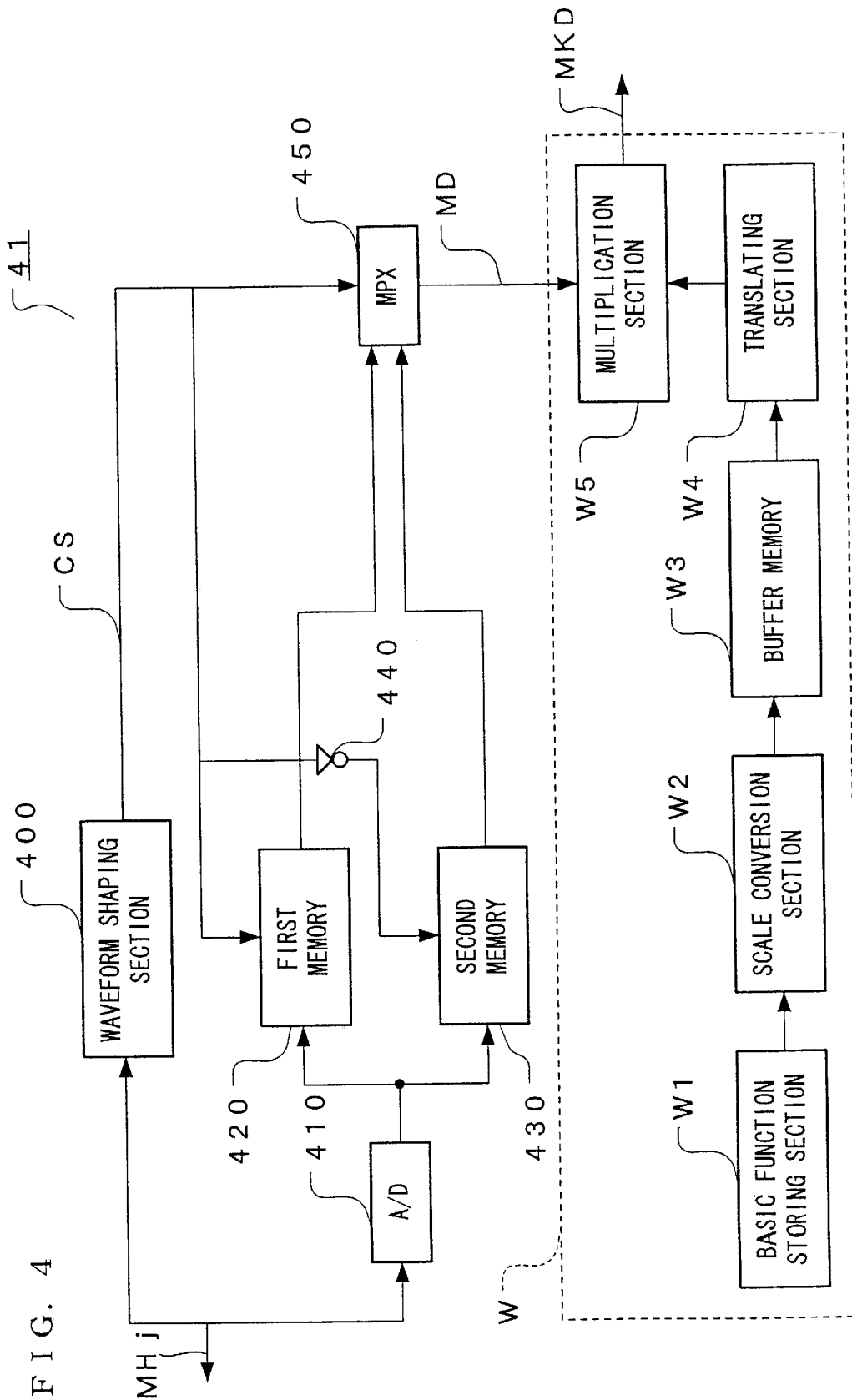


FIG. 3





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