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Kato

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- (54) **DIGITAL PLL DEVICE**
- (75) Inventor: **Syuji Kato**, Osaka (JP)
- (73) Assignee: **Panasonic Corporation**, Osaka (JP)
- (*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

5,834,987	A *	11/1998	Dent	332/127
5,945,856	A *	8/1999	Yanagiuchi	
5,970,110	A *	10/1999	Li	377/48
6,097,777	A *	8/2000	Tateishi et al.	
6,111,470	A *	8/2000	Dufour	331/17
6,188,290	B1 *	2/2001	Fallisgaard et al.	331/18
6,333,678	B1 *	12/2001	Brown et al.	331/2
6,650,193	B2 *	11/2003	Endo et al.	331/78
6,687,841	B1	2/2004	Marukawa	

(Continued)

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FOREIGN PATENT DOCUMENTS

CN 1409490 A 4/2003
(Continued)

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OTHER PUBLICATIONS

High-Definition Multimedia Interface Specification Version 1.3a, Nov. 10, 2006.
(Continued)

- (51) **Int. Cl.**
H03L 7/06 (2006.01)
- (52) **U.S. Cl.** **327/159; 327/150**
- (58) **Field of Classification Search** None
See application file for complete search history.

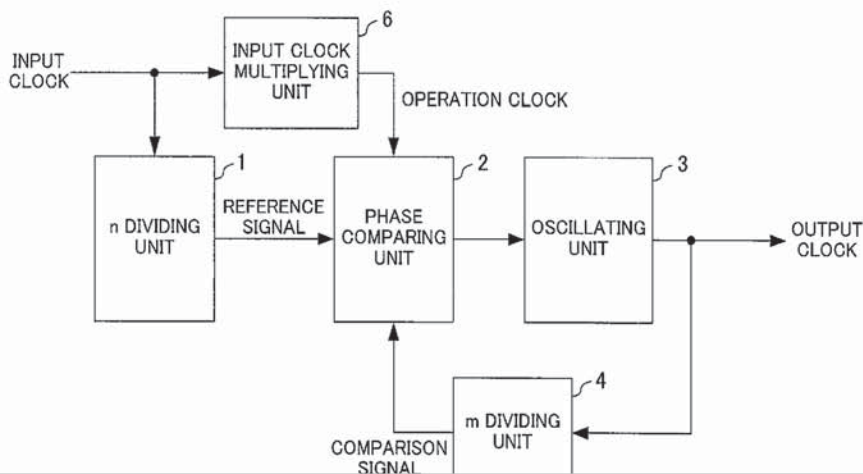
Primary Examiner — Cassandra Cox
(74) *Attorney, Agent, or Firm* — McDermott Will & Emery LLP

- (56) **References Cited**
- U.S. PATENT DOCUMENTS
- | | | | | |
|-----------|-----|---------|------------------|---------|
| 4,813,005 | A * | 3/1989 | Redig et al. | 702/117 |
| 5,028,887 | A * | 7/1991 | Gilmore | 331/18 |
| 5,265,081 | A | 11/1993 | Shimizume et al. | |

(57) **ABSTRACT**

An input clock dividing unit frequency-divides an input clock, and an input clock multiplying unit frequency-multiplies the input clock. An operation clock selecting unit selects the frequency-divided clock when the input clock is fast and selects the frequency-multiplied clock when the input clock is slow, based on the frequency detection result of frequency detecting unit. The operation clock selecting unit then outputs the selected clock to a phase comparing unit as an operation clock. The phase comparing unit operates according to the frequency-divided or frequency-multiplied clock, and controls an oscillating unit so that the phase difference between a reference signal and a comparison signal becomes zero. The phase of an output clock is thus caused to track the phase of the reference signal.

11 Claims, 7 Drawing Sheets



U.S. PATENT DOCUMENTS

6,741,846	B1*	5/2004	Welland et al.	455/260
6,753,711	B2*	6/2004	McCollum et al.	327/156
6,882,229	B1*	4/2005	Ho et al.	331/1 A
7,215,165	B2*	5/2007	Yamamoto et al.	327/156
7,301,414	B2*	11/2007	Hino	331/179
7,312,649	B2*	12/2007	Origasa et al.	327/536
7,394,870	B2*	7/2008	Chien et al.	375/316
7,436,264	B2*	10/2008	Yu	331/17
7,512,205	B1*	3/2009	Erol	375/376
2001/0017573	A1*	8/2001	Fallisgaard et al.	331/18
2006/0171496	A1	8/2006	Nakamuta et al.	
2006/0176525	A1*	8/2006	Mizuta et al.	358/474

FOREIGN PATENT DOCUMENTS

JP	10-224336	8/1998
JP	2003-347933	12/2003
JP	2004-289557	10/2004
JP	2007-082001	3/2007
JP	2007-088898	4/2007

OTHER PUBLICATIONS

Japanese Notice of Reasons for Rejection, with English translation, issued in Japanese Patent Application No. 2008-554553, dated Jun. 29, 2010.

* cited by examiner

FIG. 1

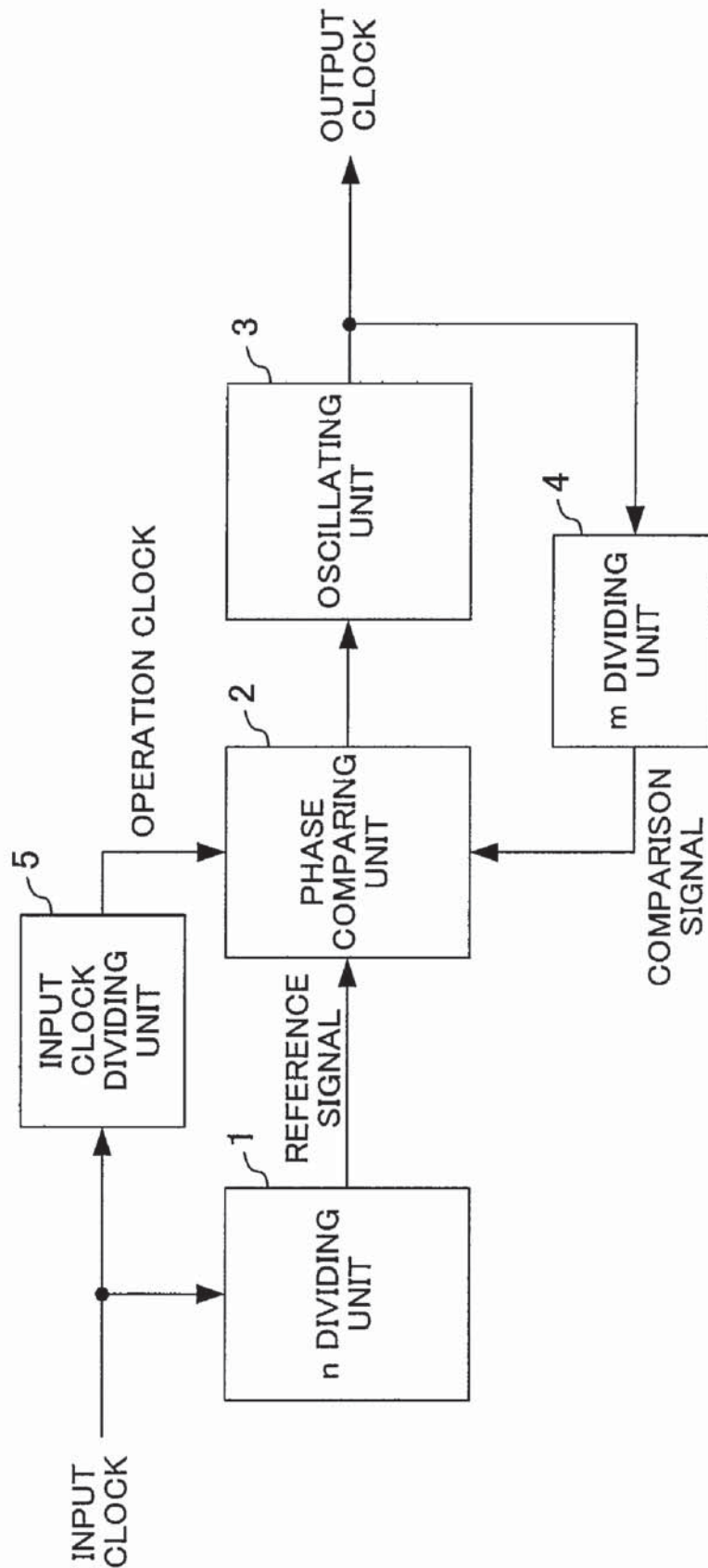
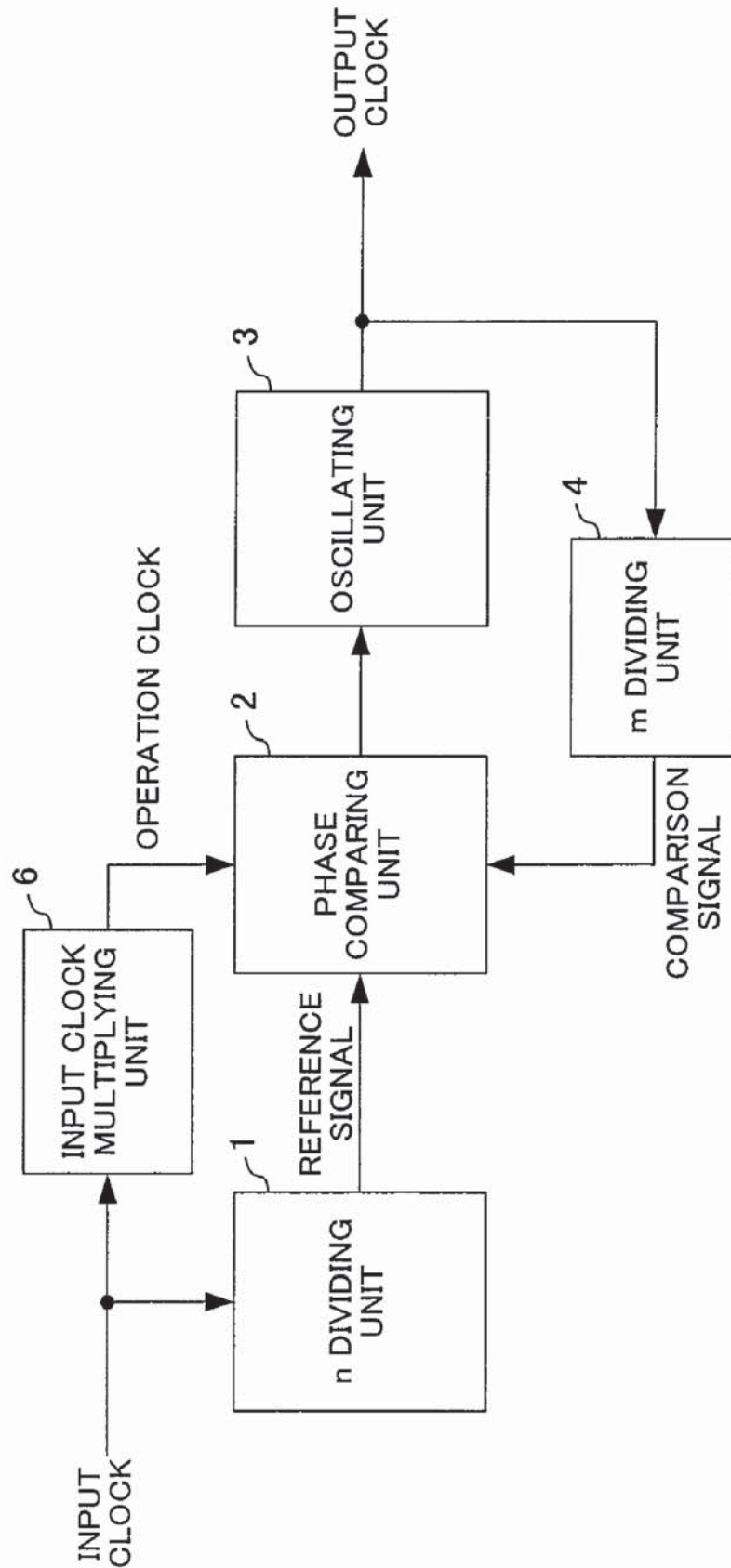


FIG. 2



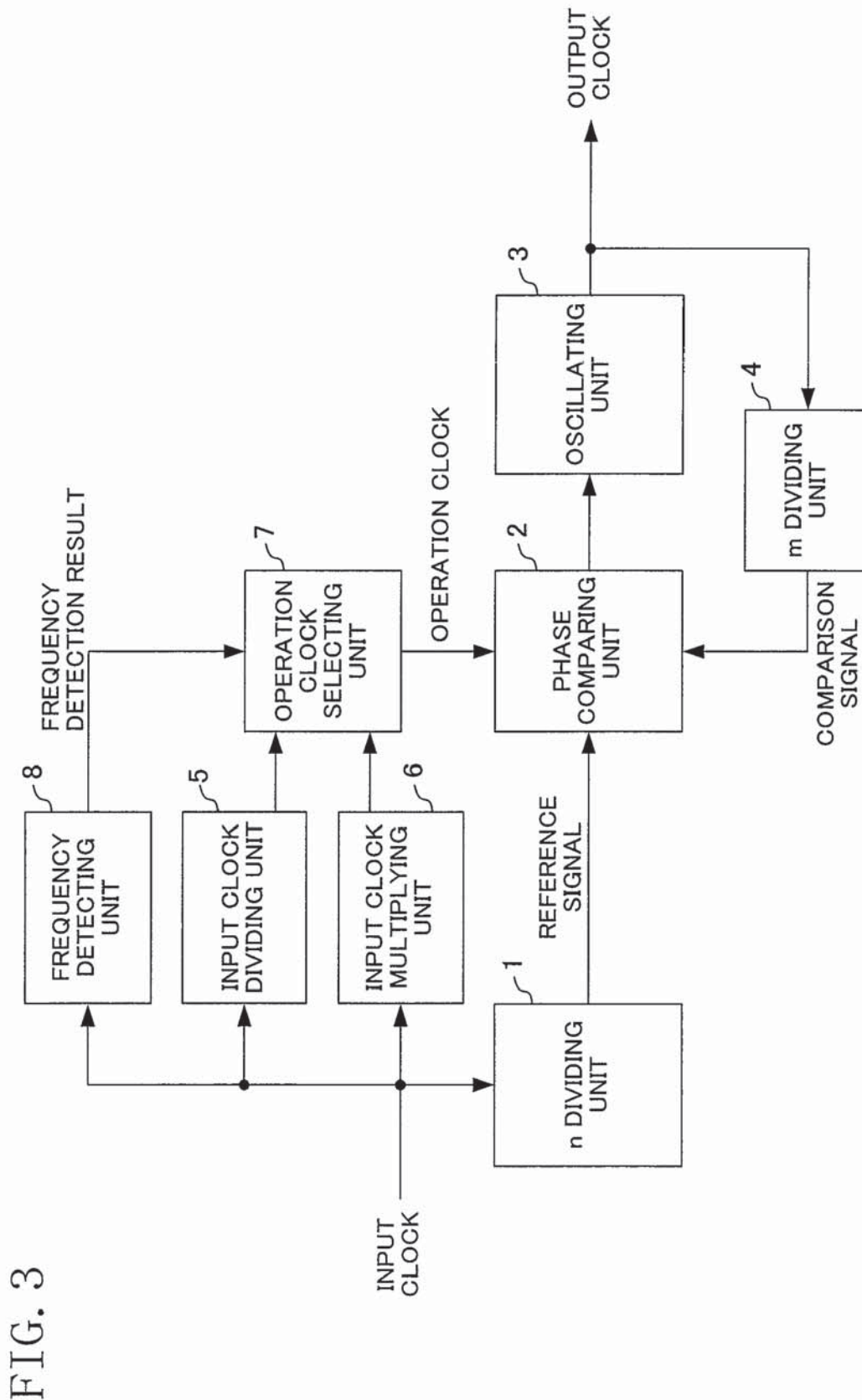


FIG. 3

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