

United States Patent [19][11] **Patent Number:** **5,584,033****Barrett et al.**[45] **Date of Patent:** **Dec. 10, 1996**

[54] **APPARATUS AND METHOD FOR BURST DATA TRANSFER EMPLOYING A PAUSE AT FIXED DATA INTERVALS**

5,159,672 10/1992 Salmon 395/325
 5,276,818 1/1994 Okazawa 395/325

OTHER PUBLICATIONS

IBM Technical Disclosure Bulletin vol. 30 No. 4 Sep. 1987 pp. 1432-1434 "Swinging Buffer With Programmable Size".

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[22] **Filed:** **Nov. 7, 1994**

Related U.S. Application Data

[63] Continuation of Ser. No. 760,426, Sep. 16, 1991, abandoned.

[51] **Int. Cl.⁶** **G06F 13/28**

[52] **U.S. Cl.** **395/800**; 364/260; 364/271.5;
 364/260.1; 364/DIG. 1; 395/868

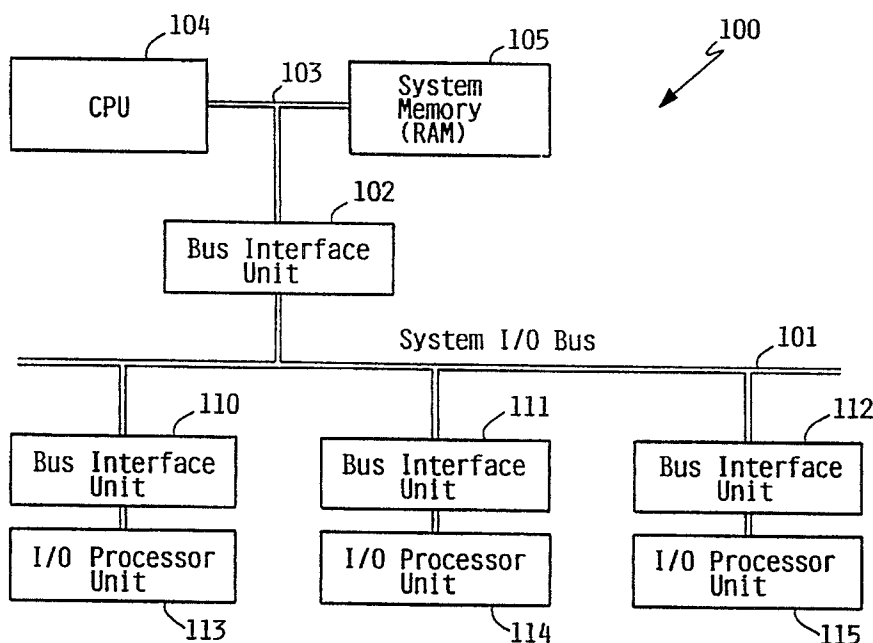
[58] **Field of Search** 395/800, 868

[56] **References Cited****U.S. PATENT DOCUMENTS**

Re.34,282	6/1993	Suzuki	395/425
4,275,440	6/1981	Adams	395/868
4,558,429	12/1985	Barlow	395/425
4,644,463	2/1987	Hotchkin	395/250
4,703,478	10/1987	Haselton	370/94
4,712,176	12/1987	Fredericks et al.	364/200
4,799,199	1/1989	Scales, III et al.	365/230
4,807,109	2/1989	Farrell et al.	364/200
4,816,947	3/1989	Scales	395/325
5,029,124	7/1991	Leahy et al.	370/85
5,073,969	12/1991	Shoemaker	395/307
5,140,680	8/1992	Best	395/325

[57] **ABSTRACT**

A plurality of devices attached to a communications bus observe a burst transfer protocol which allows pausing only at pre-determined, fixed intervals of n data words, where a word is the width of the bus. In accordance with this protocol, once burst transfer is initialized the sending device transmits an uninterrupted stream of n data words over the communications bus, after which either the sender or receiver may cause transmission to pause. The sender may need to wait for more data, or the receiver may need to finish processing the data just received. The pause lasts as long as needed until both devices are ready to proceed. This cycle is repeated until the data transmission is complete. The sending and receiving devices do not relinquish control of the bus during a pause, and therefore are not required to re-initialize communications. In the preferred embodiment, after n data words have been transmitted, the sender and receiver toggle interlocking signals that accomplish a handshaking between the two devices. The sender de-activates its signal when it is ready to send more, and the receiver de-activates its signal when it is ready to receive more. Both devices are equipped with buffers large enough to hold n data words, but the buffers need not be as large as the longest possible burst communication.

30 Claims, 5 Drawing Sheets

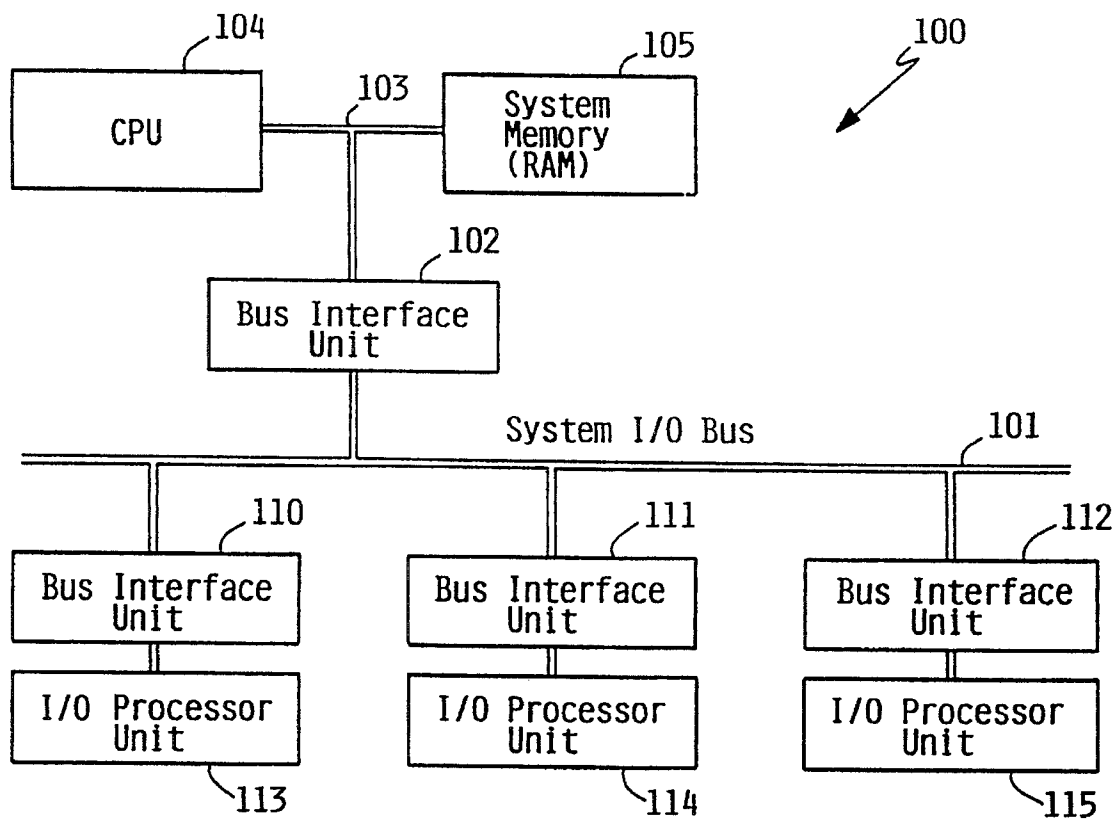


FIG. 1

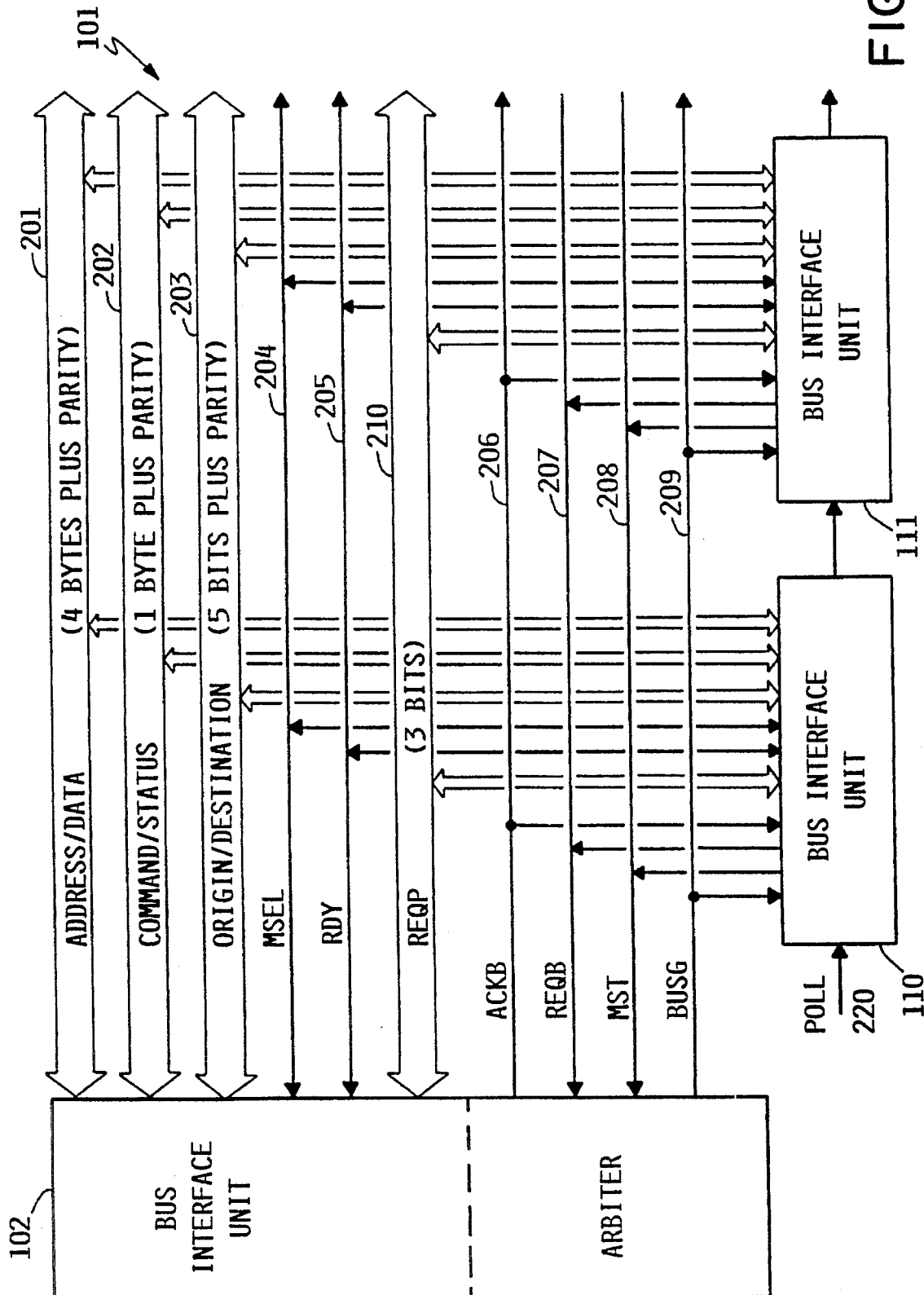


FIG. 2

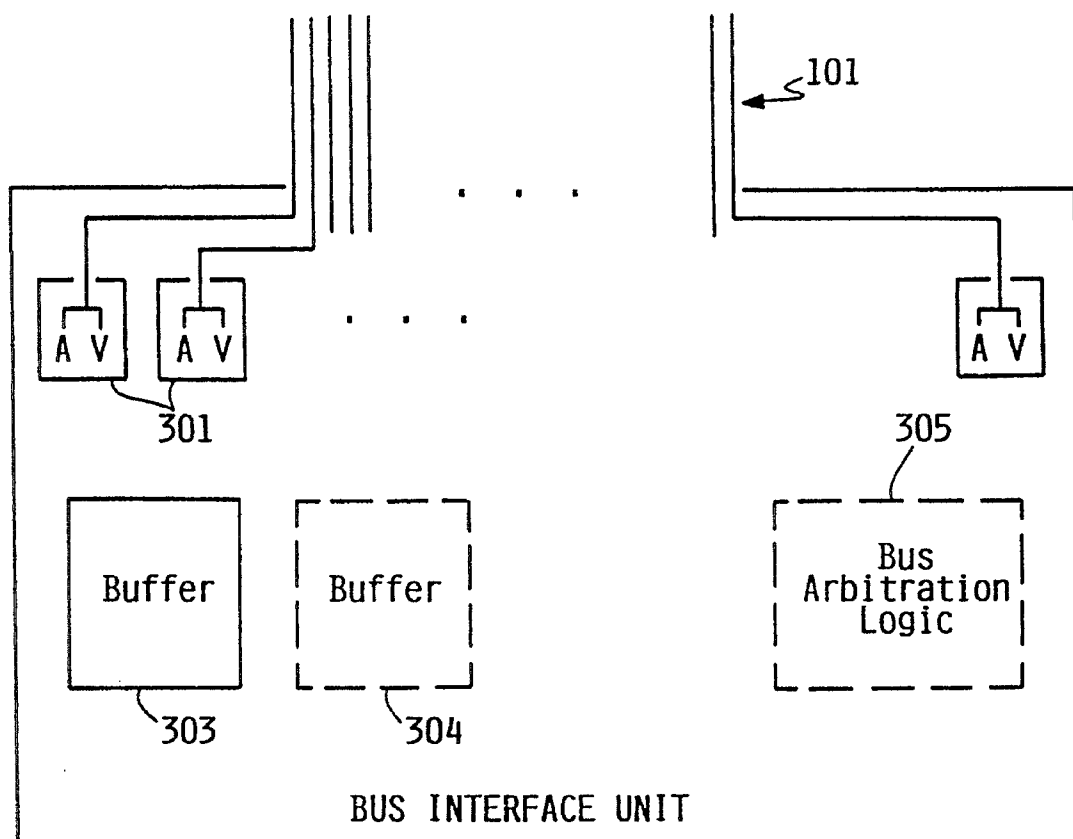


FIG. 3

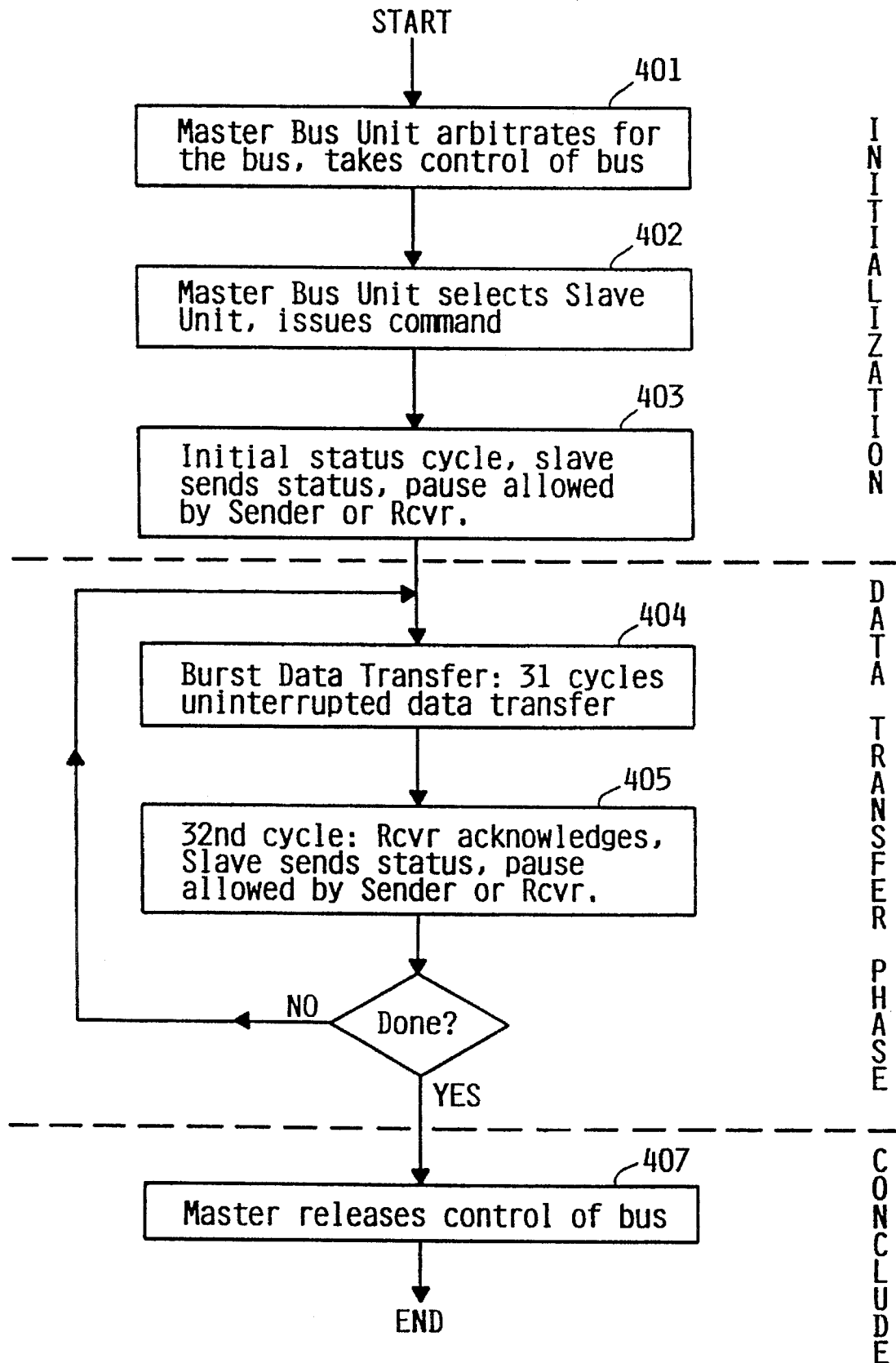


FIG. 4

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