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United States Patent [19]

Freivald et al.

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[45] Date of Patent: Jan. 4, 2000

[54] **UNIQUE-CHANGE DETECTION OF DYNAMIC WEB PAGES USING HISTORY TABLES OF SIGNATURES**

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[73] Assignee: **NetMind Technologies, Inc.**, Cambell, Calif.

[21] Appl. No.: **09/081,991**

[22] Filed: **May 20, 1998**

Related U.S. Application Data

[63] Continuation-in-part of application No. 08/783,625, Jan. 14, 1997, Pat. No. 5,898,836.

[51] **Int. Cl.**[7] **H04L 12/00**

[52] **U.S. Cl.** **709/218**; 709/229; 709/201

[58] **Field of Search** 709/218, 229, 709/224, 226, 201; 395/705; 380/21, 25, 29, 4; 705/8

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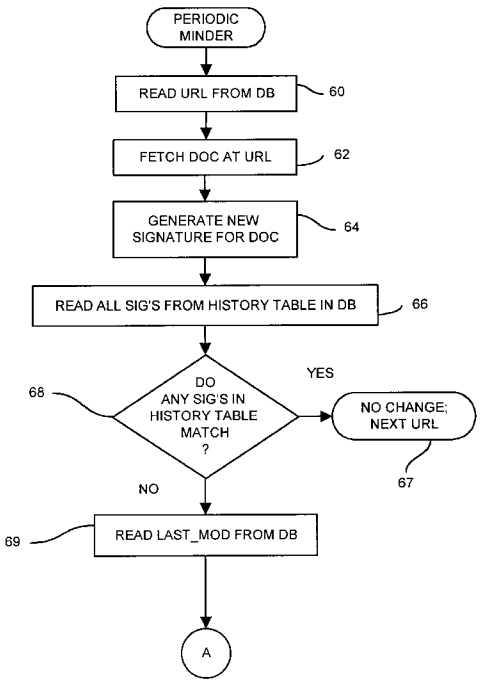
Primary Examiner—Zarni Maung
Assistant Examiner—Khanh Quang Dinh
Attorney, Agent, or Firm—Stuart T. Auvinen

[57] **ABSTRACT**

An improved change-detection tool detects only relevant changes within Internet web pages on the world-wide-web. Changes back to an earlier version of a web page are not relevant and do not cause the user to be notified. Only changes to a new, unique version of the web page generate a user notification. After the user finishes registering the web page by specifying the URL and the user's e-mail address, the change-detection tool periodically retrieves the web-page at the specified URL and generates a checksum or signature to determine when to send a notification to the user. Signatures from several older versions of the web page are stored in a history table. When a new signature for a re-fetched page matches the most-recent signature at the top of the stack in the history table, no change has occurred. When the new signature matched any of the older signatures in the history table, the detected change is not unique and notification is not made even though a change has occurred. When the new signature matches one of the older, not-most-recent signatures in the history table, the signature is moved into a permanent history table. Signatures in the permanent history table are for recurring versions of the web page and are likely to appear again. Error pages displayed when a web server is down for routine maintenance can be screened out using the history table. The frequency of notifications is tracked. When too many notifications are being sent for a web page, the last-modified header is used rather than signature-matching to reduce the frequency of notifications.

20 Claims, 14 Drawing Sheets



DOCKET ALARM

Clouding Exhibit 2001, pg. 1

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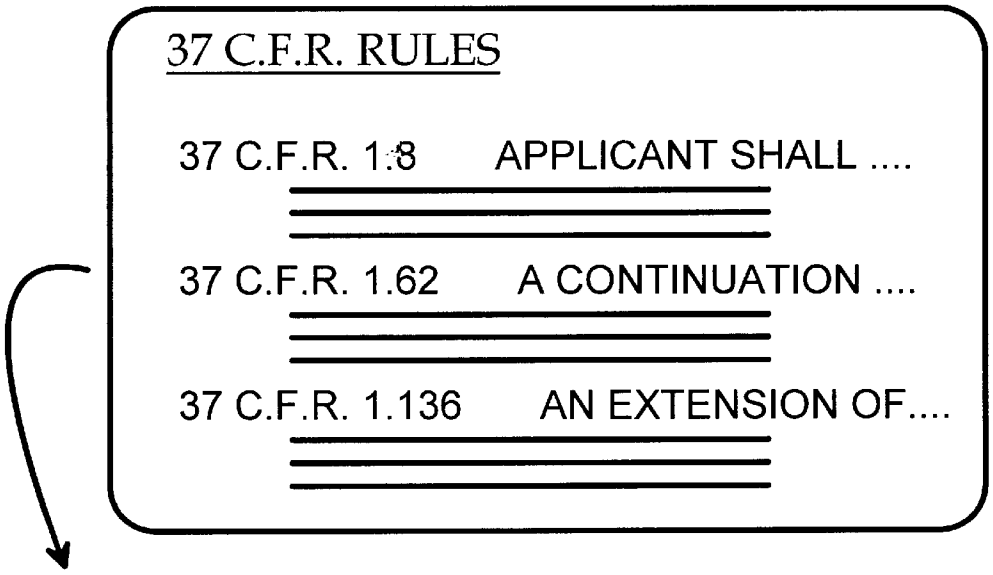

FIG. 1

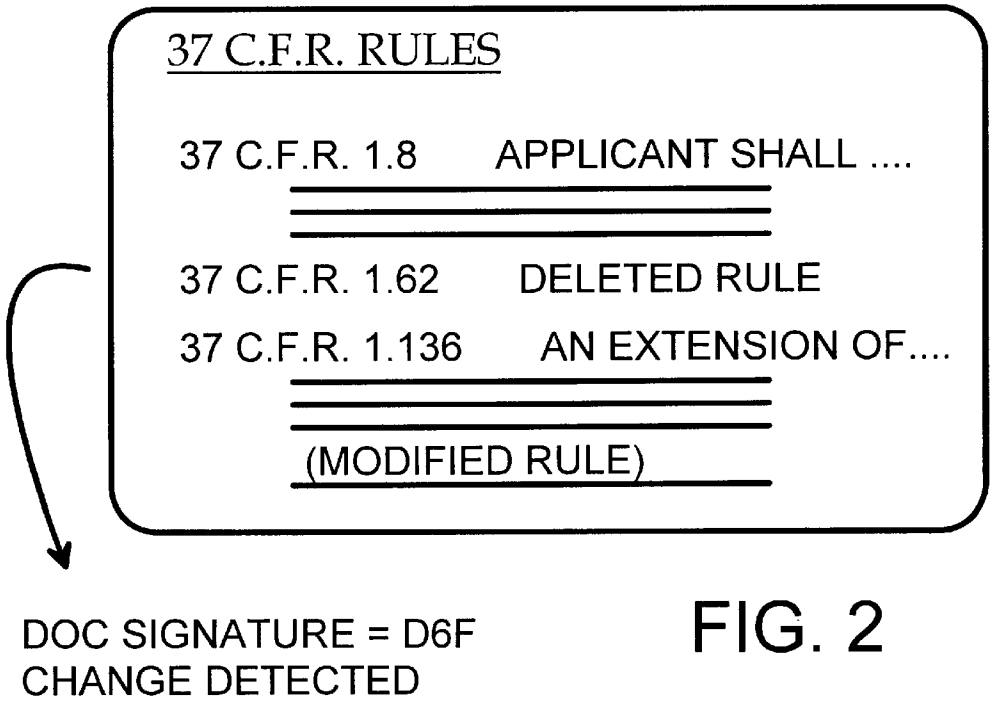

FIG. 2

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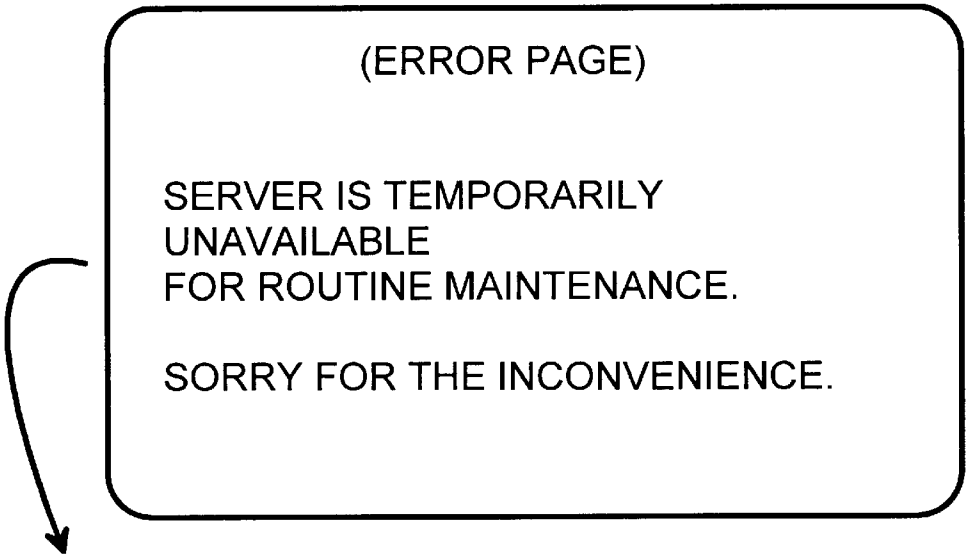

FIG. 3

DOC SIGNATURE = EB9

CHANGE DETECTED
IS NOT RELEVENT

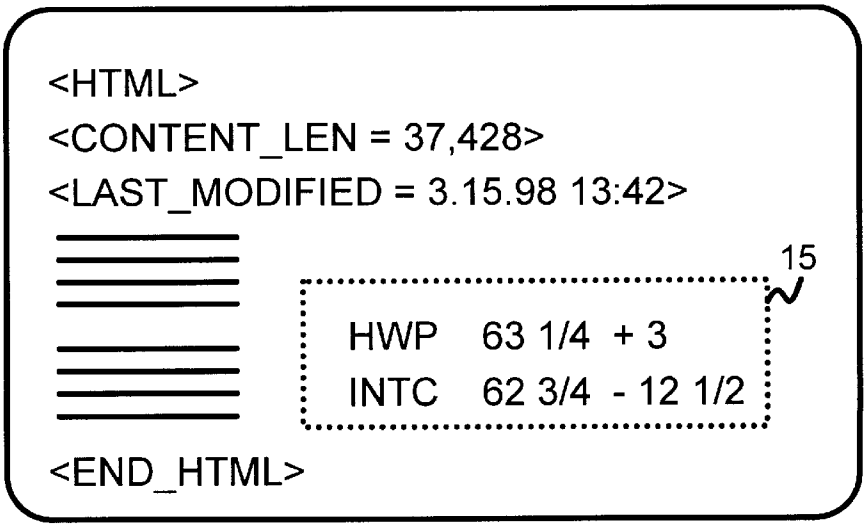

FIG. 4

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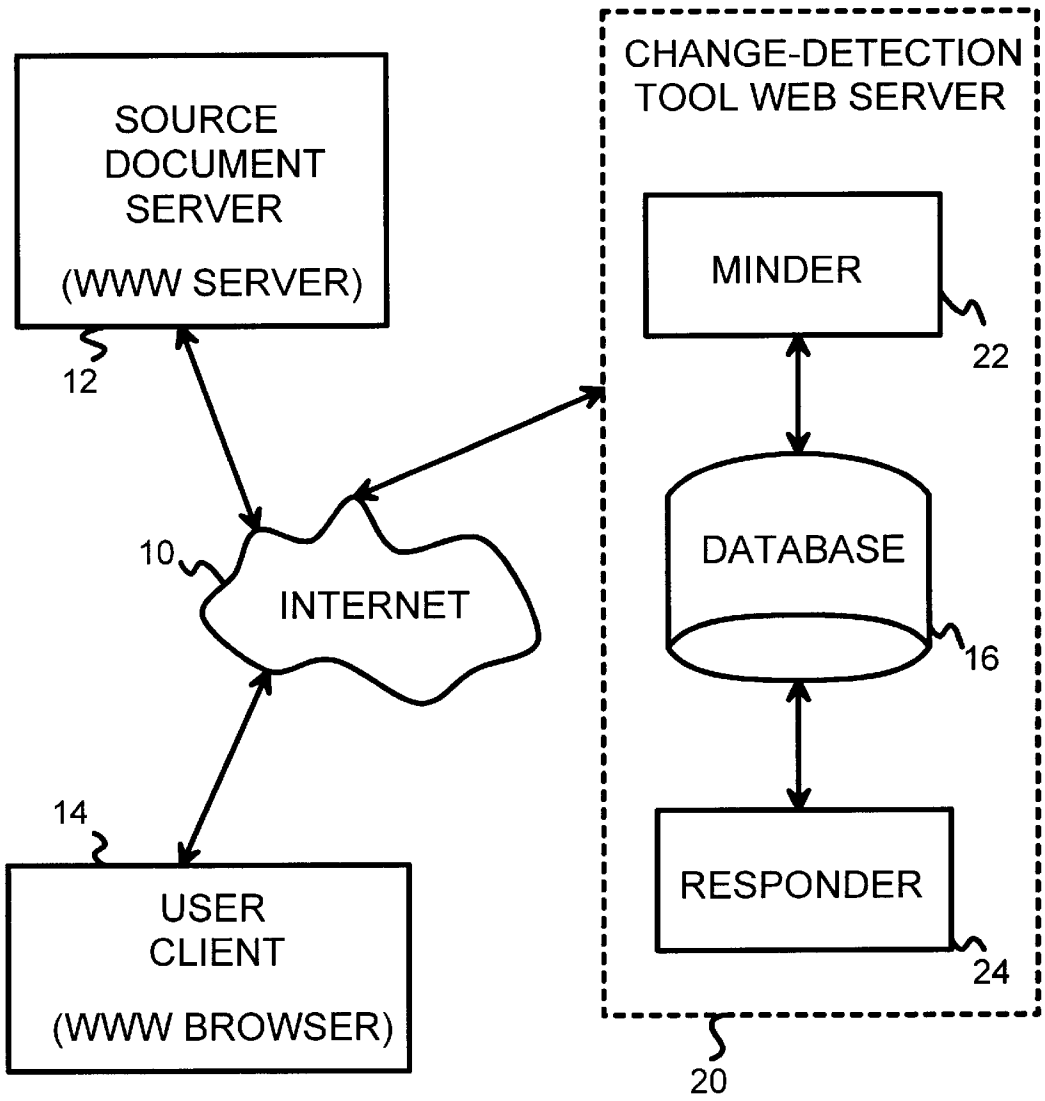

FIG. 5

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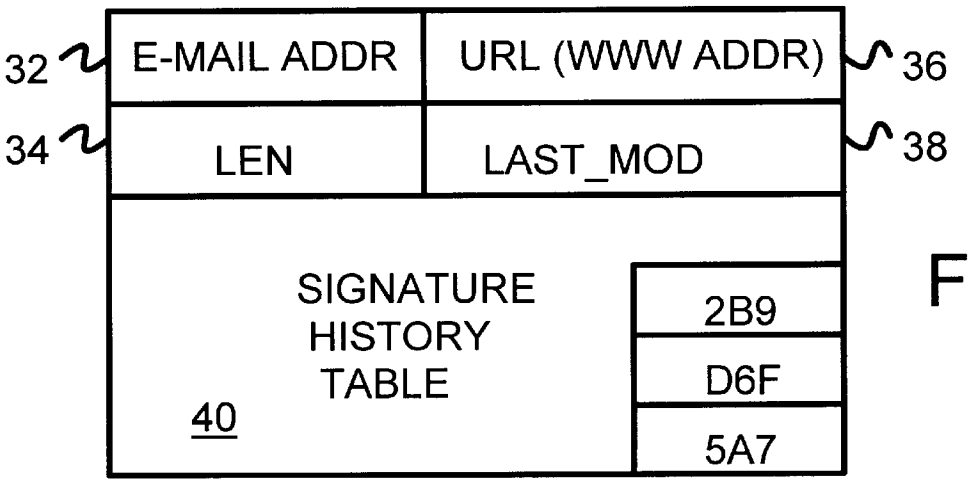

FIG. 6

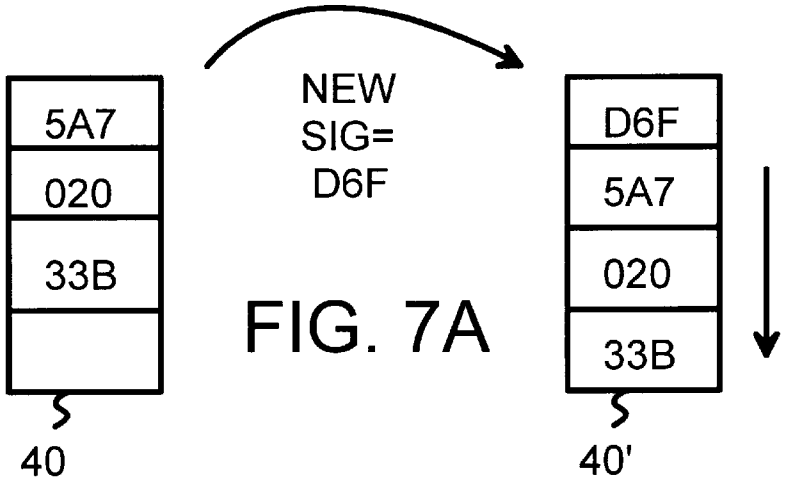

FIG. 7A

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