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United States Patent [19]

Brendel et al.

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[54] **WORLD-WIDE-WEB SERVER WITH DELAYED RESOURCE-BINDING FOR RESOURCE-BASED LOAD BALANCING ON A DISTRIBUTED RESOURCE MULTI-NODE NETWORK**

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[73] Assignee: **Resonate, Inc.**, Mountain View, Calif.

[21] Appl. No.: **691,006**

[22] Filed: **Aug. 5, 1996**

[51] **Int. Cl.**[6] **G06F 13/00**; G06F 17/30

[52] **U.S. Cl.** **395/200.31**; 395/200.32; 395/200.33; 395/200.36; 395/200.49; 395/200.56; 395/200.59; 395/200.66; 395/200.69; 395/670; 395/674; 395/675

[58] **Field of Search** 395/200.3–200.33, 395/200.36, 200.47–200.5, 200.54–200.6, 200.66, 200.69, 182.02, 182.08, 670–675

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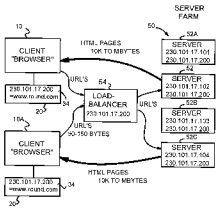
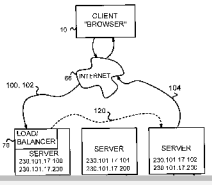
[57] **ABSTRACT**

A multi-node server transmits world-wide-web pages to network-based browser clients. A load balancer receives all requests from clients because they use a virtual address for the entire site. The load balancer makes a connection with the client and waits for the URL from the client. The URL specifies the requested resource. The load balancer waits to perform load balancing until after the location of the requested resource is known. The connection and URL request are passed from the load balancer to a second node having the requested resource. The load balancer re-plays the initial connection packet sequence to the second node, but modifies the address to that for the second node. The network software is modified to generate the physical network address of the second node, but then changes the destination address back to the virtual address. The second node transmits the requested resource directly to the client, with the virtual address as its source. Since all requests are first received by the load balancer which determines the physical location of the requested resource, nodes may contain different resources. The entire contents of the web site is not mirrored onto all nodes. Network bottlenecks are avoided since the nodes transmit the large files back to the client directly, bypassing the load balancer. Client browsers can cache the virtual address, even though different nodes with different physical addresses service requests.

16 Claims, 18 Drawing Sheets





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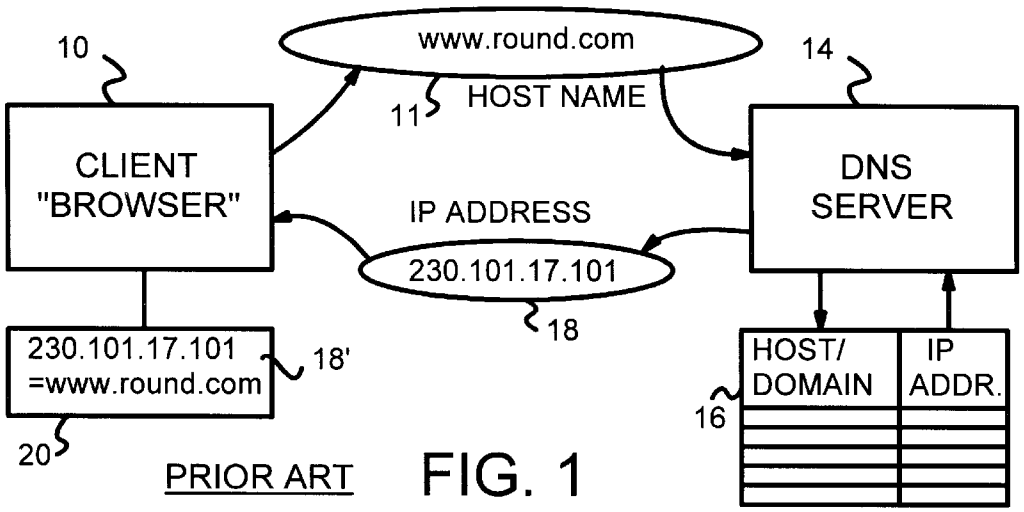

PRIOR ART FIG. 1

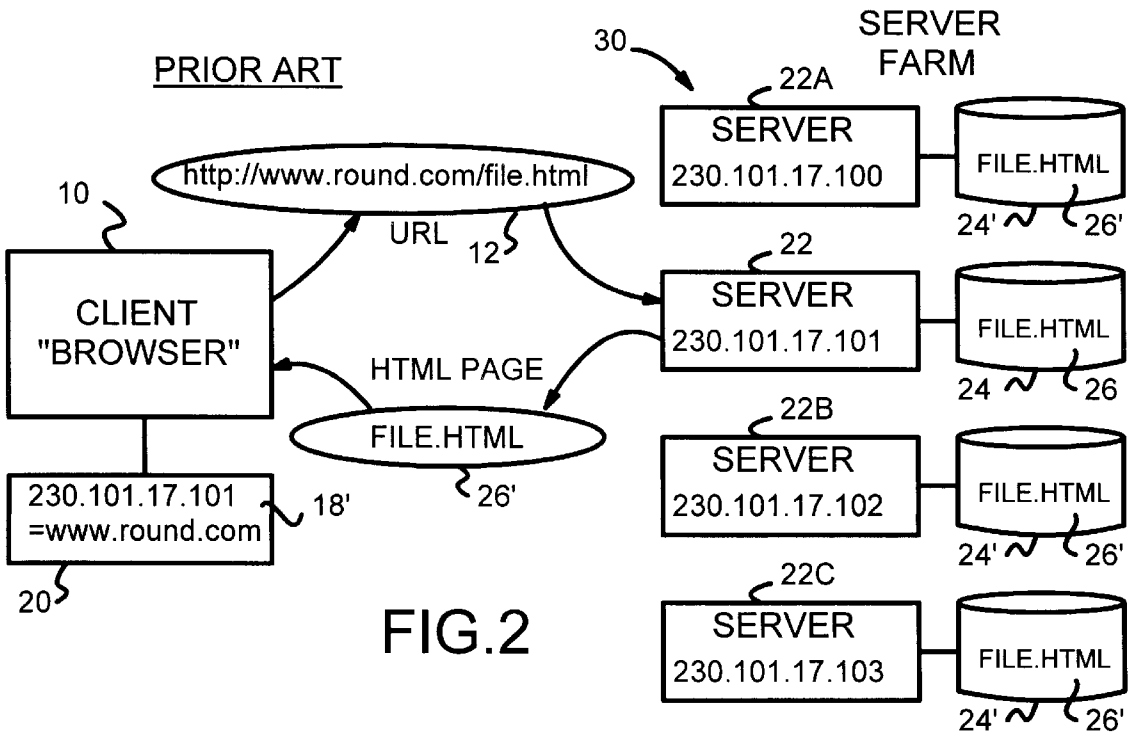

FIG.2

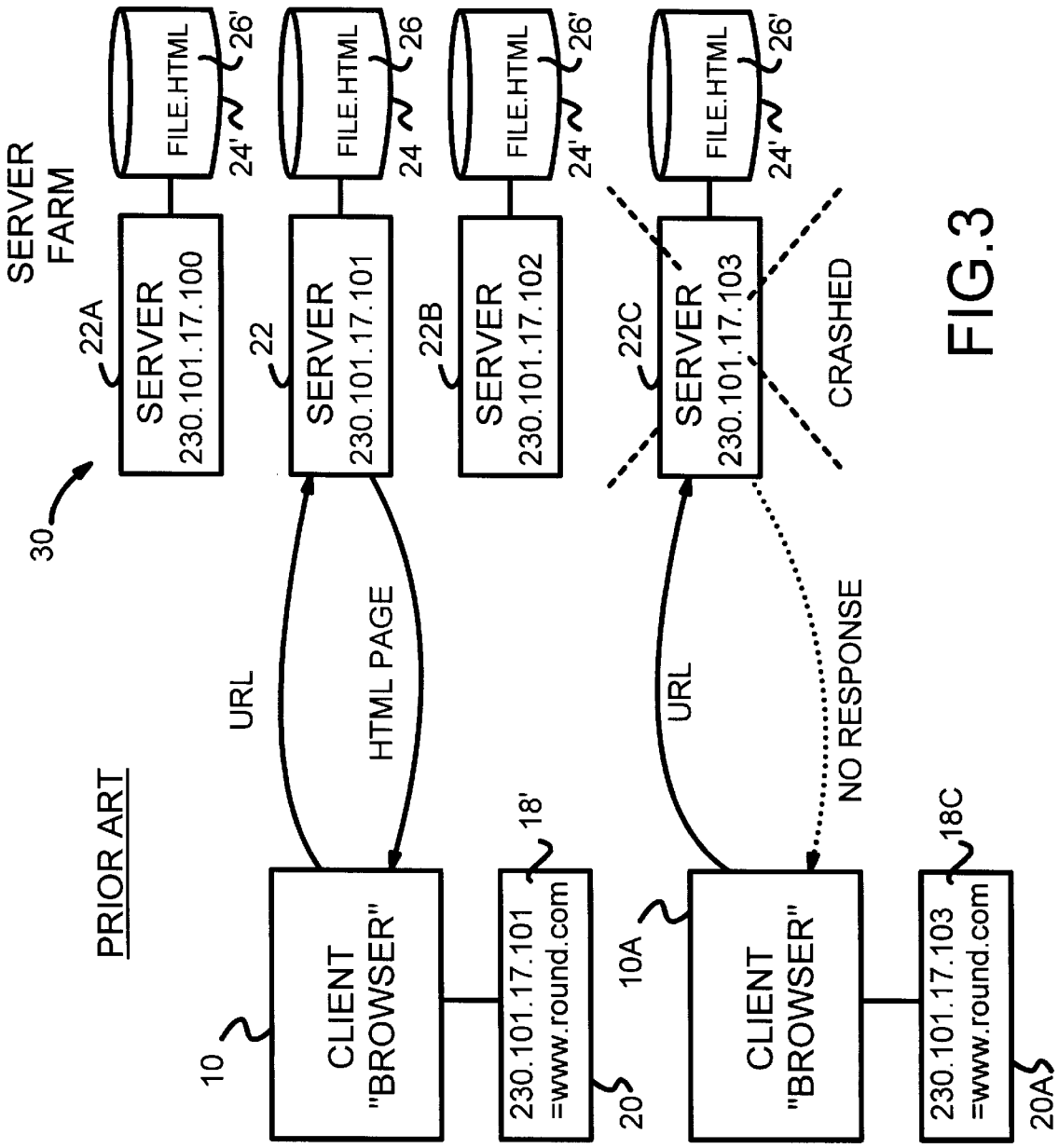

FIG.3

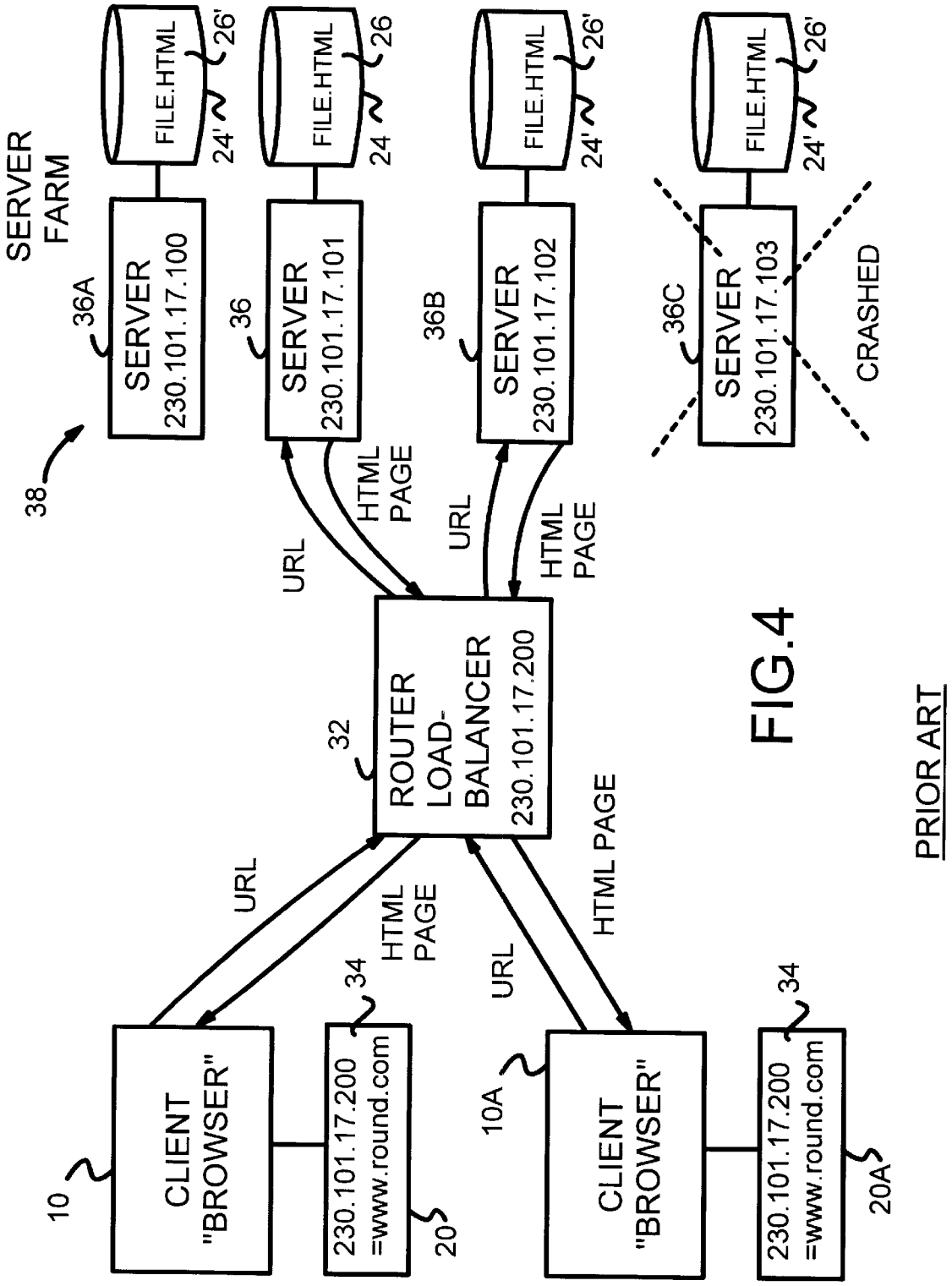

FIG.4

PRIOR ART

DOCKET ALARM

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