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United States Patent [19]

Cooper

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[54] **METHOD AND APPARATUS CAPABLE OF PRIORITIZING AND STREAMING OBJECTS WITHIN A 3-D VIRTUAL ENVIRONMENT**

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[51] **Int. Cl.**[7] **G06F 15/00**

[52] **U.S. Cl.** **345/433**

[58] **Field of Search** 345/433, 419, 345/421, 422, 425

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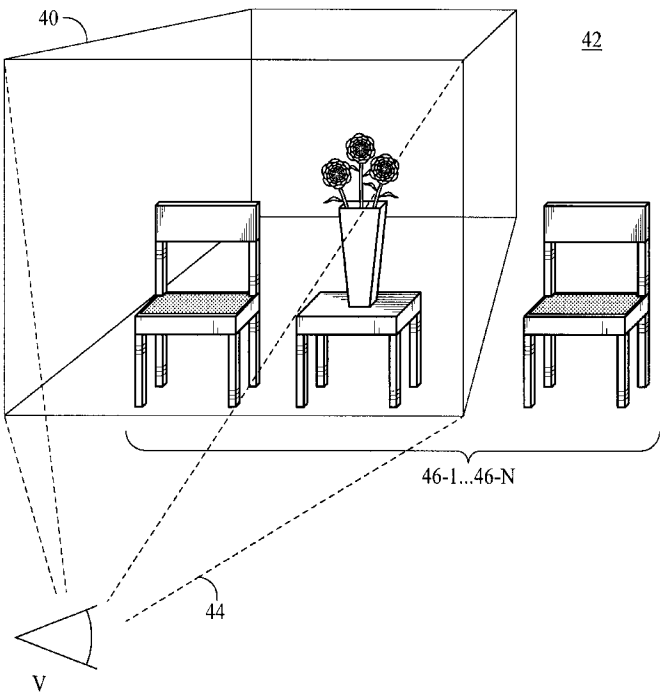
[57] **ABSTRACT**

A method of assessing objects in a 3D graphical scene provides discovery of the most important objects in that scene from the viewer's perspective at any instant in time. These objects are then queued in priority order and requests for each object's data sent to the server at a rate determined by the available network bandwidth. The importance of each object is recalculated per scene update and new requests are sent out based on these values. Only data requests that can be responded to within the next update cycle are sent, while most request messages are retained. This allows for immediate response to a changing view position, and reduces visual latency, defined as the time that lapses until an object having a data deficit gets that data. Latency is reduced for important objects at the cost of lesser objects. Because important objects are those which contribute most to the visual scene, the overall richness of the scene appears to grow faster than the number of objects received.

18 Claims, 5 Drawing Sheets



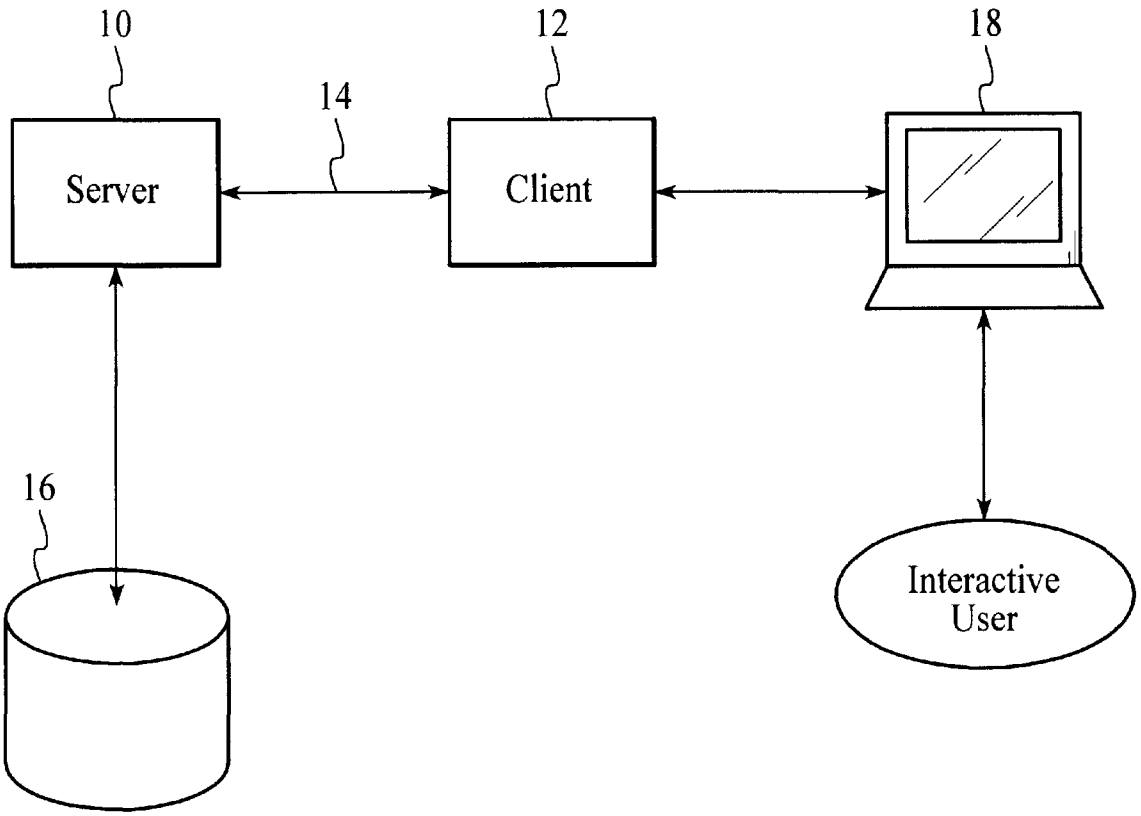


FIG. 1

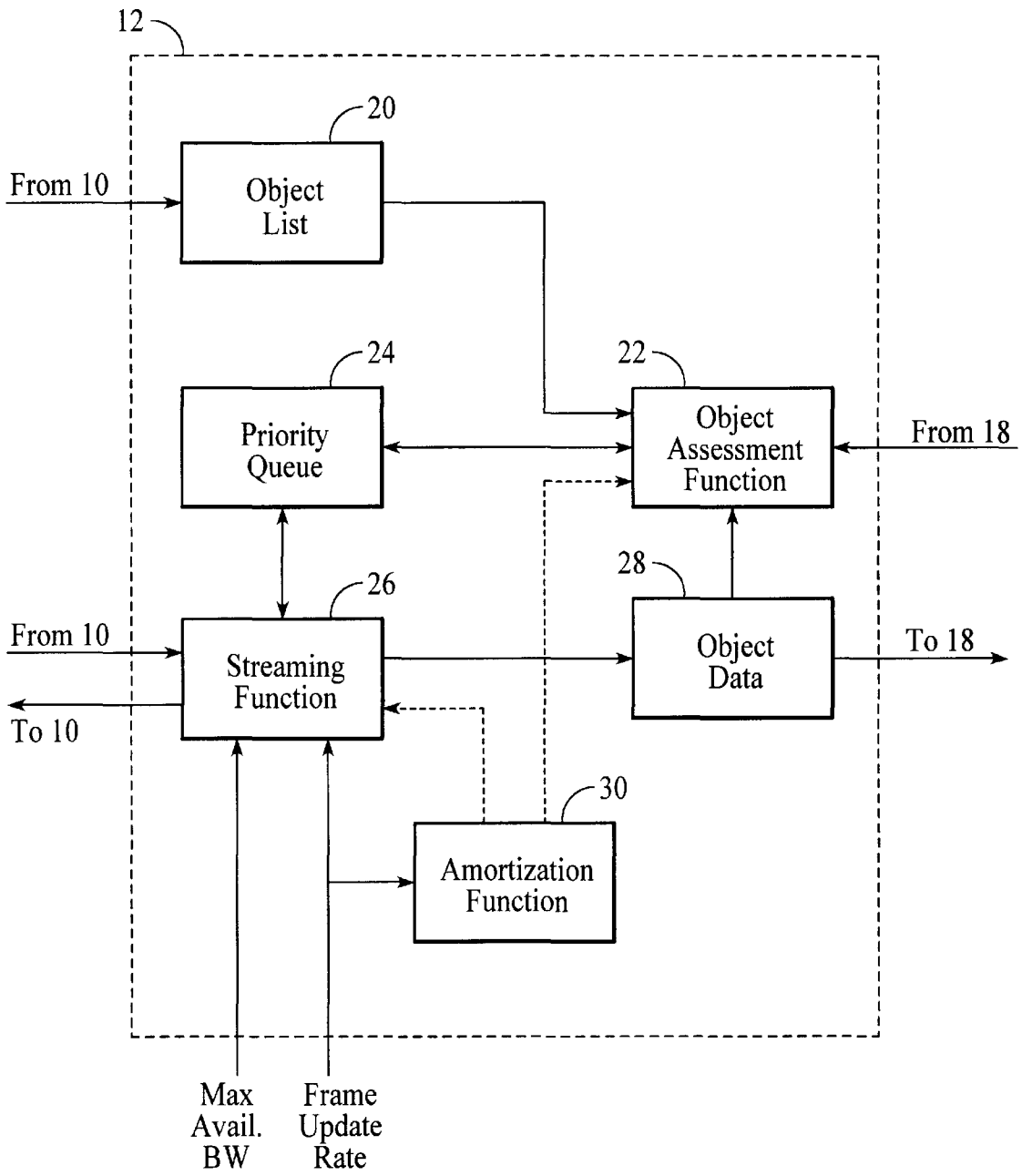


FIG. 2

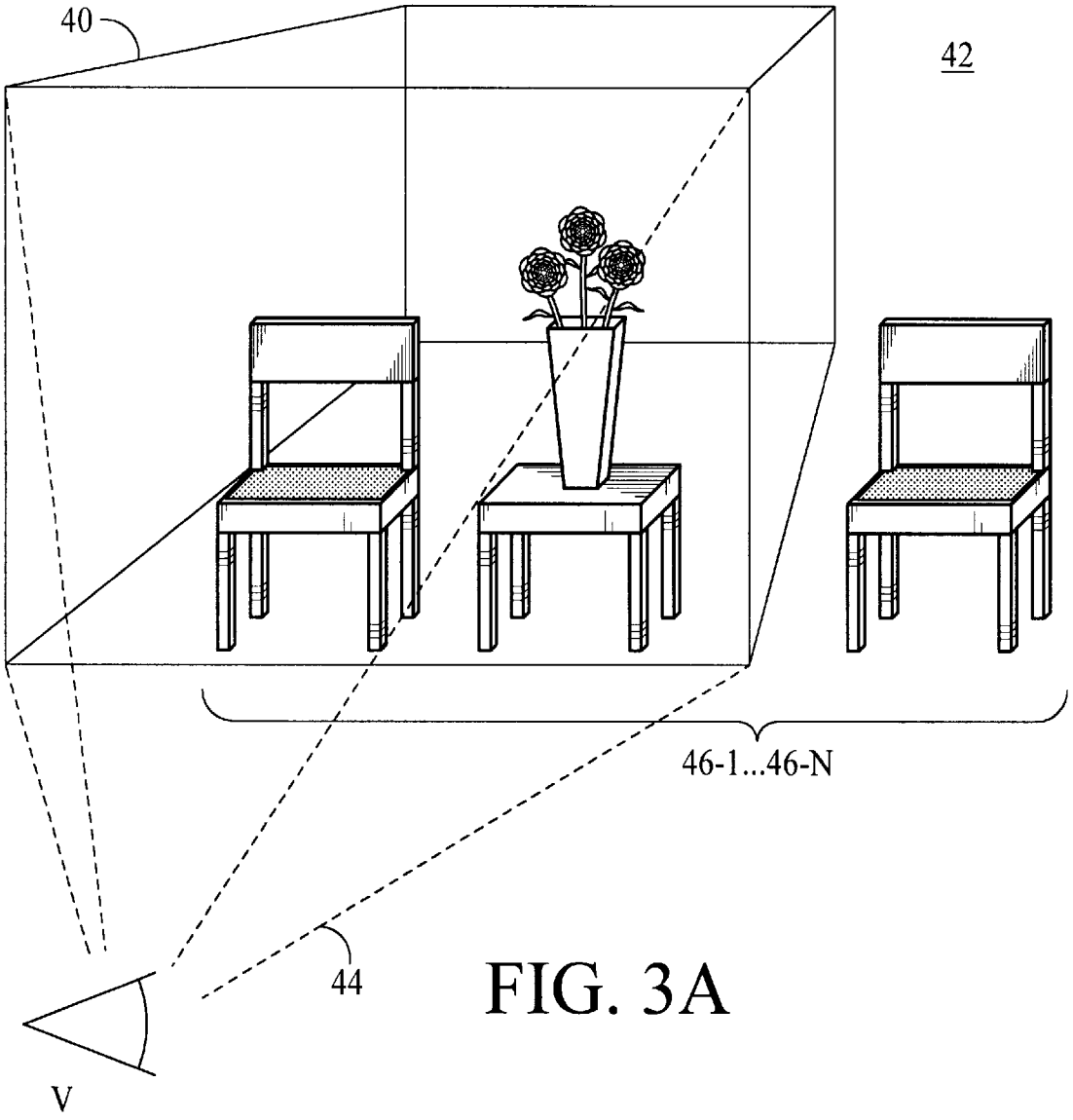


FIG. 3A

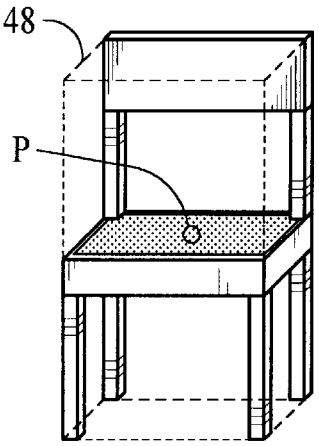


FIG. 3B

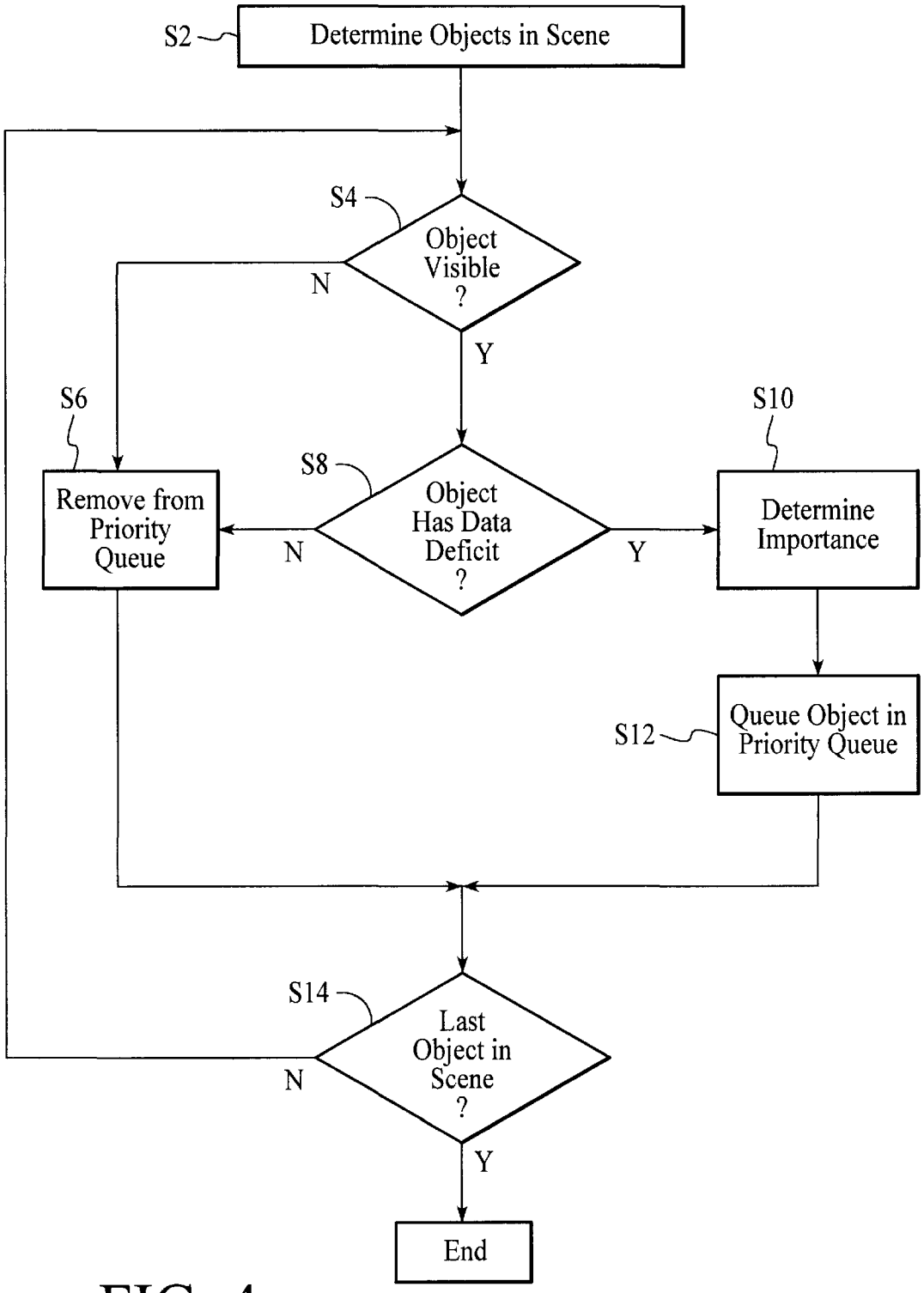


FIG. 4

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