determining the animation in response to the players input saves many bytes in storage space requirements. In following figures, details of methods and apparatus used to present a game of chance generated from a 3-D gaming environment are described.

[0055] Returning to **FIG. 1**, the 3-D gaming environment **100** includes three objects: 1) a rectangular box **101** on top of, 2) a plane **114** and 3) a second box **126**. The box **101**, box **127** and plane **114** are defined in a 3-dimensional rectangular coordinate space **104**. Typically, surfaces of the objects in the gaming environment are defined using a plurality of surface elements. The surface elements may comprise different shapes, such as different types of polygons that are well known in the 3-D graphical arts. For example, the objects in the present information may be defined in a manner to be compatible with one or more graphics standards such as Open Graphics Library (OpenGL). Information on OpenGL may be found at www.opengl.org.

[0056] In one embodiment, the objects in the gaming environment **100** may be defined by a plurality of triangular elements. As an example, a plurality of triangular surface elements **125** are used to define a portion of the surface **108** and the surface face **112**. In another embodiment, the objects in the gaming environment **100**, such as box **101** and box **126**, may be defined by a plurality of rectangular elements. In yet another embodiment, a combination of different types of polygons, such as triangles and rectangles may be used to describe the different objects in the gaming environment **100**. By using an appropriate number of surface elements, such as triangular elements, objects may be made to look round, spherical, tubular or embody any number of combinations of curved surfaces.

[0057] Triangles are by the most popular polygon used to define 3-D objects because they are the easiest to deal with. In order to represent a solid object, a polygon of at least three sides is required (e.g. triangle). However, OpenGL supports Quads, points, lines, triangle strips and quad strips and polygons with any number of points. In addition, 3-D models can be represented by a variety of 3-D curves such as NURBs and Bezier Patches.

[0058] Each of the surface elements comprising the 3-D virtual gaming environment may be described in a rectangular coordinate system or another appropriate coordinate system, such as spherical coordinates or polar coordinates, as dictated by the application. The 3-D virtual gaming environments of the present invention are not limited to the shapes and elements shown in **FIG. 1** (see **FIGS. 2, 3** and **4**) or the coordinate system used in **FIG. 1** which are shown for illustrative purposes only. Details of 3-D graphical rendering methods that may be used with the present invention are described in "OpenGL Reference Manual: The Official Reference Document to Open GL, Version 1.2," 3rd edition, by Dave Shreiner (editor), OpenGL Architecture Review Board, Addison-Wesley Publishing, Co., 1999, ISBN: 0201657651 and "OpenGL Program Guide: The Official Guide to Learning OpenGL, Version 1.2," 3rd edition, by Mason Woo, Jackie Neider, Tom Davis, Dave Shreiner, OpenGL Architecture Review Board, Addison-Wesley Publishing, Co., 1999, ISBN: 0201604582, which are incorporated herein in their entirety and for all purposes.

[0059] Surface textures may be applied to each of the surface elements, such as elements **125**, defining the surfaces in the virtual gaming environment **100**. The surface textures may allow the 3-D gaming environment to appear more "real" when it is viewed on a display screen on the gaming machine. As an example, colors, textures and reflectance's may be applied to each of the surface elements defining the various objects in the 3-D gaming environment. Millions of different colors may be used to add a realistic "feel" to a given gaming environment. Textures that may be applied include smoothness or surface irregularities such as bumps, craters, lines, bump maps, light maps, reflectance maps and refractance maps or other patterns that may be rendered on each element. The textures may be applied as mathematical models stored as "texture maps" on the gaming machine.

[0060] In one embodiment, the "texture map" may be an animated texture. For instance, frames of a movie or another animation may be projected onto a 3-D object in the 3-D gaming environment. These animated textures may be captured in 2-D views presented in video frames on the gaming machine. Multiple animated textures may be used at the same time. Thus, for example, a first movie may be projected onto a first surface in the 3-D gaming environment and a second movie maybe projected onto a second surface in the 3-D gaming environment where both movies may be viewed simultaneously.

[0061] Material properties of a 3-D surface may describe how the surface reacts to light. These surface properties may include such things as a) a material's ability to absorb different wave-lengths of light, b) a material's ability to reflect different wavelengths of light (reflectance), c) a material's ability to emit certain wavelengths of light such as the tail lights on a car and d) a material's ability to transmit certain wavelengths of light. As an example, reflectance refers to how much light each element reflects. Depending on the reflectance of a surface element other items in the gaming environment may be reflected fuzzily, sharply or not at all. Combinations of color, texture and reflectance may be used to impart an illusion of a particular quality to an object, such as hard, soft, warm or cold.

[0062] Some shading methods that are commonly used with 3-D graphics to add texture that may be applied to the present invention include gourand shading and phong shading. Gourand and phong shading are methods used to hide an object's limited geometry by interpolating between two surfaces with different normals. Further, using Alpha Blending, pixels may be blended together to make an object appear transparent i.e. the object transmits light.

[0063] Virtual light sources, such as **102**, may be used in the gaming environment to add the appearance of shading and shadows. Shading and shadows are used to add weight and solidity to the rendering of a virtual object. For example, to add solidity to the rectangular box **101**, light rays emitted from light source **102** are used to generate a shadow **103** around the rectangular box **101**. In one method, ray tracing is used to plot paths of imaginary light rays emitted from an imaginary light source such as **102**. These light rays may impact and may reflect off various surfaces affecting the colors assigned to each surface element. In some gaming environments, multiple light sources may be used where the number of lights and the intensity of each light source change with time. Typically, in real time 3D, the light sources do not generate shadows and it is up to the pro-