

[0057] Video data in FIG. 2C also includes perspective. Various embodiments that add perspective will now be discussed.

[0058] A person standing in front of a gaming machine and looking at a traditional mechanical reel benefits from depth perception of the three dimensional curved reel. As a result, an actual mechanical reel is often perceived with a slight bi-concave shape on its lateral edges.

[0059] In a specific embodiment, a video reel includes a slight outward bowing of the lateral sides of the video reel to better simulate its mechanical counterpart. This outward bowing is only slightly done, and is illustrated in FIG. 3A. This effect is also included in the video data of reels 125 of FIGS. 2A-2C.

[0060] Referring to FIG. 3A, video reel strip 150 includes slight outward curvature on its two lateral sides. A contrast box 172 (shown by a dotted line) includes true rectangular dimensions and is placed within the perimeter of video strip 150 to illustrate the slight outward curvature at the lateral sides of video reel strip 150.

[0061] In one embodiment, the central portion of video reel strip 150 includes a larger width than rectangular contrast box 172. In another embodiment, the top and bottom portions of each side are laterally decreased to create the outwardly bowed sides.

[0062] In general, objects that subtend a greater angle at the human eye are perceived to be closer than objects that subtend a smaller angle. Referring to FIG. 1C, since the center B of reel 74 is closer to an observation point A than are the upper and lower edges C of viewable portion of reel 74, the human visual processing subconsciously expects a uniform-width reel strip to appear wider at the closest point B than at the edge points C. This apparent variation in width depends on the distance difference between the observer and the center and edge viewing points. The absence of this bowing and slight curvature will be noticeable to observers if they are attempting to ascertain whether the reel strip is genuine or merely an image, or it may just create enough of a visual inconsistency that the observer senses that "something just isn't right" without being able to identify the specific anomaly. By providing a suitable degree of bowing or convexity to the lateral edges of video reel strip 150 video data on display device 18c, a person's visual expectation may be fulfilled.

[0063] An excessive amount of curvature is undesirable. Too much curvature is typically immediately recognizable as unrealistic and destroys the illusion of a real reel. In some cases, too much curvature tends to make the video reel seem balloon-like and cartoonish. Experimentally, an un upper bound on curvature was determined when the bowing and outward curvature transitioned from barely noticeable to excessive, at which point the reel strip 150 images appeared cartoonish. In one embodiment, the upper limit of reel width curvature (after which the reels transition in perception from quasi-realistic to cartoon-like) is such that a reel strip width at a central portion 182 is greater than a width for bottom and top portions 184 and 186 by less than about 5 percent. For example, if reel strip 150 includes a center width of 160 millimeters wide, then reel strip 150 width at the top and bottom edges may be no less than about 152 millimeters. In a specific embodiment, a reel strip width at a central portion 182 is greater than a width for bottom and top portions 184 and 186 by less than about 2 percent to about 3 percent. Thus, the amount of curvature is slight: enough to create the perceived effect, but not too much. The exact amount of curva-

ture to be applied to the video reel strip 150 may vary with a number of visual attributes of the image, such as: the modeled radius of video reel 152, the width of the simulated reel strip 150, the relative size of video reel 152 with respect to the rest of the images, the number of reels 152, the ratio of the width of reel 152 to its height, the ratio of reel 152 width to the spacing between adjacent reels, etc.

[0064] The video data may also include simulated perspective in the reel symbols. In a specific embodiment, shape of a symbol 160 on a reel strip 150 depends on its position on reel 152. FIG. 3B shows a graphical simplification of this simulated perspective (the effect is amplified for discussion); the symbols in FIG. 2C also includes this effect to a more realistic effect.

[0065] The same perceived 'size-versus-viewing distance' phenomenon discussed above with respect to FIG. 1C also affects symbols printed on a reel strip. Referring back to FIG. 1C, reel 74 curvature affects the difference in distance at the extreme edges C of the visible portion of the reel. Symbol B, located at the center of the reel, is unaffected by this phenomenon because its upper and lower edges are approximately equidistant from the observer.

[0066] Referring to FIG. 3B, the lower edge of a symbol 170a, located at the uppermost portion of reel strip 150 (and a transparent reel window 15 of display device 18a, but not shown), is closer to a person standing in front of the gaming machine and more normal to the person's view than the upper edge of the symbol 170a. Correspondingly, the lower edge of symbol 170a appears slightly larger to the player than the upper edge, which is farther away.

[0067] Re-creating this effect in the all-video simulation may be accomplished by introducing a measure of "keystoning" to the symbols. As shown in FIG. 3B, upper symbol 170a and lower symbol 170c have been given a slight trapezoidal shape that conveys the sensation that the extreme edges are farther away than are the edges disposed closer to the center of the reel. This adds to the perceived sensation of curvature of video reel 152 by altering the shape of each symbol 170, depending on the position of each symbol 170 on the reel. The amount of keystoning may use the width ratios used for video reel strip 150 described above. More specifically, the width of each symbol 170 at a particular position on strip 150 may be reduced by the ratio of the width of its current position to the maximum lateral width at central portion 182. In one specific embodiment, implementation of this technique uses multiple versions of each reel symbol 170 in game memory, where a slightly different version with appropriate geometric modification is used for each different reel rotational position. For example, in a game with three horizontal paylines, a distinct version of each symbol may be used for the upper, center, and lower paylines, respectively. In another specific embodiment, symbol 170 is resized in real time by altering physical dimensions of symbol 170 using a scalar based on rotational position for symbol 170 on the reel 152.

[0068] The present invention may also use preferential lighting to emulate a real mechanical reel gaming machine. When a person stands in front of a mechanical reel gaming machine, lighting in the ambient room differentially illuminates the reels based on the outward position. Typically, light sources from above, such as ceiling lights, favorably illuminate outer (or protruding) and upper portions of the reel. In one embodiment, the video data provided to the layered displays illuminates and shades the silkscreen video data on the