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Matsumoto et al.

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(54) **TEXTURE INFORMATION ASSIGNMENT METHOD, OBJECT EXTRACTION METHOD, THREE-DIMENSIONAL MODEL GENERATING METHOD, AND APPARATUS THEREOF**

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G06K 9/00 (2006.01)
G06K 9/20 (2006.01)

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See application file for complete search history.

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(57) **ABSTRACT**

The present method represents a three-dimensional shape model by polygons according to a plurality of object images information picked up by rotating a real object for every arbitrary angle to assign texture information on each polygon from object image information having the largest projection area of the relevant polygon. In order to improve the color continuity between adjacent polygons, the object image information having correspondence between a polygon of interest and an adjacent polygon thereof is selected so as to be the object image information approximating the shooting position and the shooting direction. An alternative method divides an object image into a plurality of regions, obtains difference between an object image and a background image in region level, outputs a mean value of the absolute value of difference in the region level, and detects the region having the mean value of absolute values of difference equal to or greater than a threshold value as the object portion. Another further method obtains a plurality of object images by shooting only a background of an object of interest and by shooting the object of interest during each rotation. A silhouette image is generated by carrying out a difference process between the object image and the background image. A voting process is carried out on the voxel space on the basis of the silhouette image. A polygon is generated according to the three-dimensional shape obtained by the voting process. The texture obtained from the object image is mapped to the polygon.

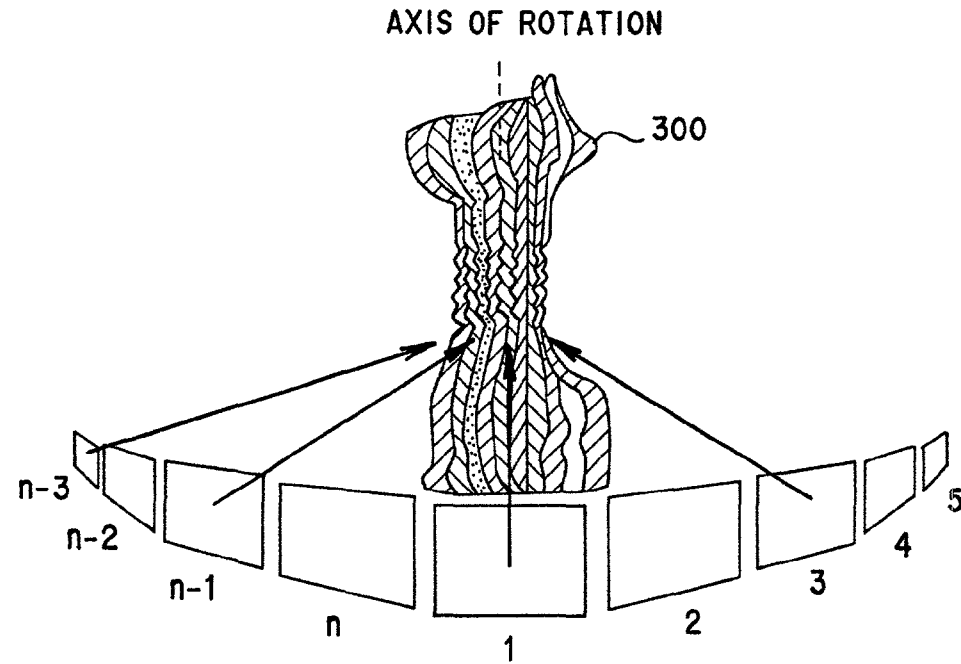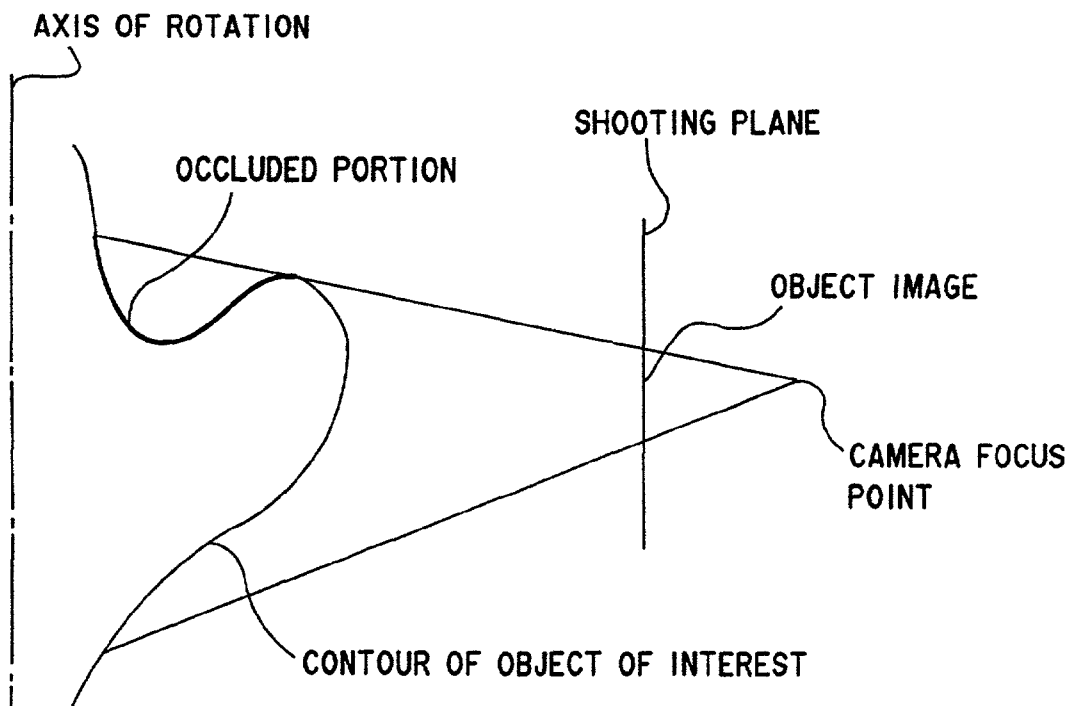**27 Claims, 43 Drawing Sheets**

FIG.1
PRIOR ART

AXIS OF ROTATION

300

n-3
n-2
n-1
n
1
2
3
4
5

FIG.2

AXIS OF ROTATION

SHOOTING PLANE

OCCLUDED PORTION

OBJECT IMAGE

CAMERA FOCUS
POINT

CONTOUR OF OBJECT OF INTEREST

FIG. 3

FIG. 4

F I G. 5

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┌──────────────────────────────────┐
│         IMAGE SHOOTING           │──── S10
└──────────────────────────────────┘
                 │
                 ▼
┌──────────────────────────────────┐
│    SILHOUETTE IMAGE PRODUCTION   │──── S12
└──────────────────────────────────┘
                 │
                 ▼
┌──────────────────────────────────┐
│         VOTING PROCESS           │──── S14
└──────────────────────────────────┘
                 │
                 ▼
┌──────────────────────────────────┐
│       POLYGON REPRODUCTION       │──── S16
└──────────────────────────────────┘
                 │
                 ▼
┌──────────────────────────────────┐
│         TEXTURE MAPPING          │──── S18
└──────────────────────────────────┘
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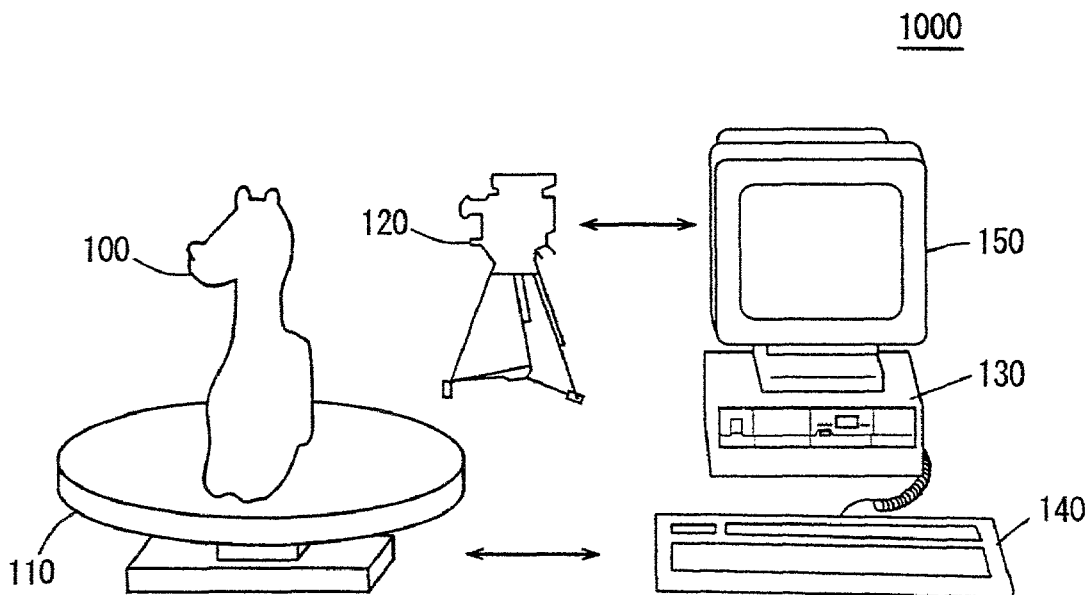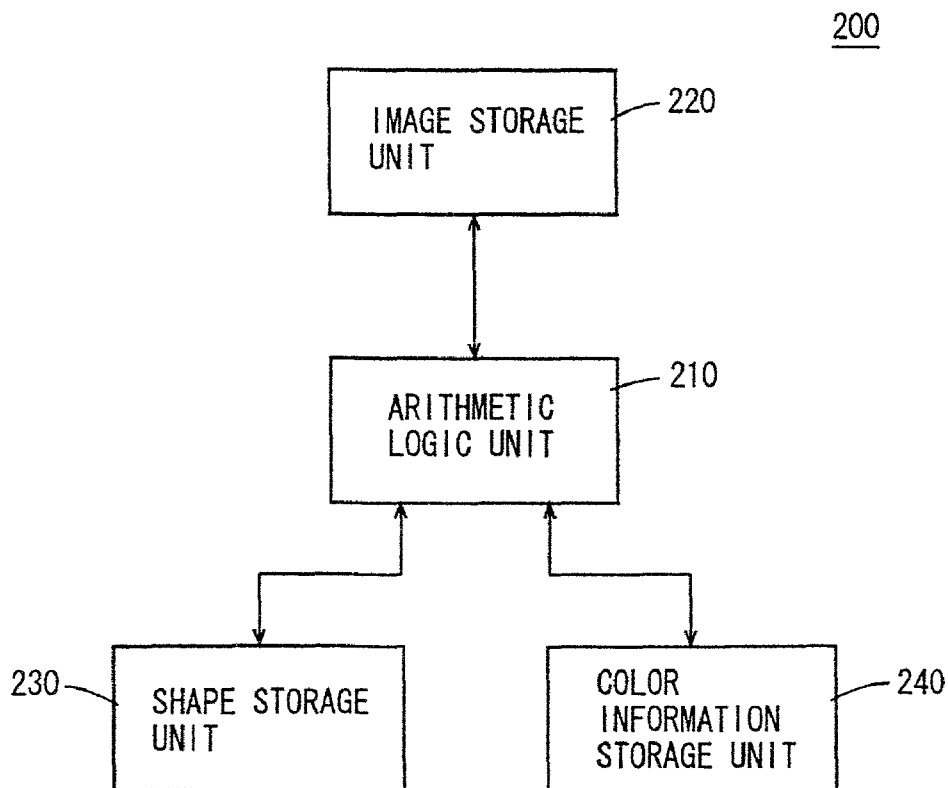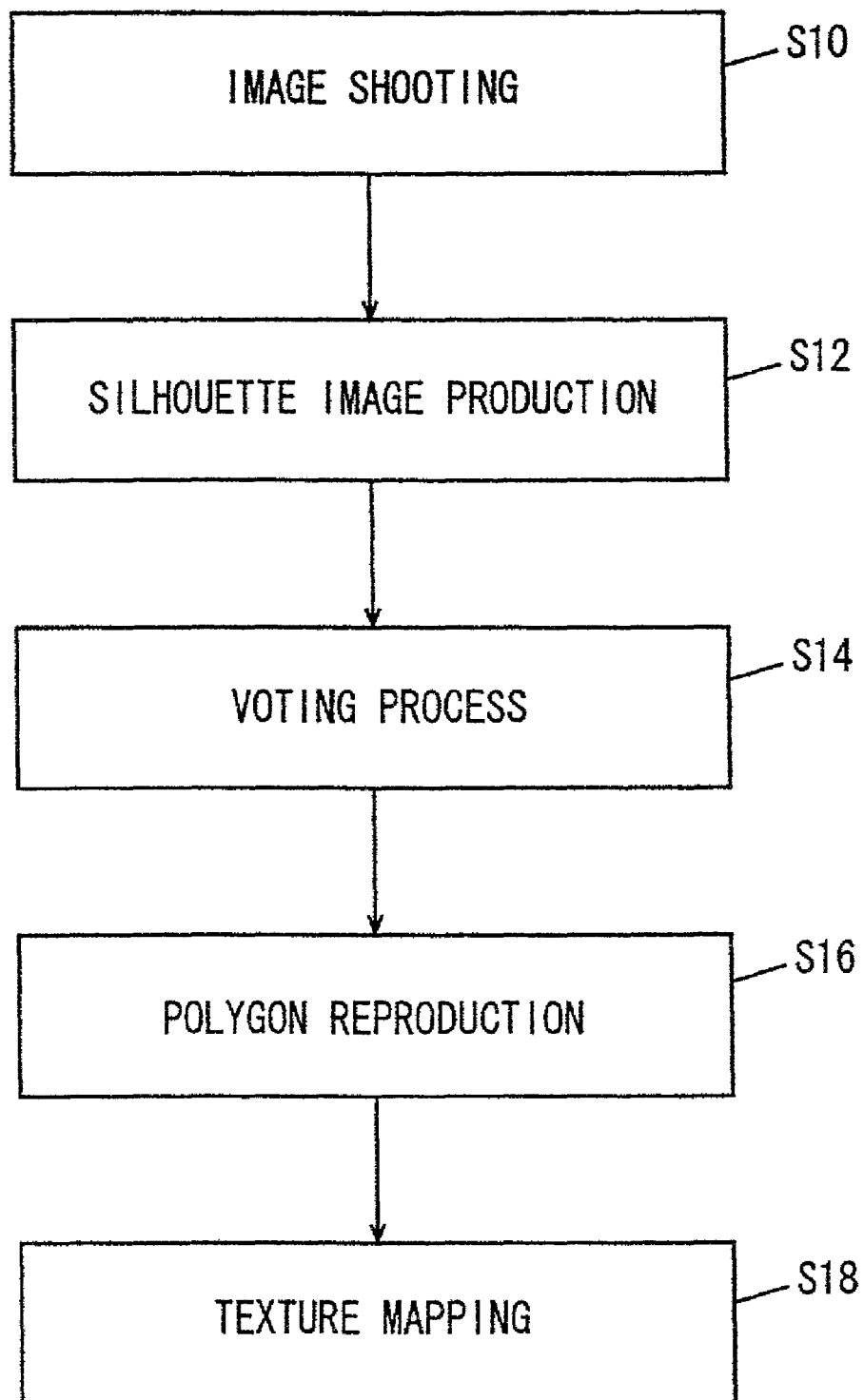
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