

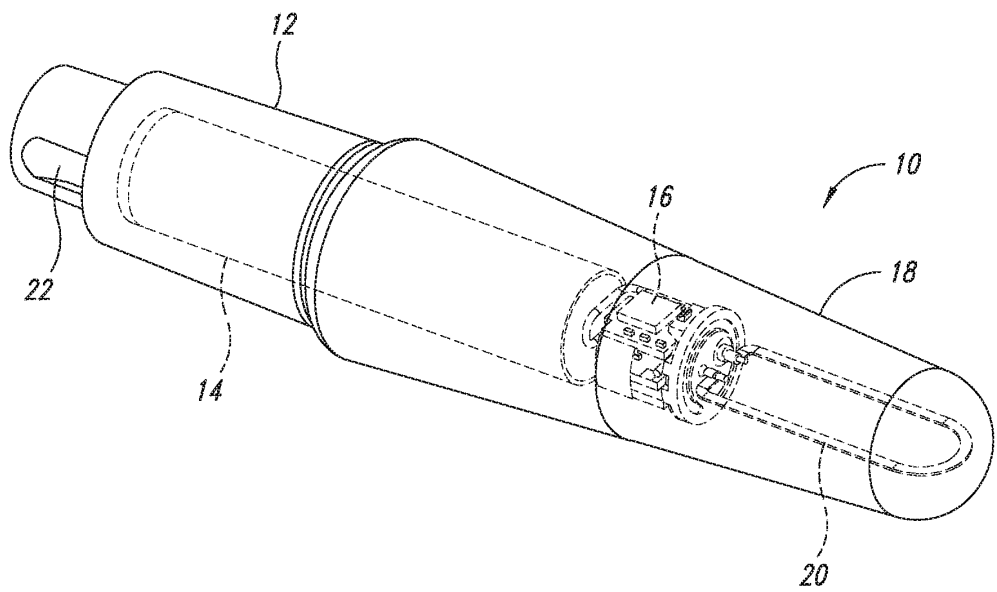


FIG. 1

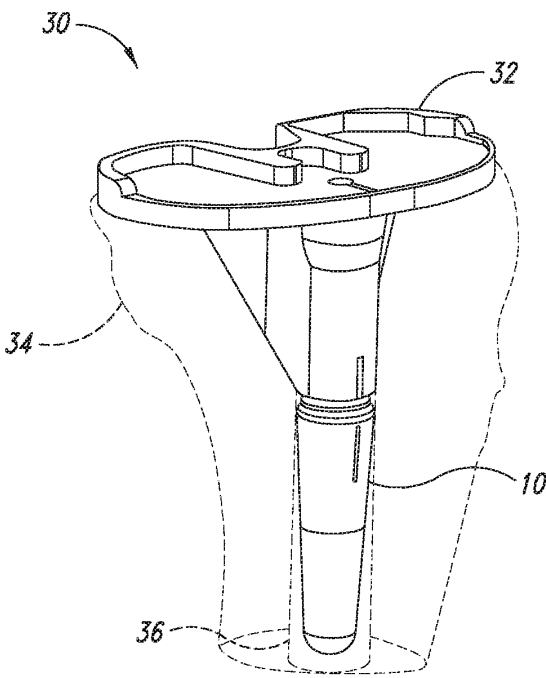


FIG. 2

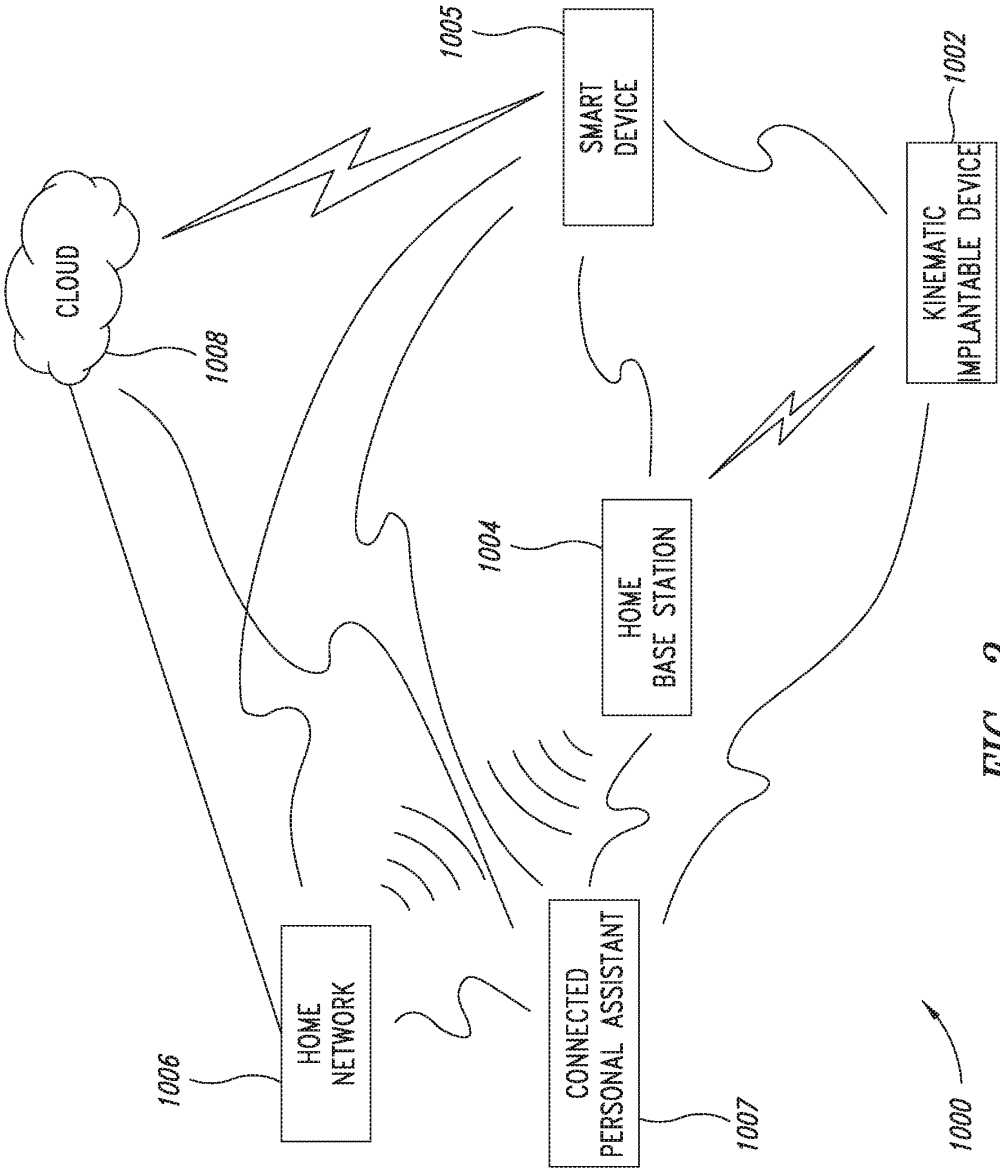


FIG. 3

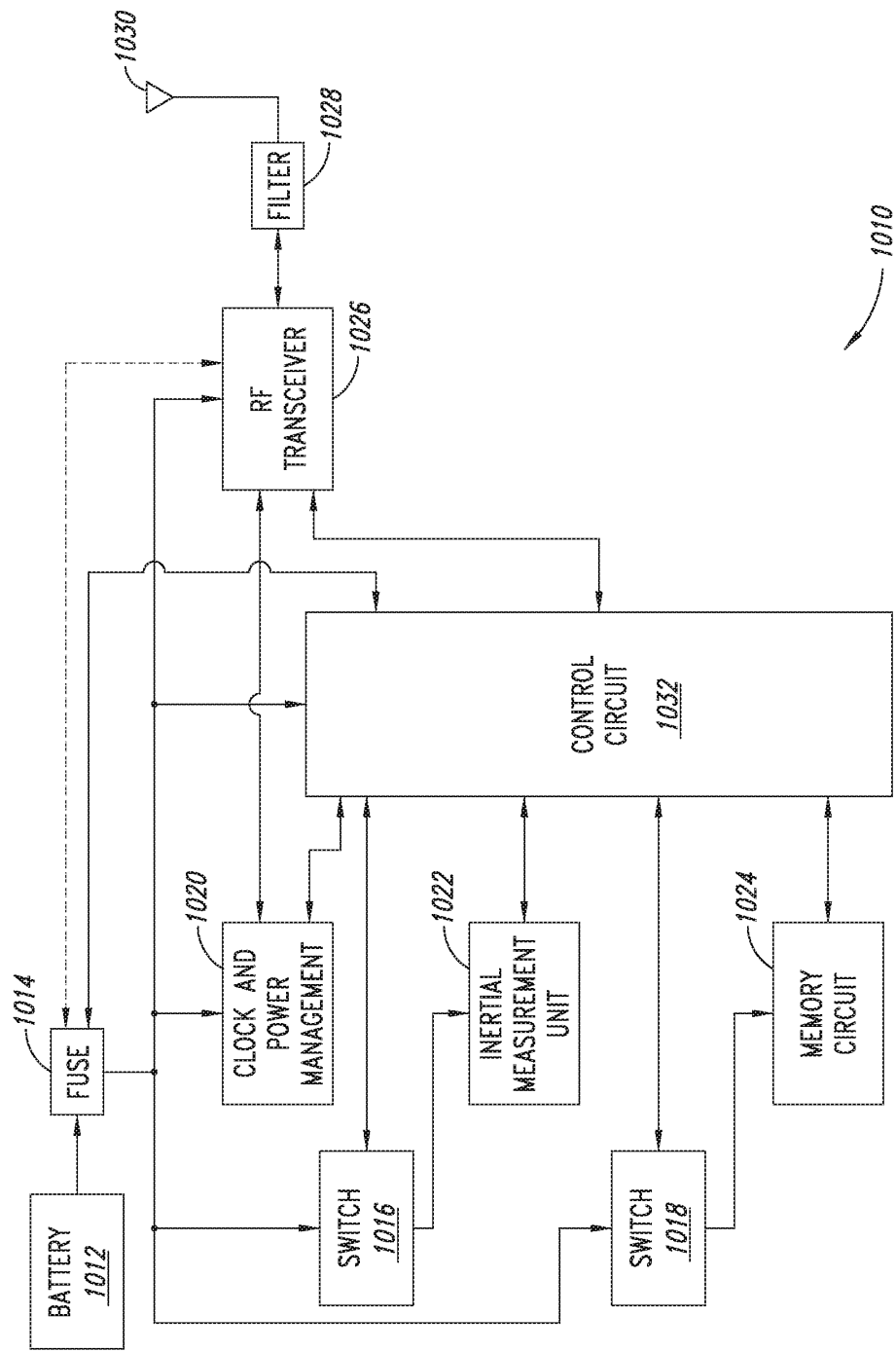


FIG. 4

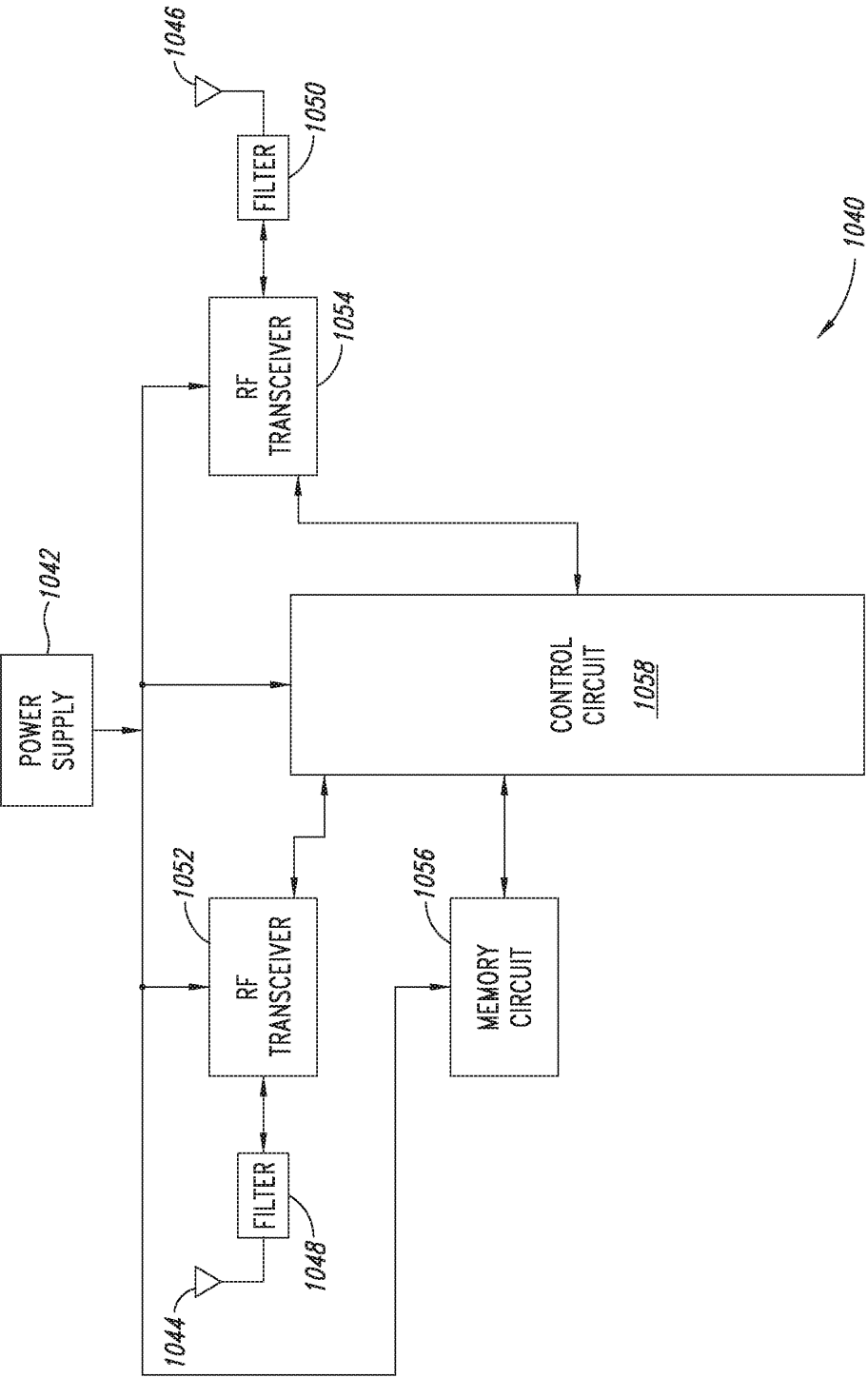


FIG. 5

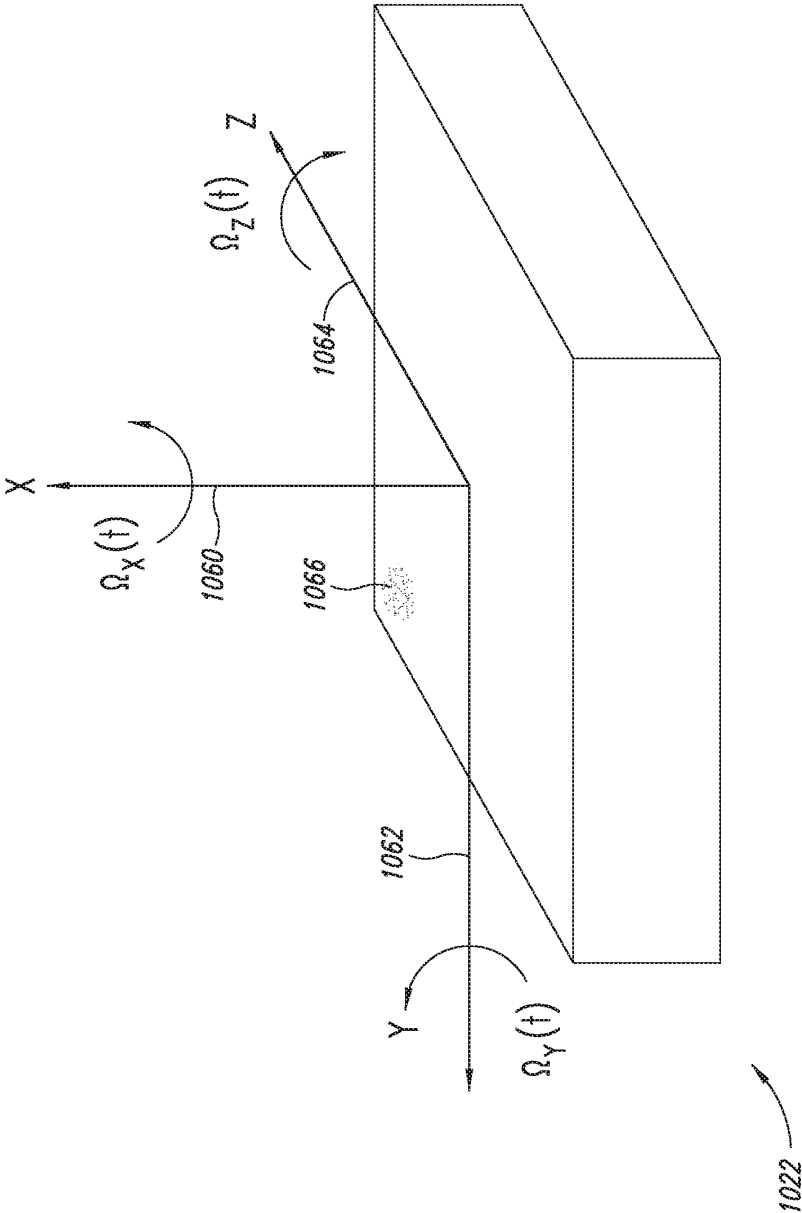
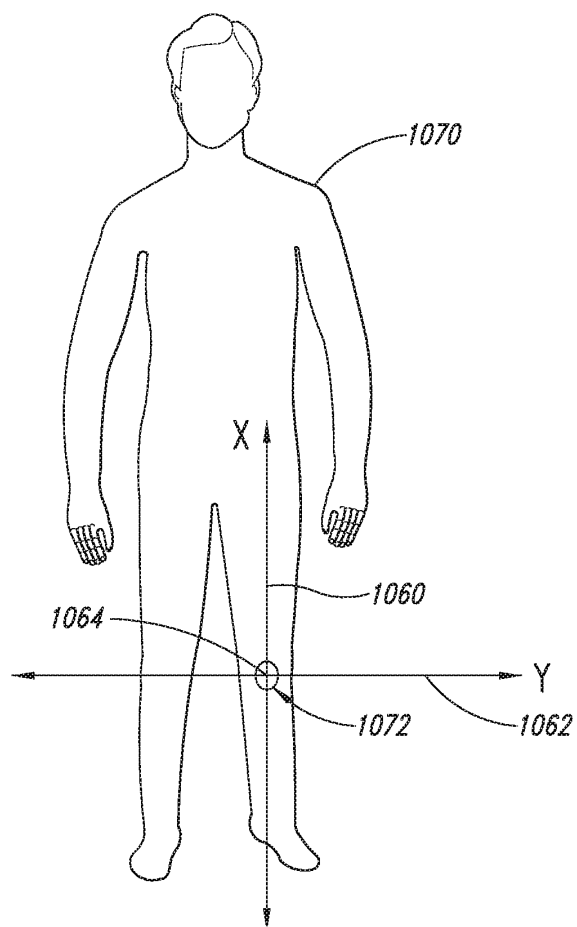
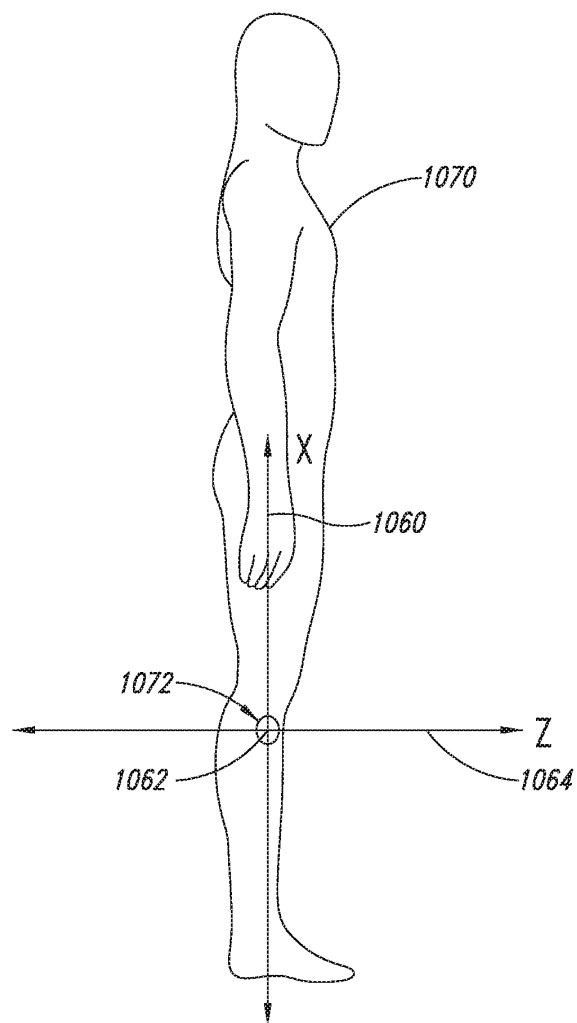


FIG. 6

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*FIG. 7*

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*FIG. 8*

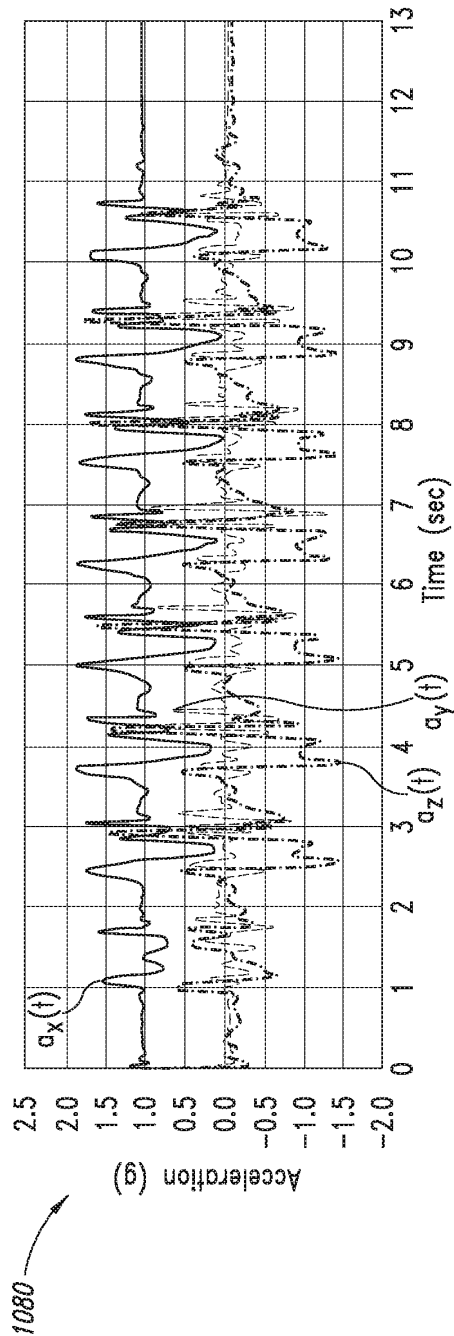


FIG. 9

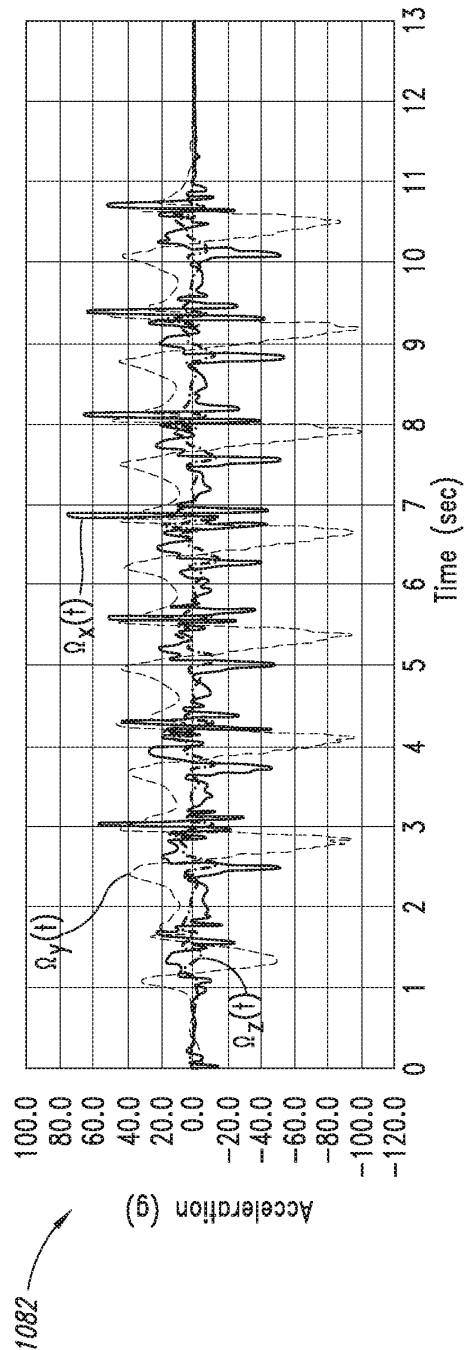


FIG. 10

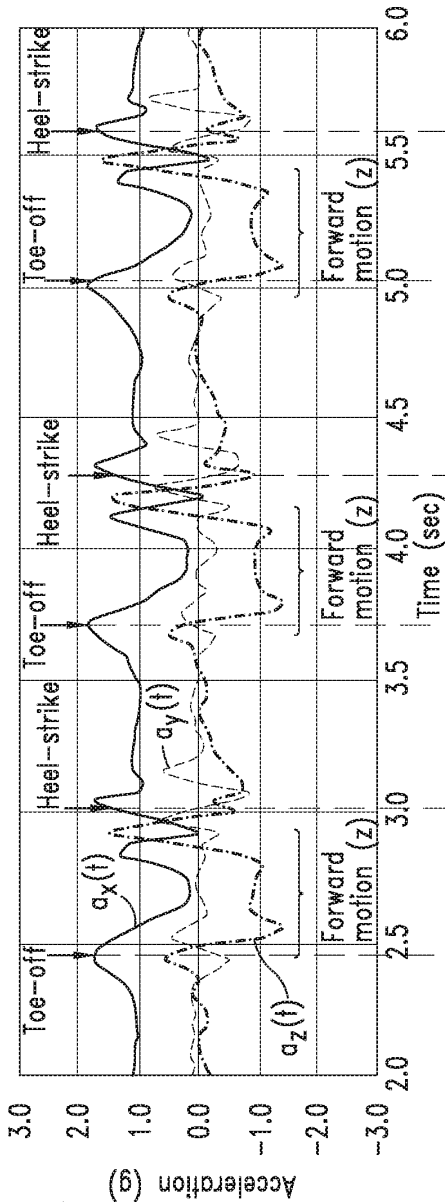


FIG. 11

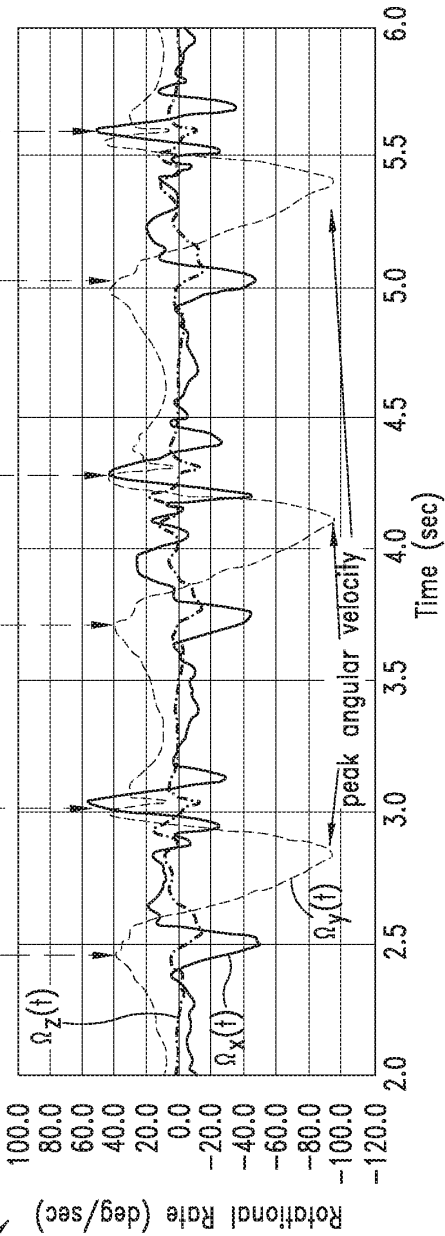
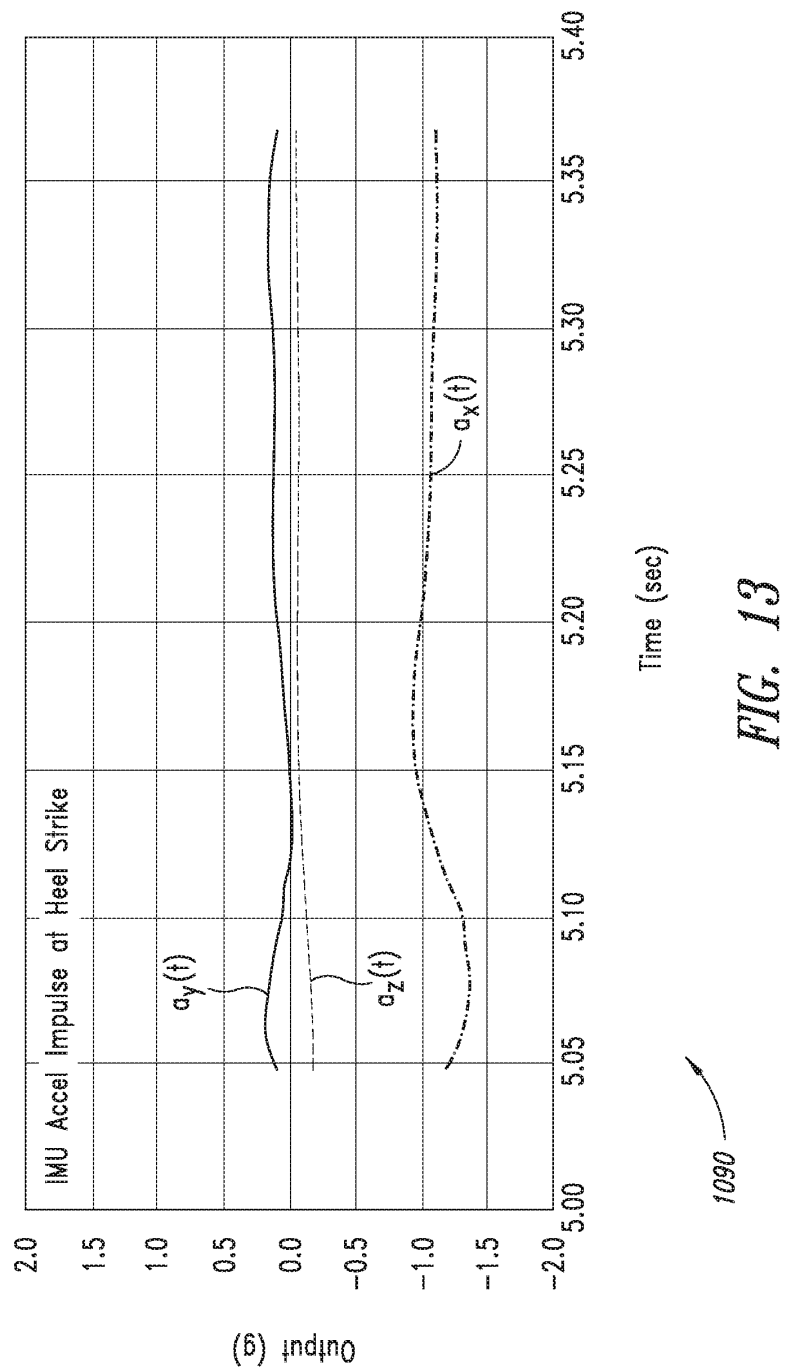


FIG. 12

1084

1086



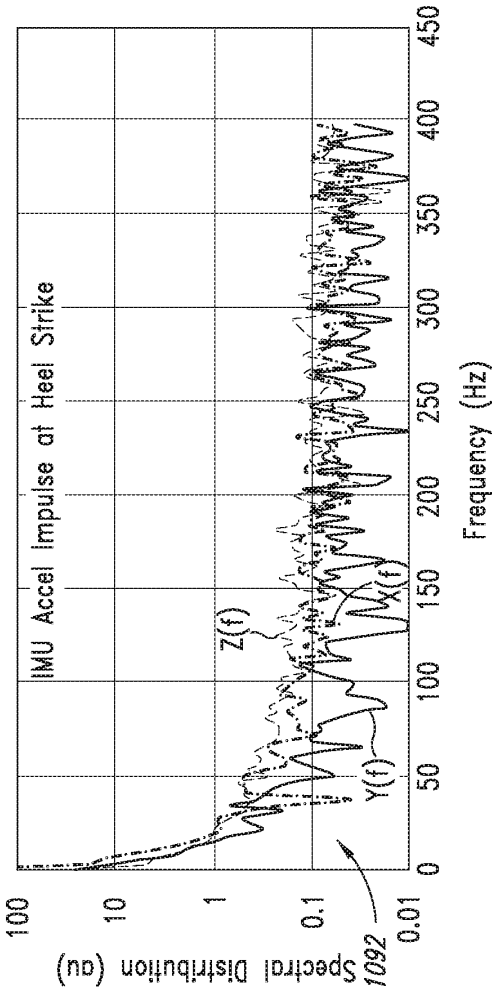


FIG. 14

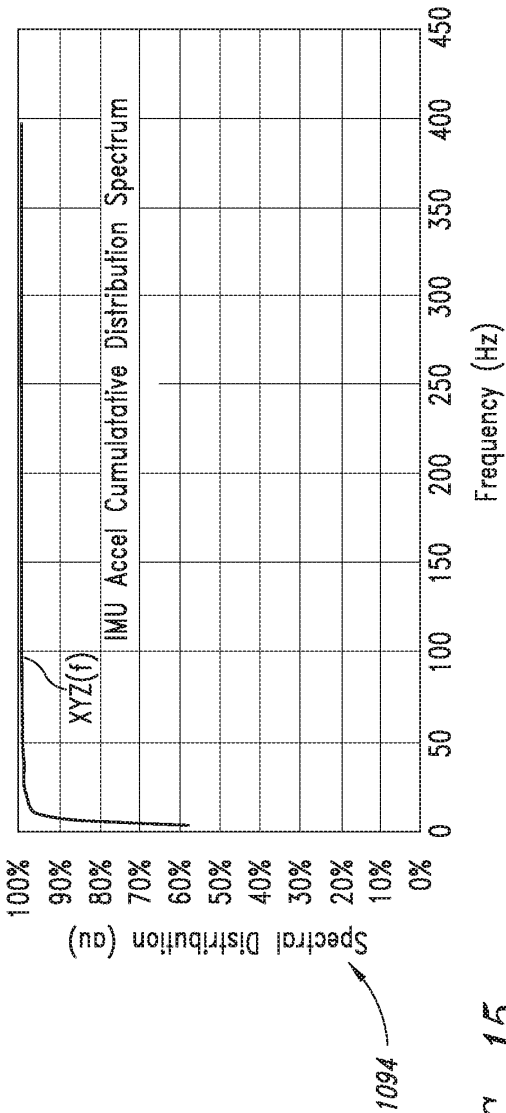


FIG. 15

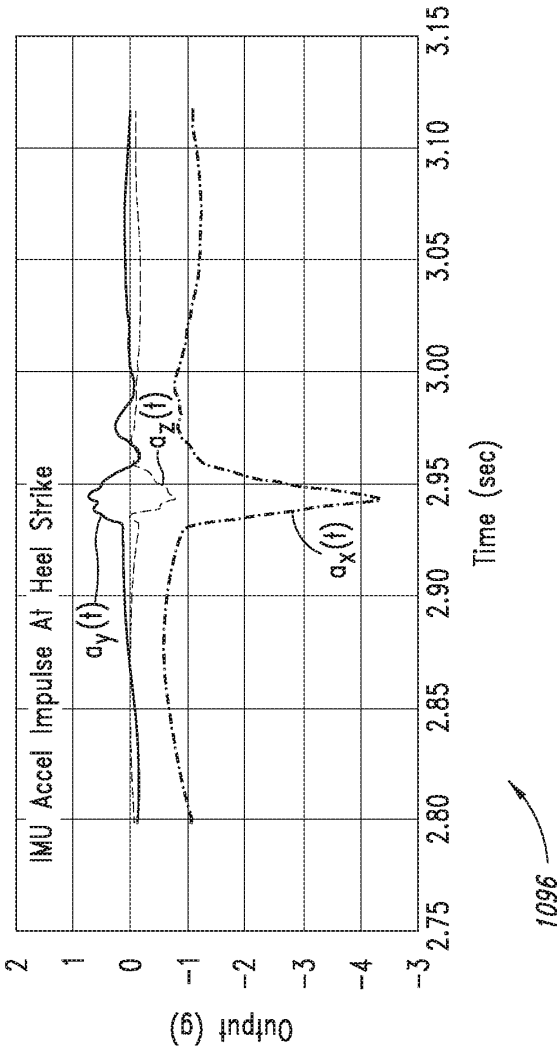


FIG. 16

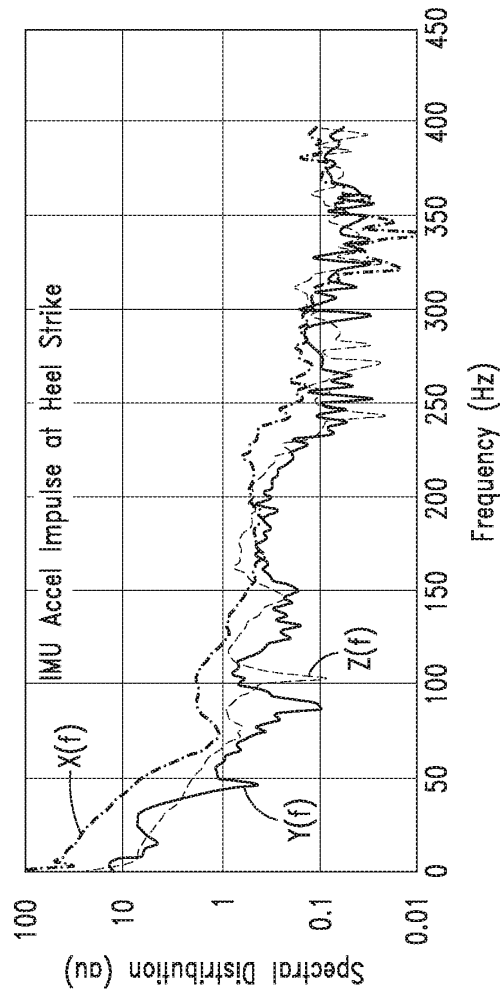


FIG. 17

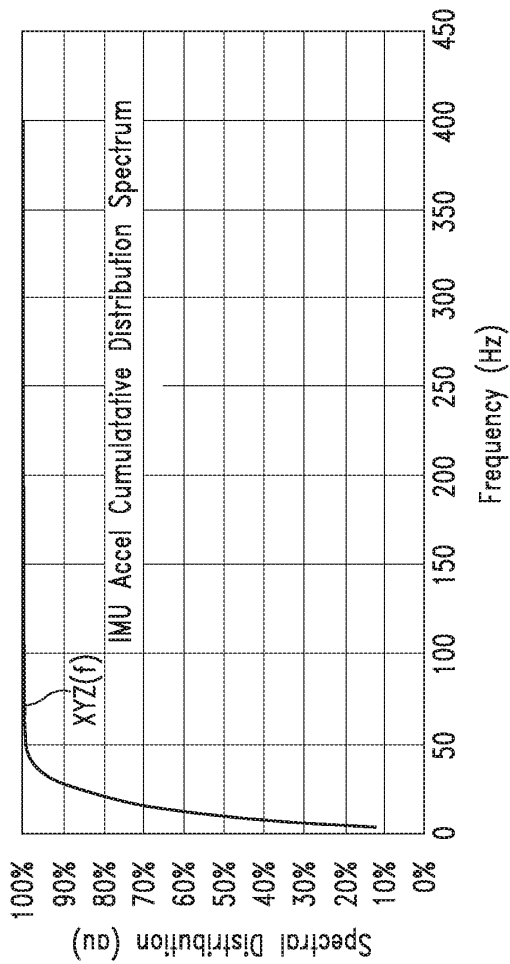


FIG. 18

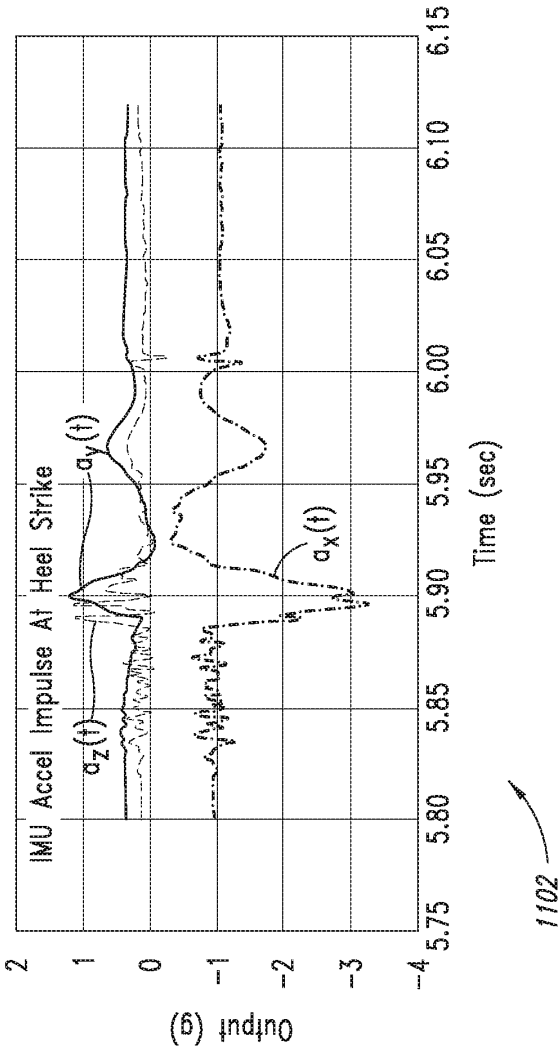


FIG. 19

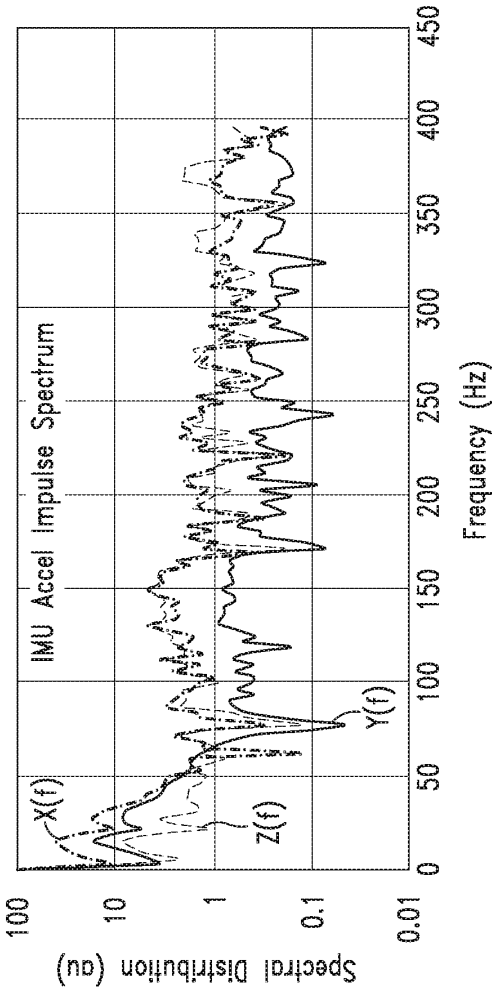


FIG. 20

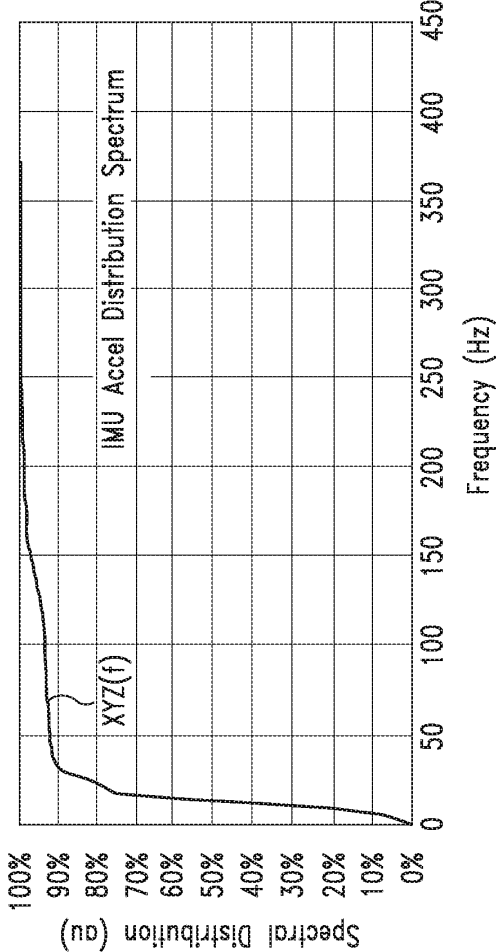


FIG. 21

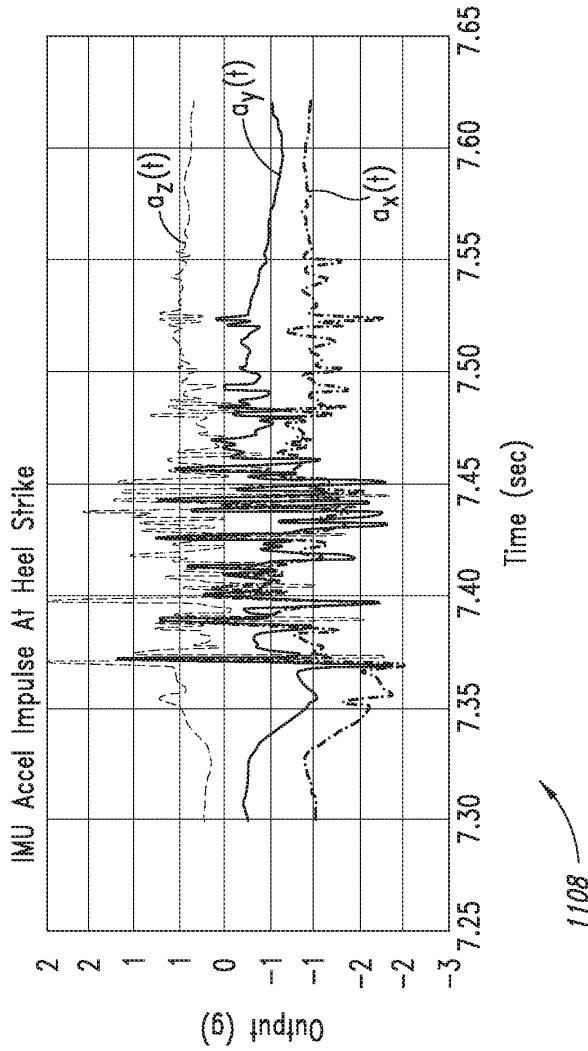


FIG. 22

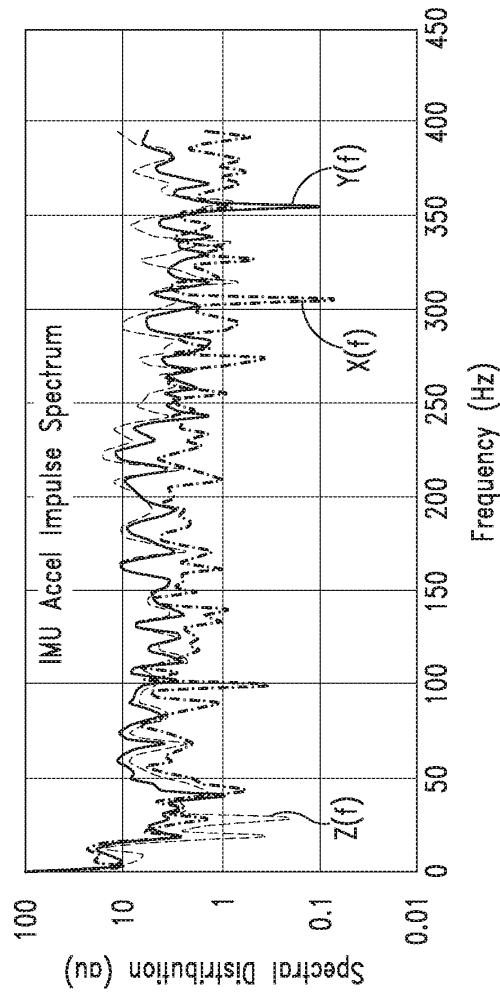


FIG. 23

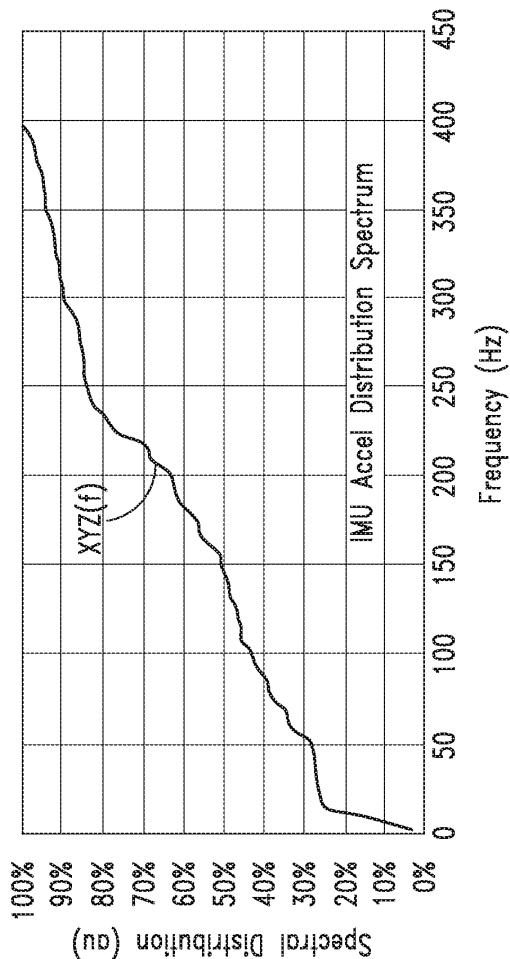


FIG. 24

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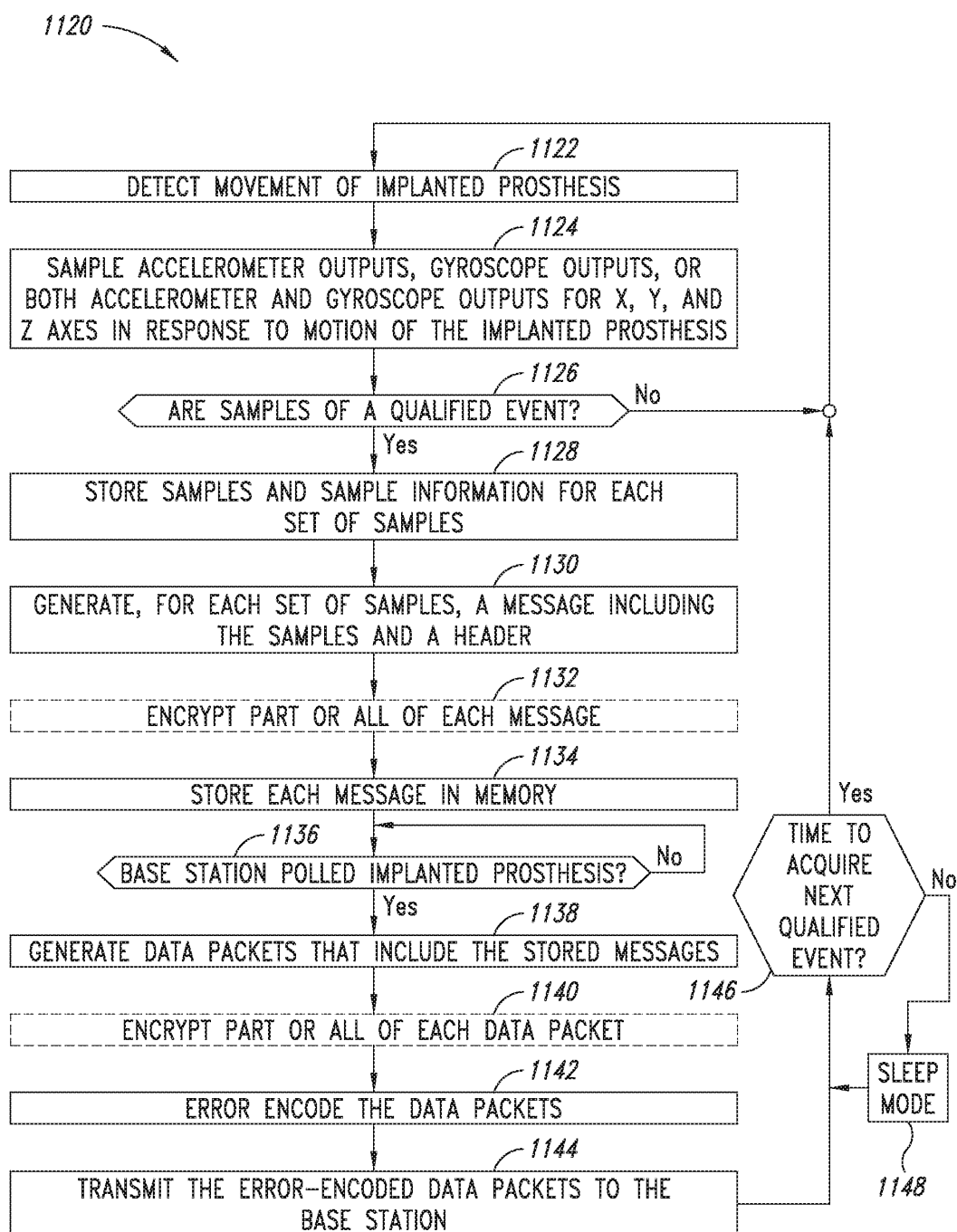


FIG. 25

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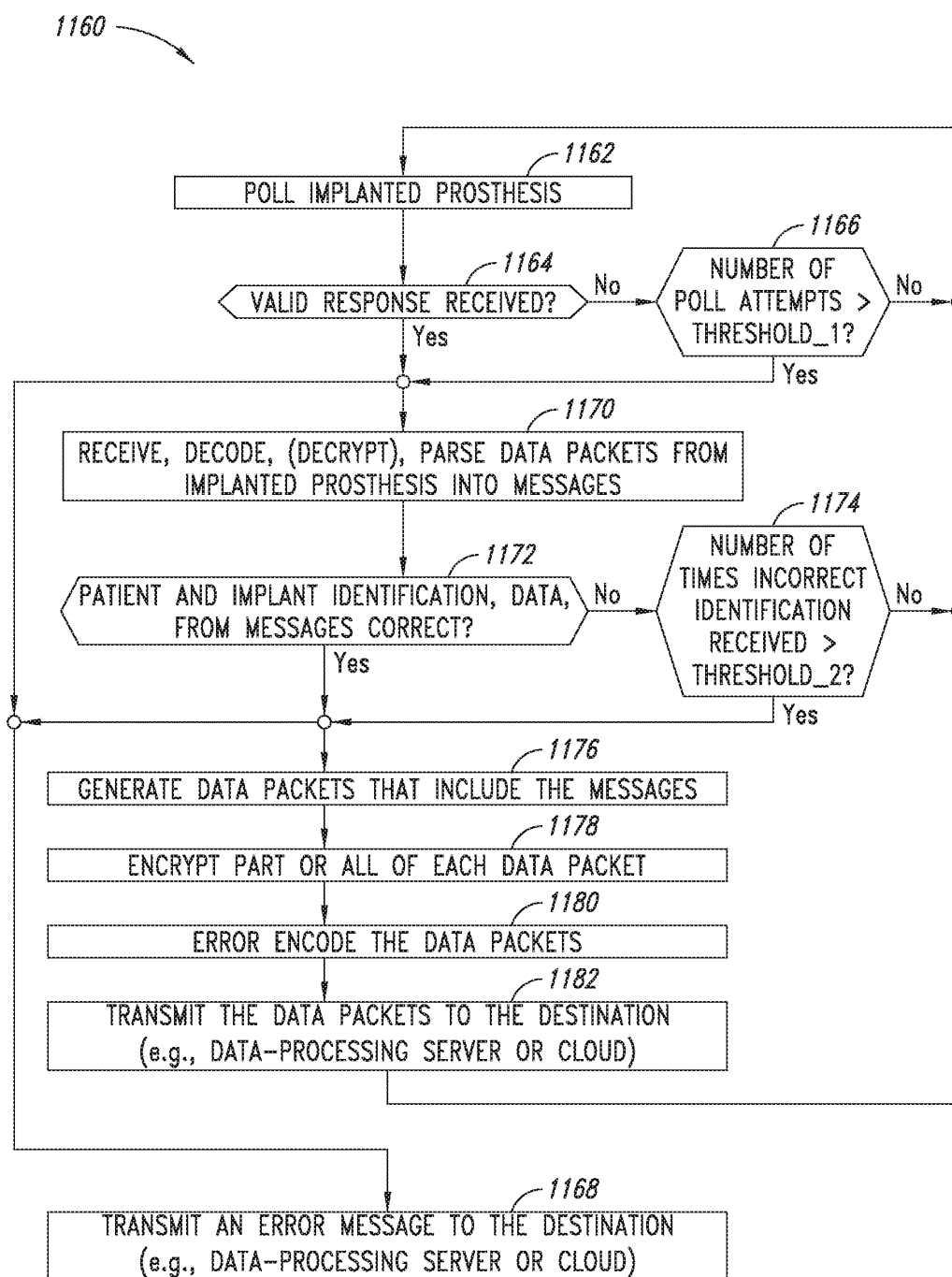


FIG. 26

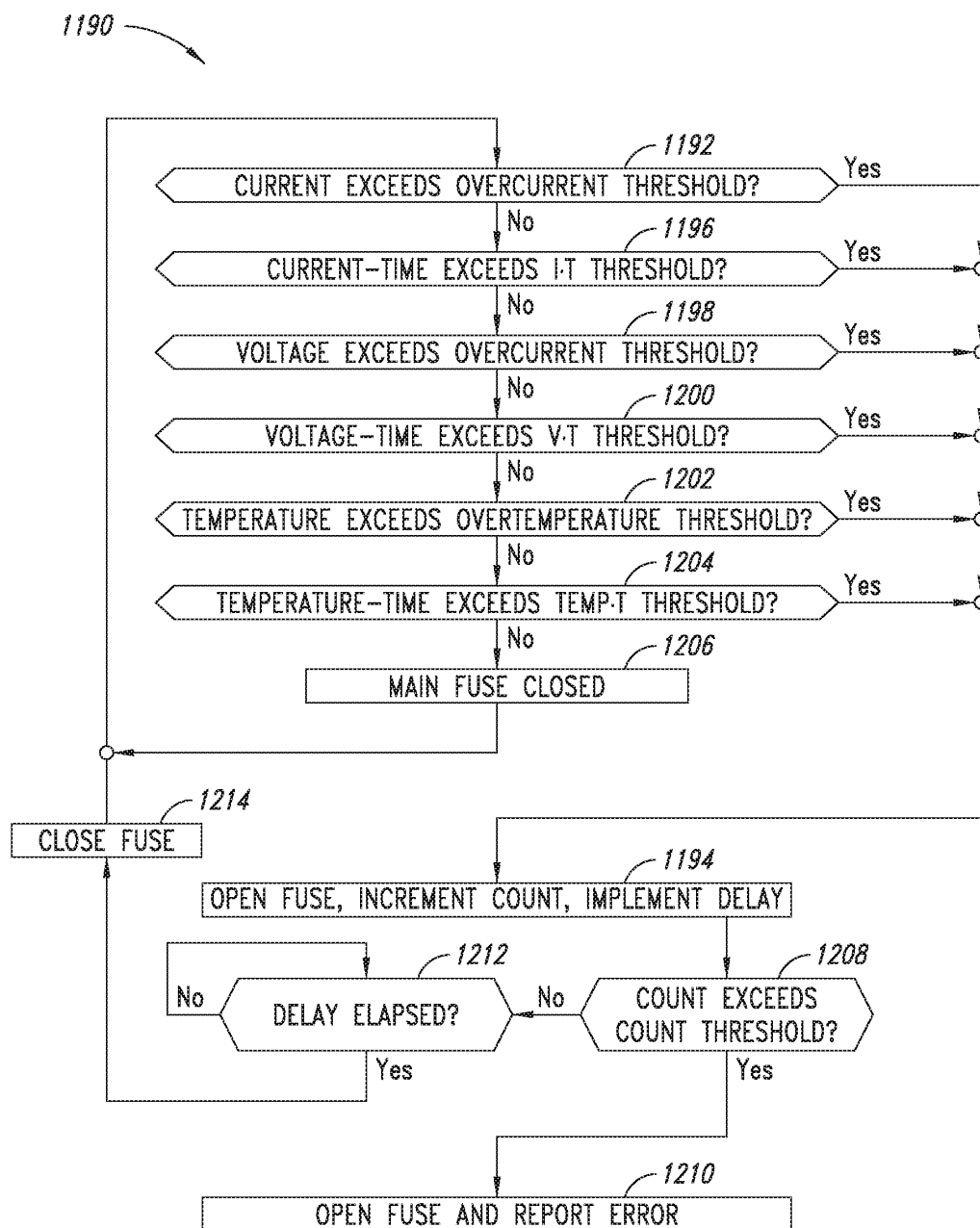


FIG. 27

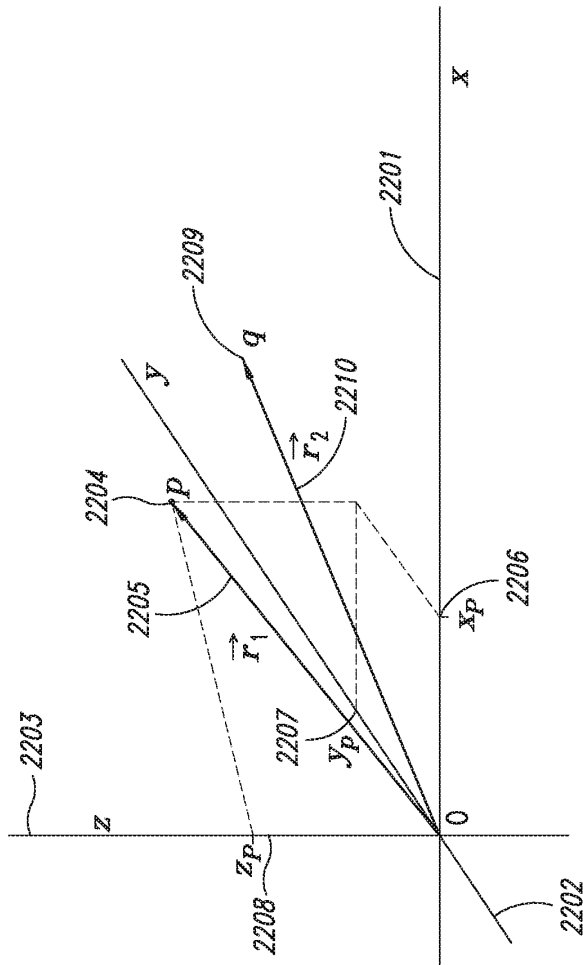


FIG. 28

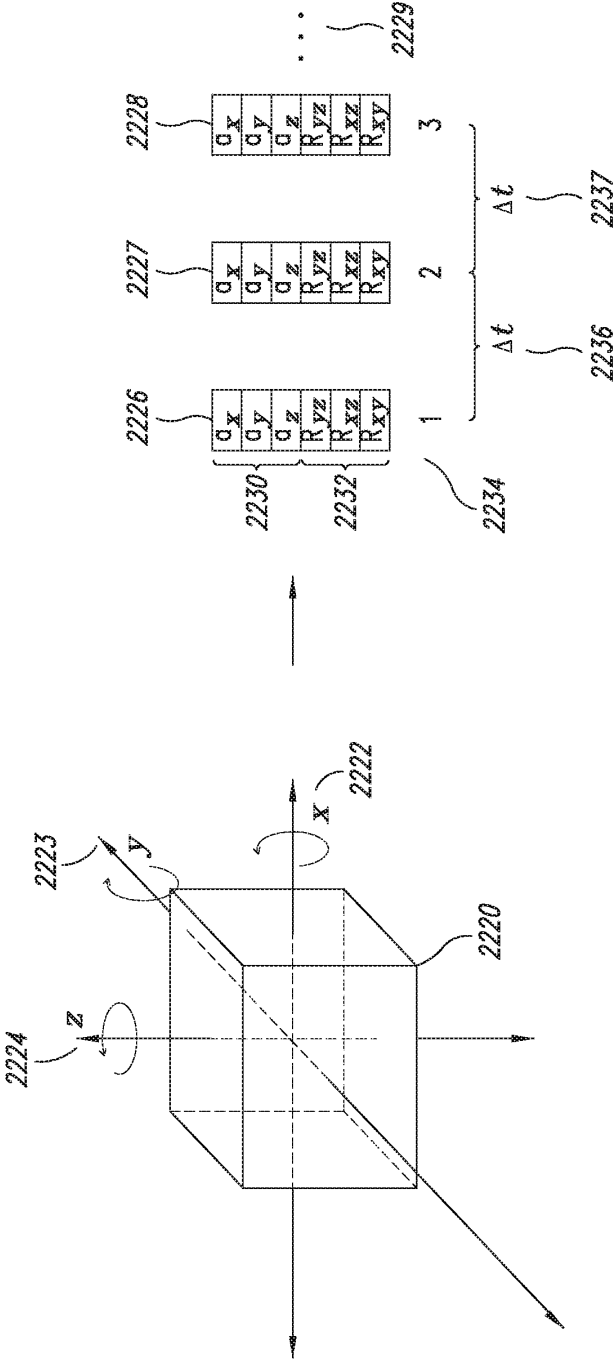


FIG. 29A

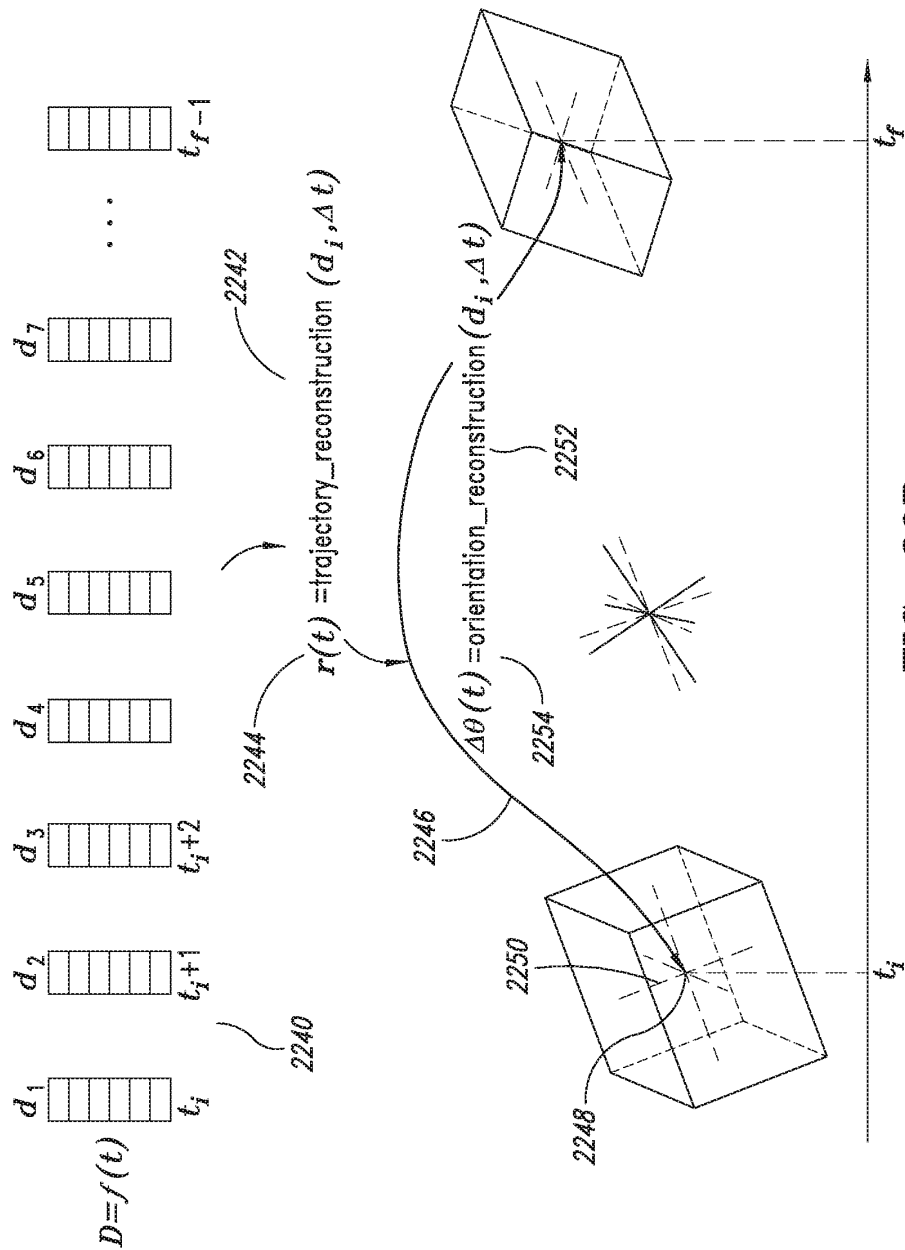
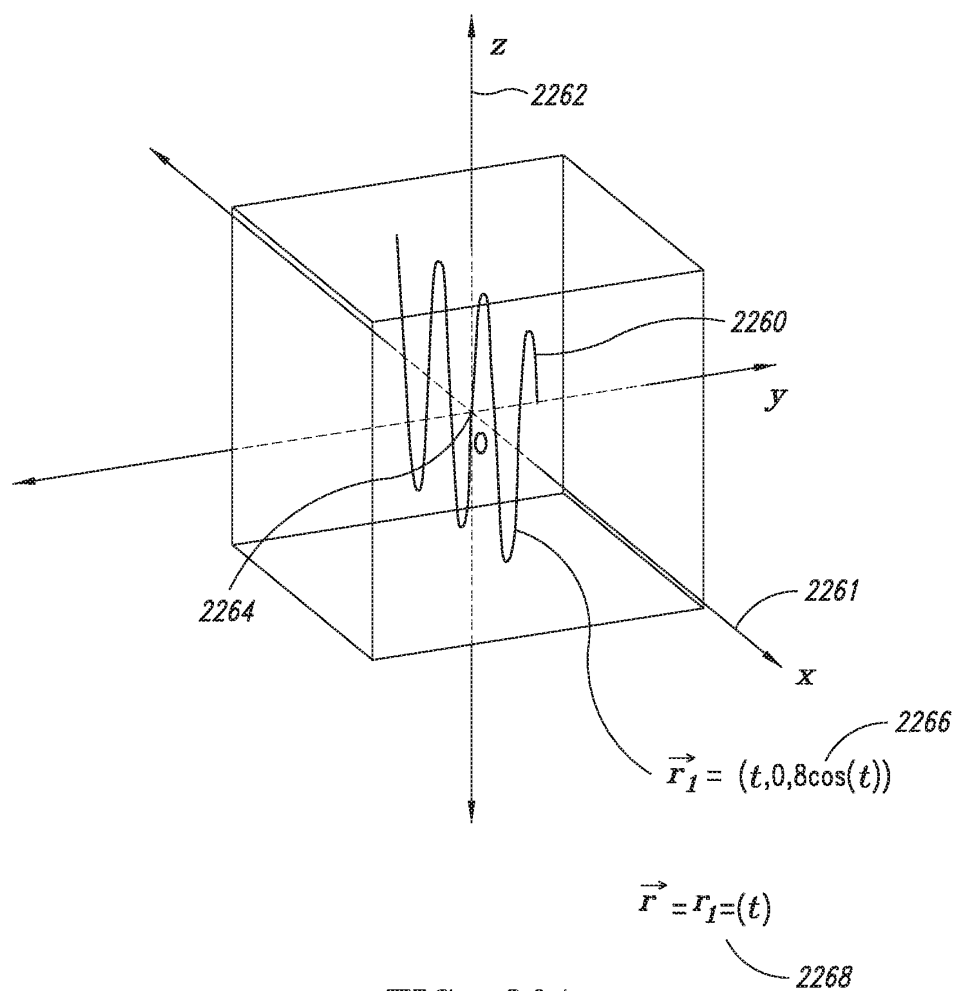


FIG. 29B

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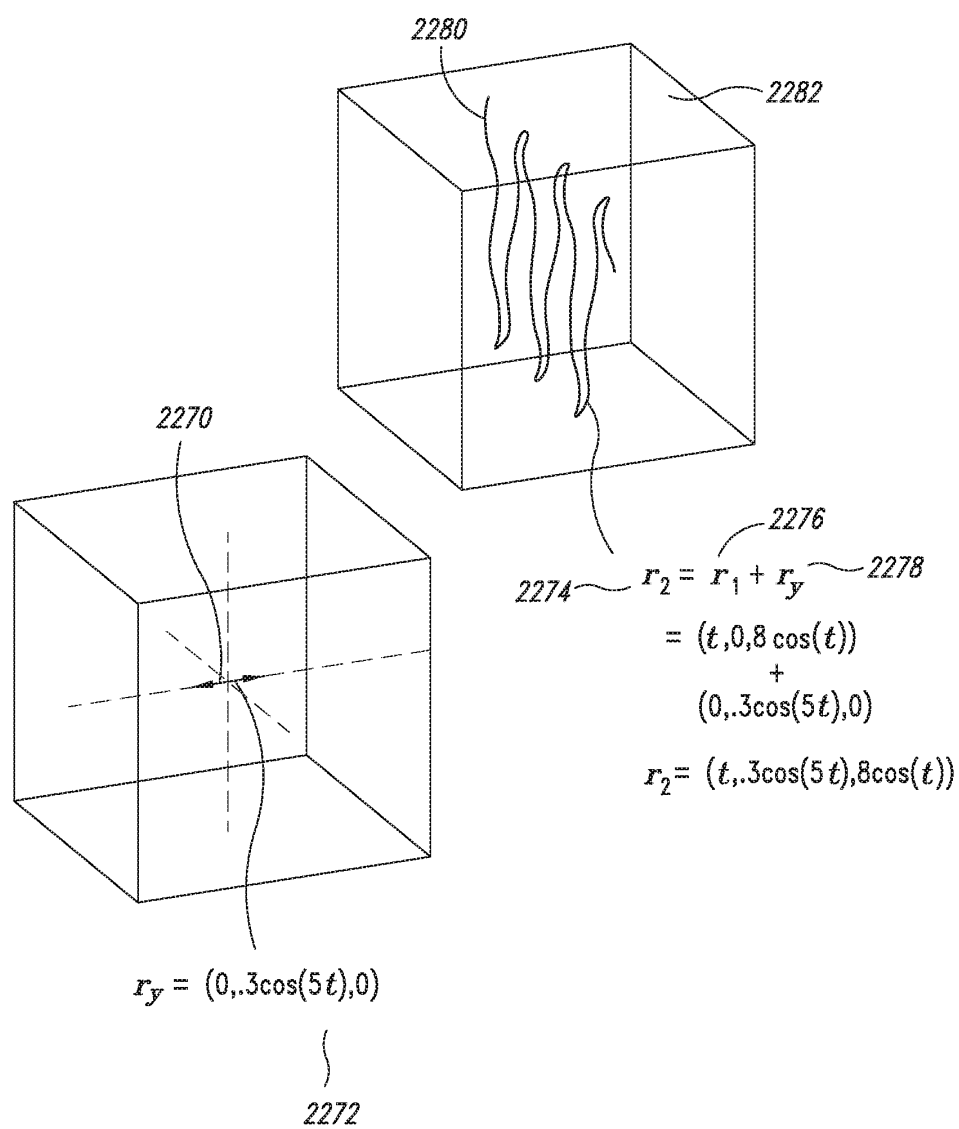


FIG. 30B

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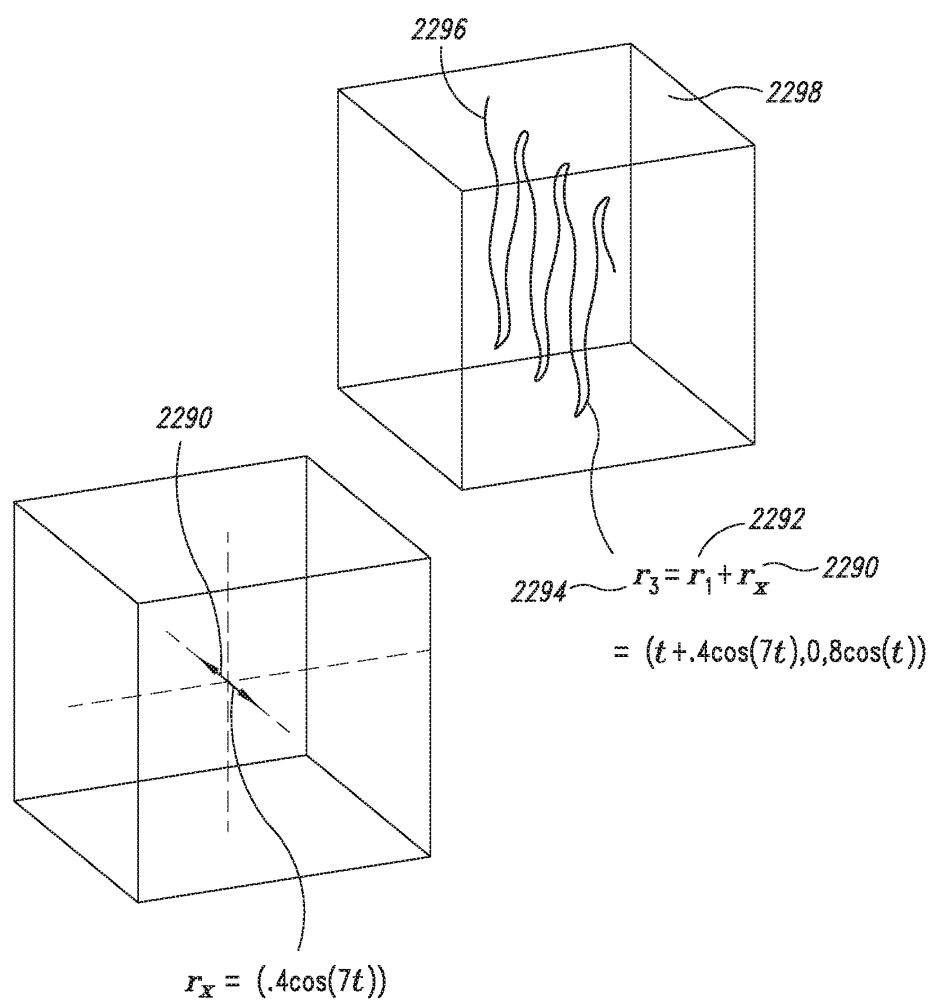
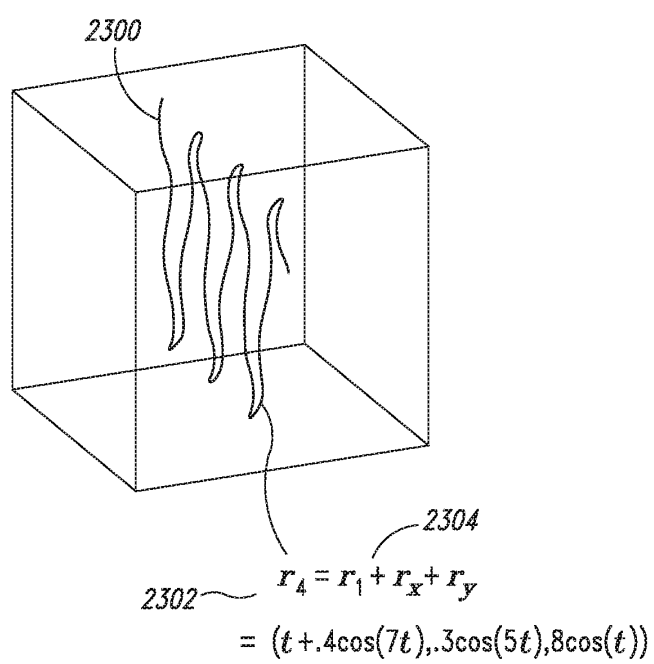


FIG. 30C

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*FIG. 30D*

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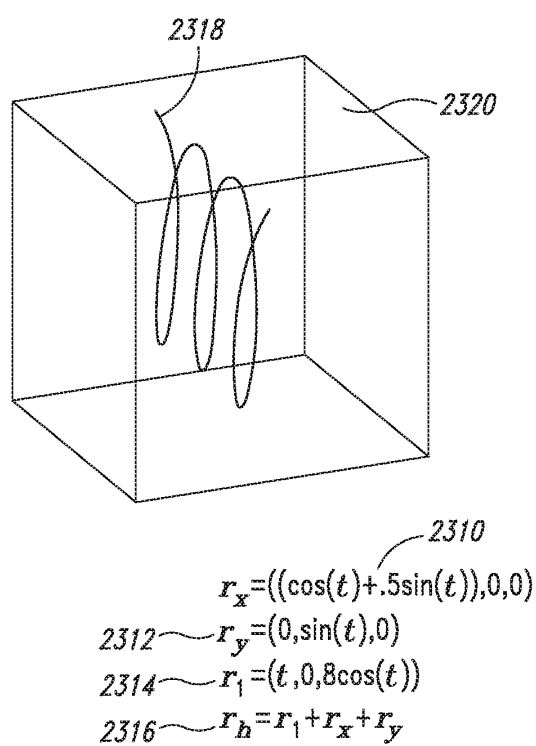
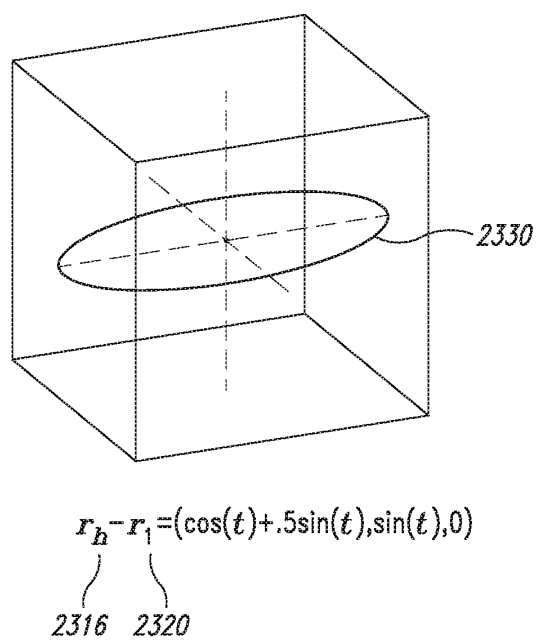
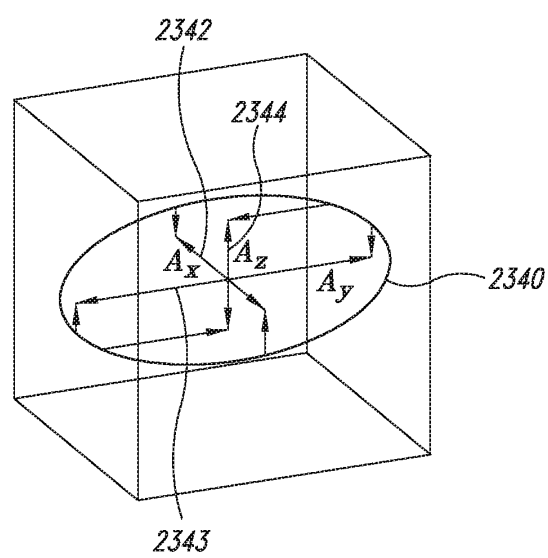
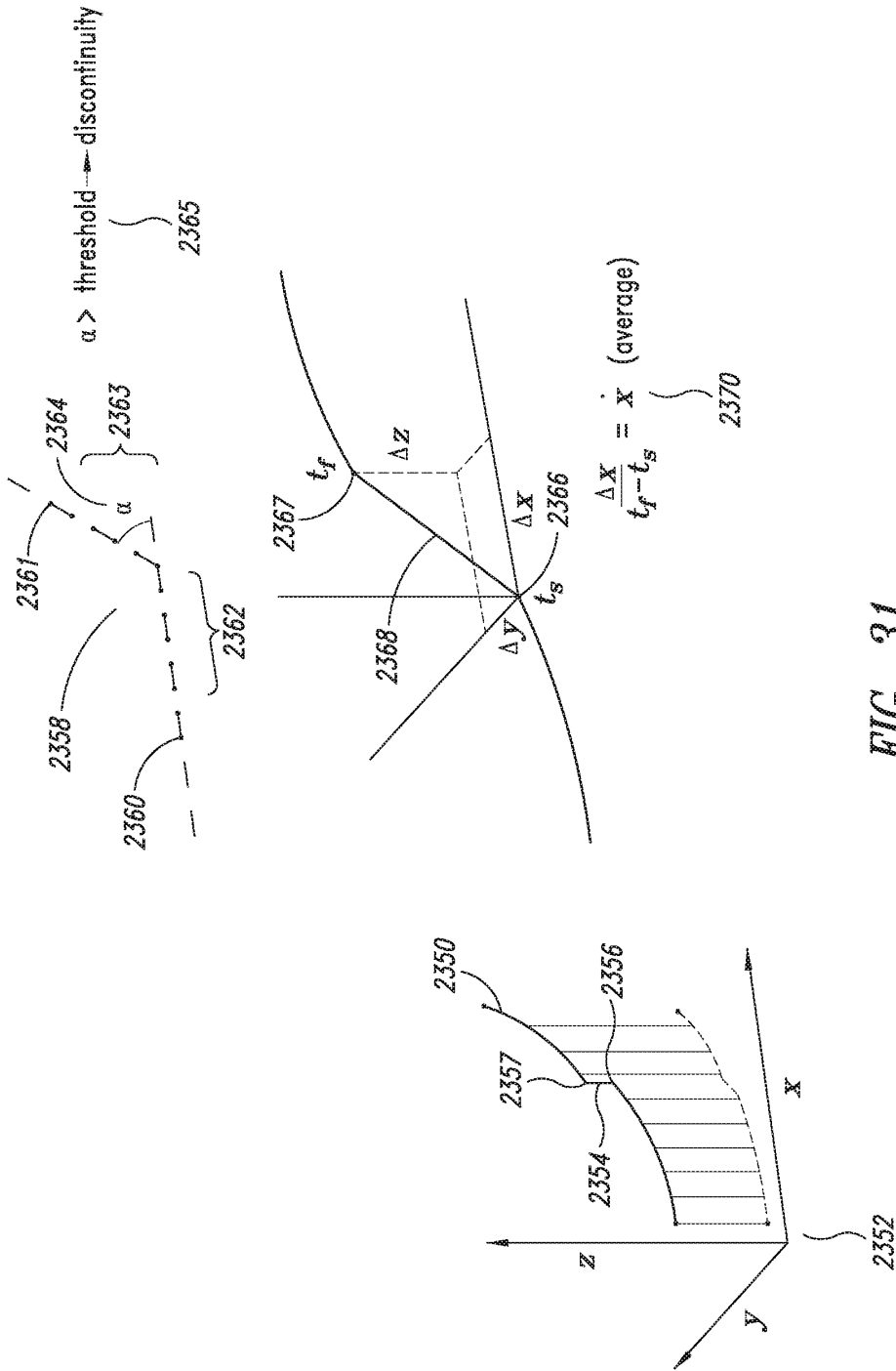


FIG. 30E

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*FIG. 30F*

*FIG. 30G*



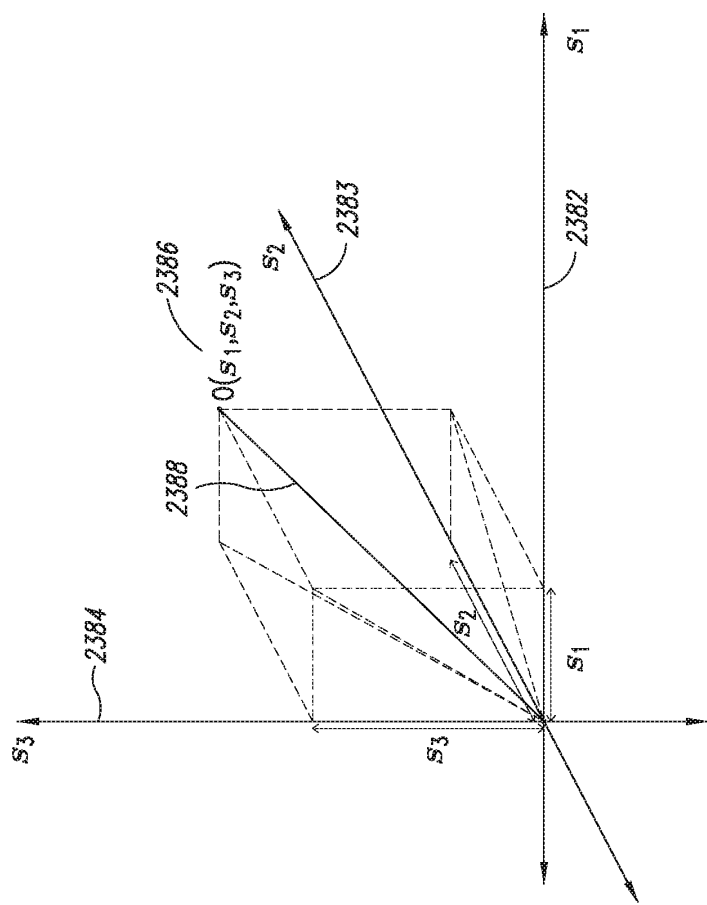


FIG. 32A

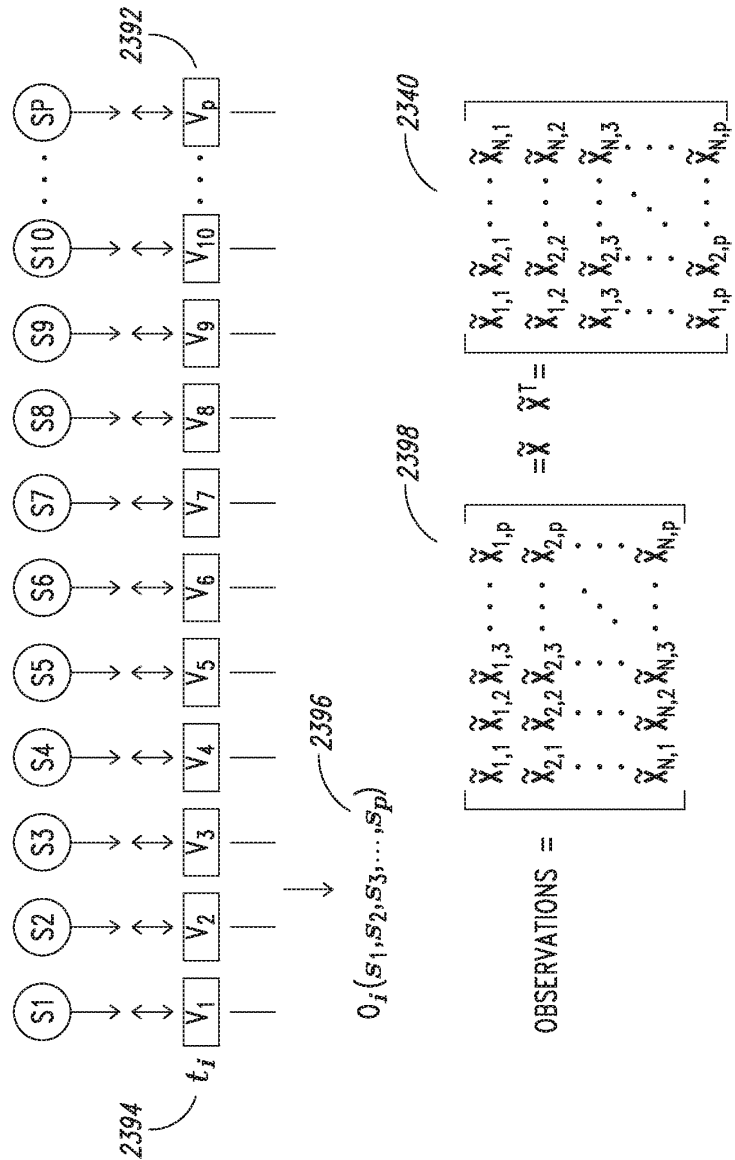


FIG. 32B

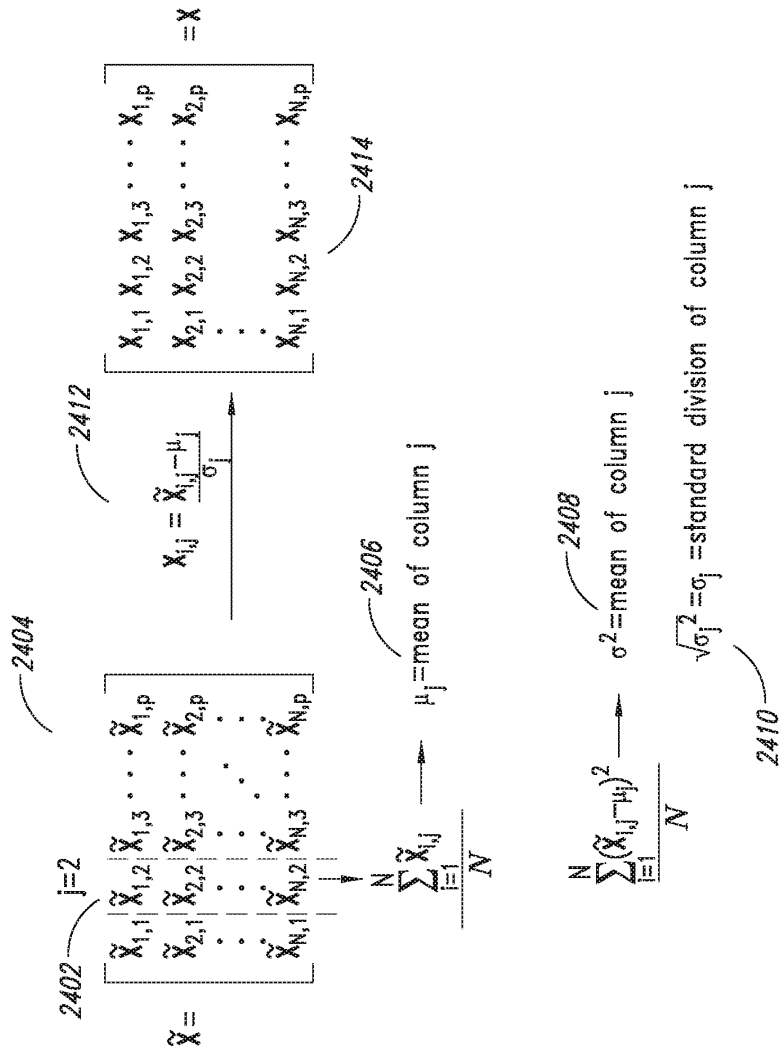


FIG. 32C

$$\mathbf{A} = \begin{bmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{bmatrix} \quad \text{2422}$$

$$\mathbf{u} = \begin{bmatrix} u_1 \\ u_2 \\ u_3 \end{bmatrix} \quad \text{2424}$$

$$\mathbf{Au} = \lambda \mathbf{u} \quad \text{2426}$$

$$\begin{bmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{bmatrix} \begin{bmatrix} u_1 \\ u_2 \\ u_3 \end{bmatrix} = \begin{bmatrix} a_{11}u_1 + a_{12}u_2 + a_{13}u_3 \\ a_{21}u_1 + a_{22}u_2 + a_{23}u_3 \\ a_{31}u_1 + a_{32}u_2 + a_{33}u_3 \end{bmatrix} = \begin{bmatrix} \lambda u_1 \\ \lambda u_2 \\ \lambda u_3 \end{bmatrix} \quad \text{2428}$$

$$\mathbf{Au} = \lambda \mathbf{u} = 0 \quad \text{2430}$$

$$(\mathbf{A} - \lambda \mathbf{I})\mathbf{u} = 0 \quad \text{2432}$$

$$\mathbf{u} = (\mathbf{A} - \lambda \mathbf{I})^{-1} \mathbf{0} \quad \text{2434}$$

$$\|\mathbf{A} - \lambda \mathbf{I}\| = 0 \quad \text{2436}$$

FIG. 32D

2442

$$\begin{bmatrix} a_{11}^{-\lambda} & a_{12} & a_{13} \\ a_{21} & a_{22}^{-\lambda} & a_{23} \\ a_{31} & a_{32} & a_{33}^{-\lambda} \end{bmatrix} = a_{11}^{-\lambda} \begin{bmatrix} a_{22}^{-\lambda} & a_{23} \\ a_{32} & a_{33}^{-\lambda} \end{bmatrix} + a_{12} \begin{bmatrix} a_{23} & a_{21} \\ a_{33}^{-\lambda} & a_{31} \end{bmatrix} + a_{13} \begin{bmatrix} a_{21} & a_{22}^{-\lambda} \\ a_{31} & a_{32} \end{bmatrix}$$

2444

$$0 = a\lambda^3 + b\lambda^2 + c\lambda + d$$

2446

$$AU = \Lambda U, \text{ where } U = \begin{bmatrix} u_1 \\ u_2 \\ u_3 \end{bmatrix} \text{ and } \Lambda = \begin{bmatrix} \lambda_1 & 0 & 0 \\ 0 & \lambda_2 & 0 \\ 0 & 0 & \lambda_3 \end{bmatrix}$$

2448

$$A = U\Lambda U^{-1}$$

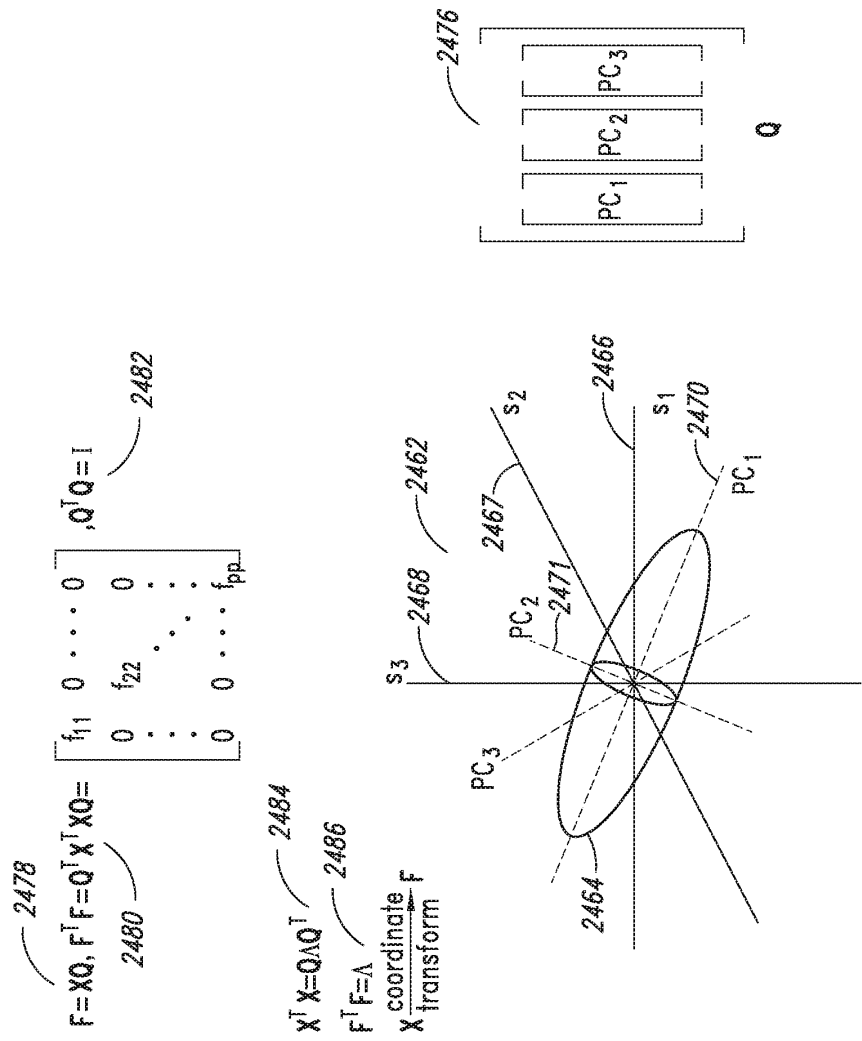
2450

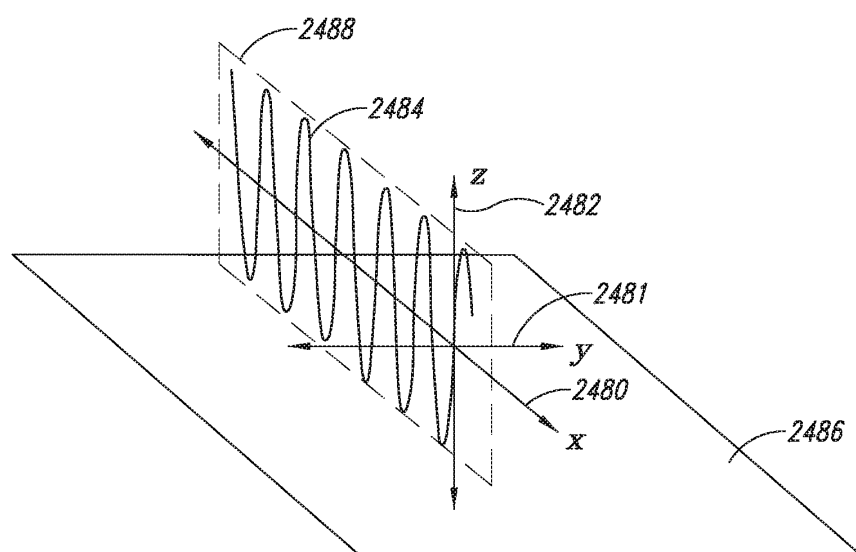
$$A = \bar{X}X \Rightarrow \lambda_i \geq 0; \quad U_i \cdot U_j = 0 \text{ when } \lambda_i \neq \lambda_j; \quad U^{-1} = U^T$$

2451

$$A = U\Lambda U^T$$

FIG. 32E





$\text{PCA}(\dot{\theta}_x, \dot{\theta}_y, \dot{\theta}_z) \rightarrow z \text{ or } y \text{ principle axis}$

$\text{PCA}(a_x, a_y, a_z) \rightarrow x = \text{principle axis, } z \text{ secondary axis}$

*FIG. 33*

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$$\begin{aligned}
 y &= f(x) \quad 2490 \\
 F &= f(x) = F(u) = \int_{-\infty}^{\infty} f(x) e^{-i2\pi ux} dx \quad 2492, 2494 \\
 F^{-1} F(u) &= f(x) = \int_{-\infty}^{\infty} F(u) e^{i2\pi ux} dx \quad 2496, 2498 \\
 F(u) &= R(u) + iI(u) \quad 2499 \\
 F(u) &= |F(u)| e^{i\theta(u)} \quad 2500 \\
 \text{where } |F(u)| &= (R^2(u) + I^2(u))^{\frac{1}{2}} \text{ and} \\
 \theta(u) &= \tan^{-1} \frac{I(u)}{R(u)} \\
 P(u) &= |F(u)|^2 \quad 2502 \\
 \sum_{x=1}^4 e^{-i2\pi ux} &= \cos(2\pi u) - i\sin(2\pi u) + \cos(4\pi u) - i\sin(4\pi u) + \cos(6\pi u) - i\sin(6\pi u) + \cos(8\pi u) - i\sin(8\pi u) \quad 2504, 2506
 \end{aligned}$$

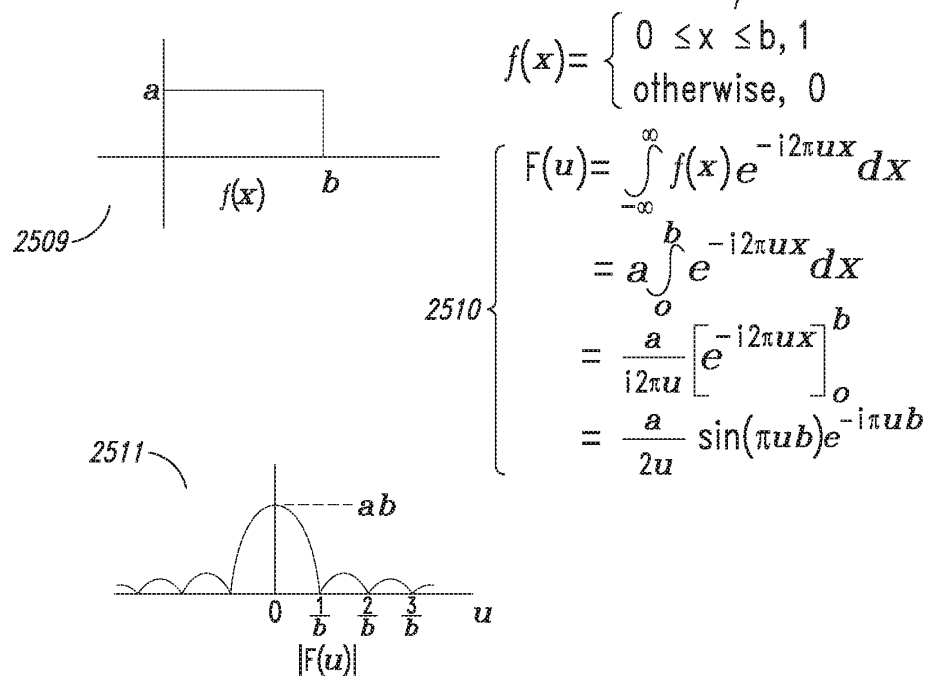
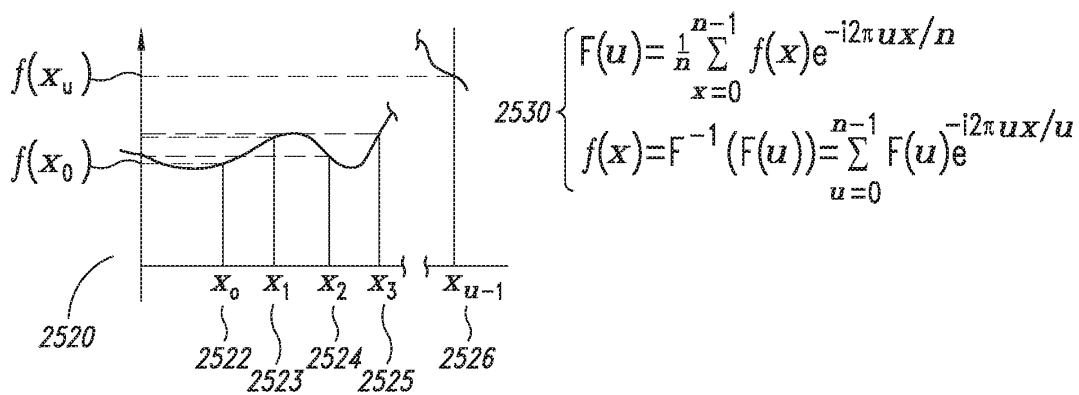
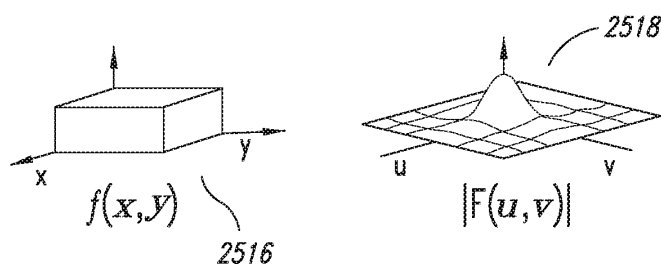


FIG. 34A

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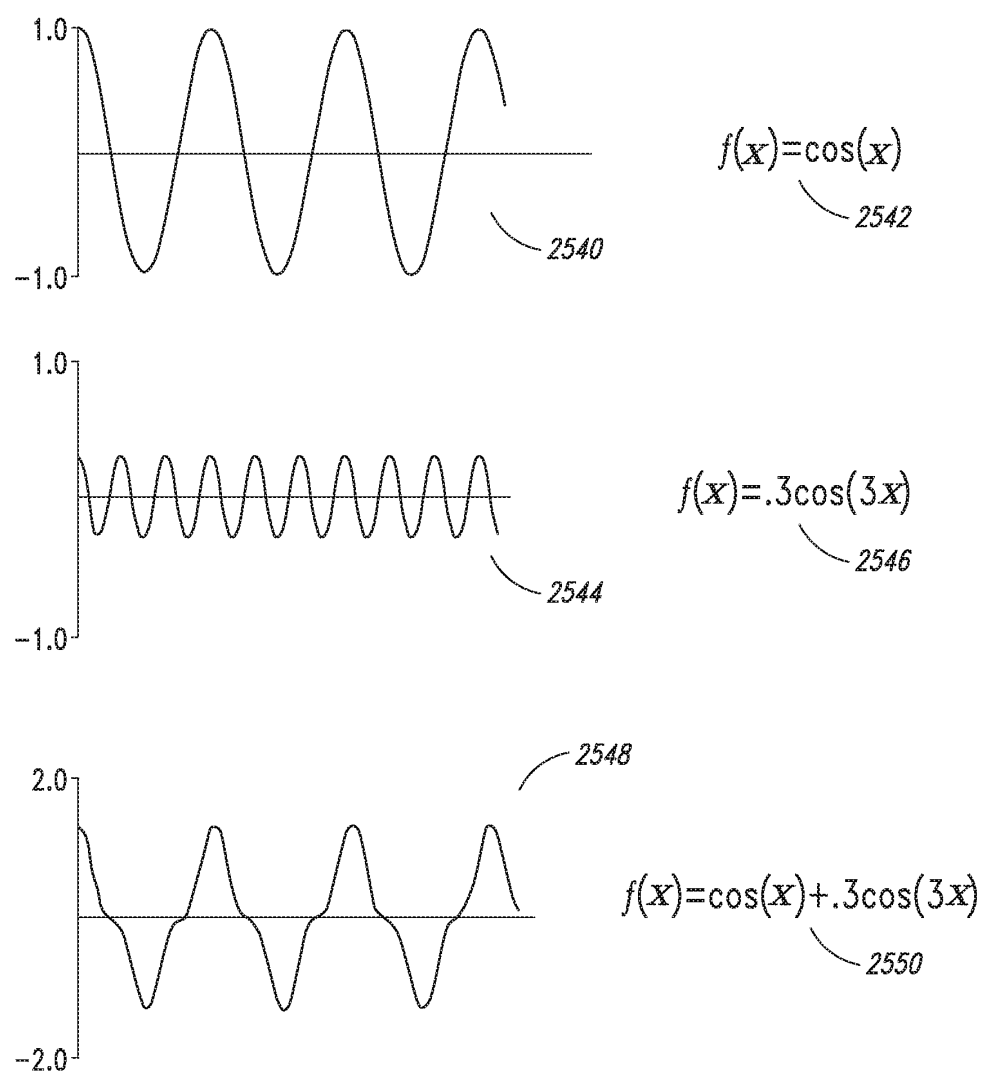
$$2512 \left\{ \begin{array}{l} z = f(x, y) \quad 2514 \\ F(f(x, y)) = F(u, v) = \int_{-\infty}^{\infty} \int_{-\infty}^{\infty} f(x, y) e^{-i2\pi(ux+vy)} dx dy \\ F^{-1}(F(u, v)) = \int_{-\infty}^{\infty} \int_{-\infty}^{\infty} F(u, v) e^{i2\pi(ux+vy)} du dv \end{array} \right.$$



$$\left. \begin{array}{l} F(u, v) = \frac{1}{mn} \sum_{x=0}^{m-1} \sum_{y=0}^{n-1} f(x, y) e^{-i2\pi(ux/m+vy/n)} \\ f(x, y) = \sum_{u=0}^m \sum_{v=0}^n F(u, v) e^{i2\pi(ux/m+vy/n)} \end{array} \right\} 2532$$

FIG. 34B

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*FIG. 34C*

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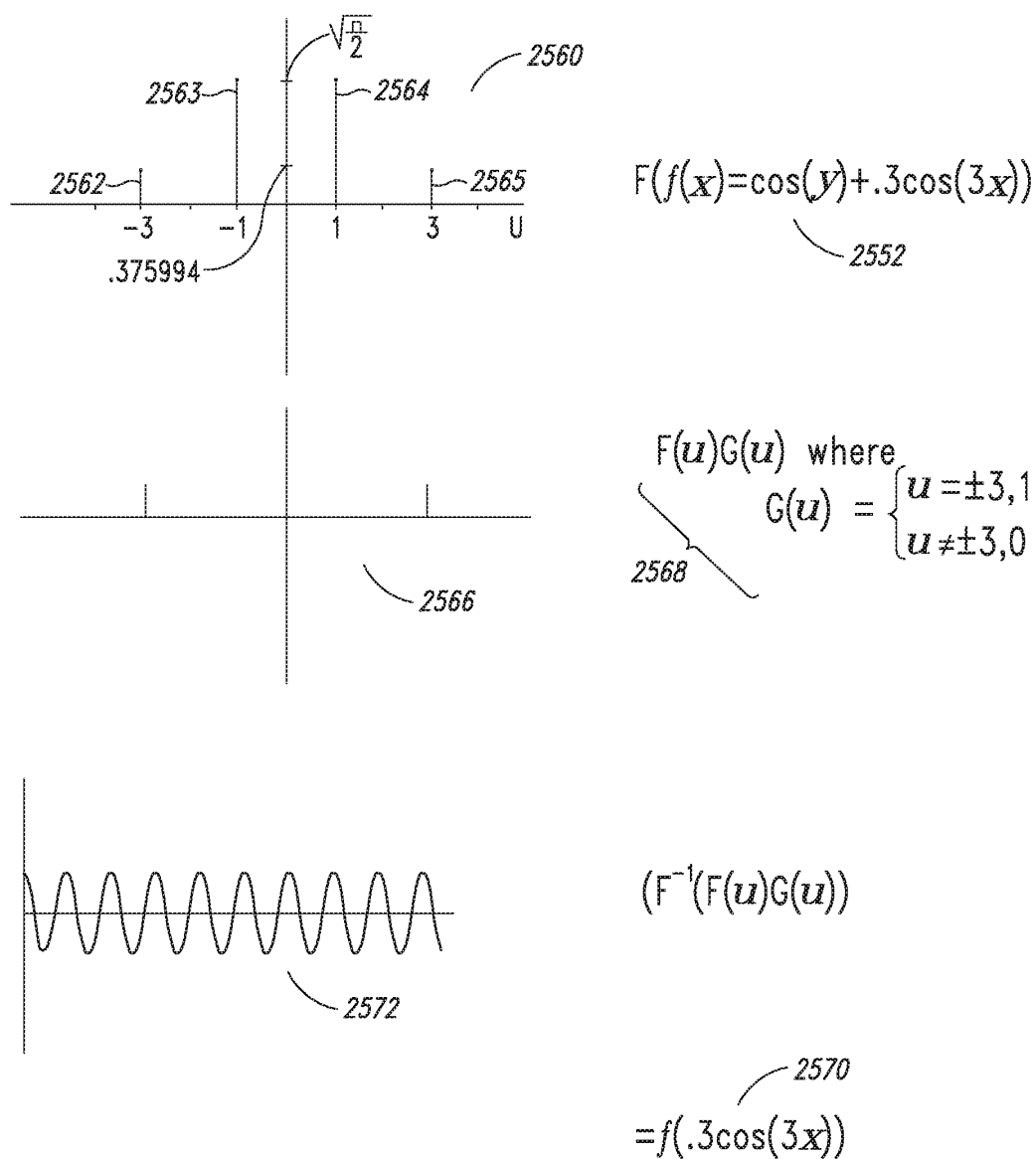


FIG. 34D

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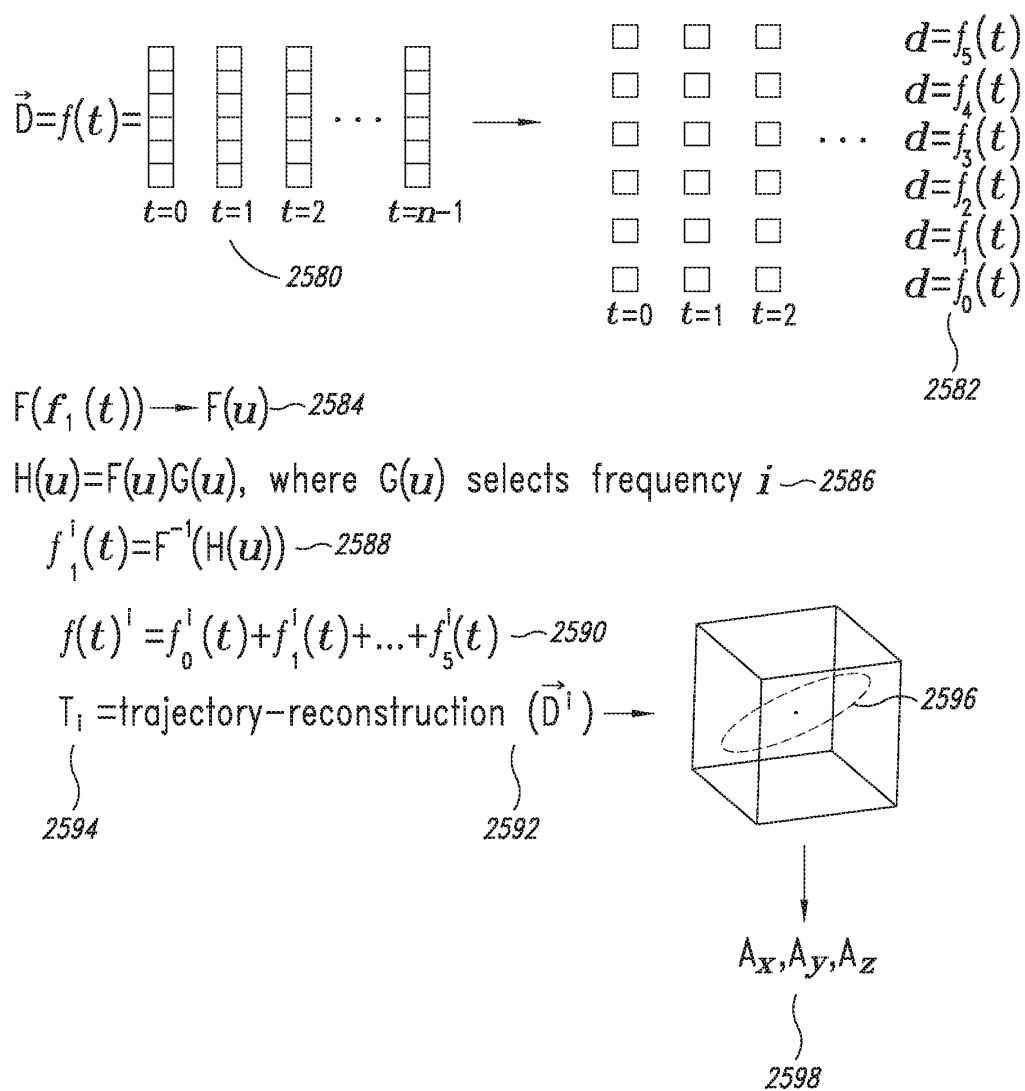


FIG. 35

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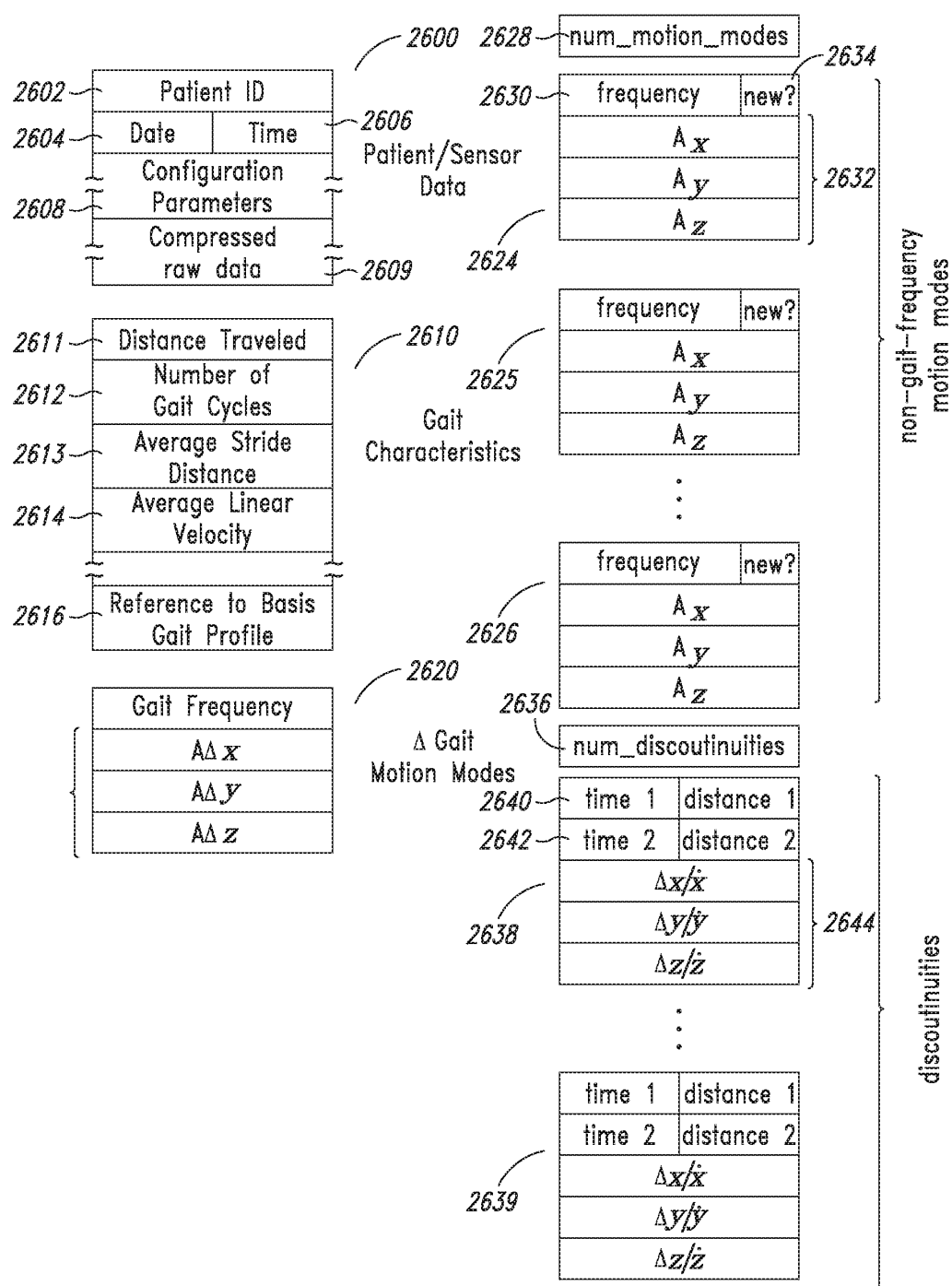


FIG. 36A

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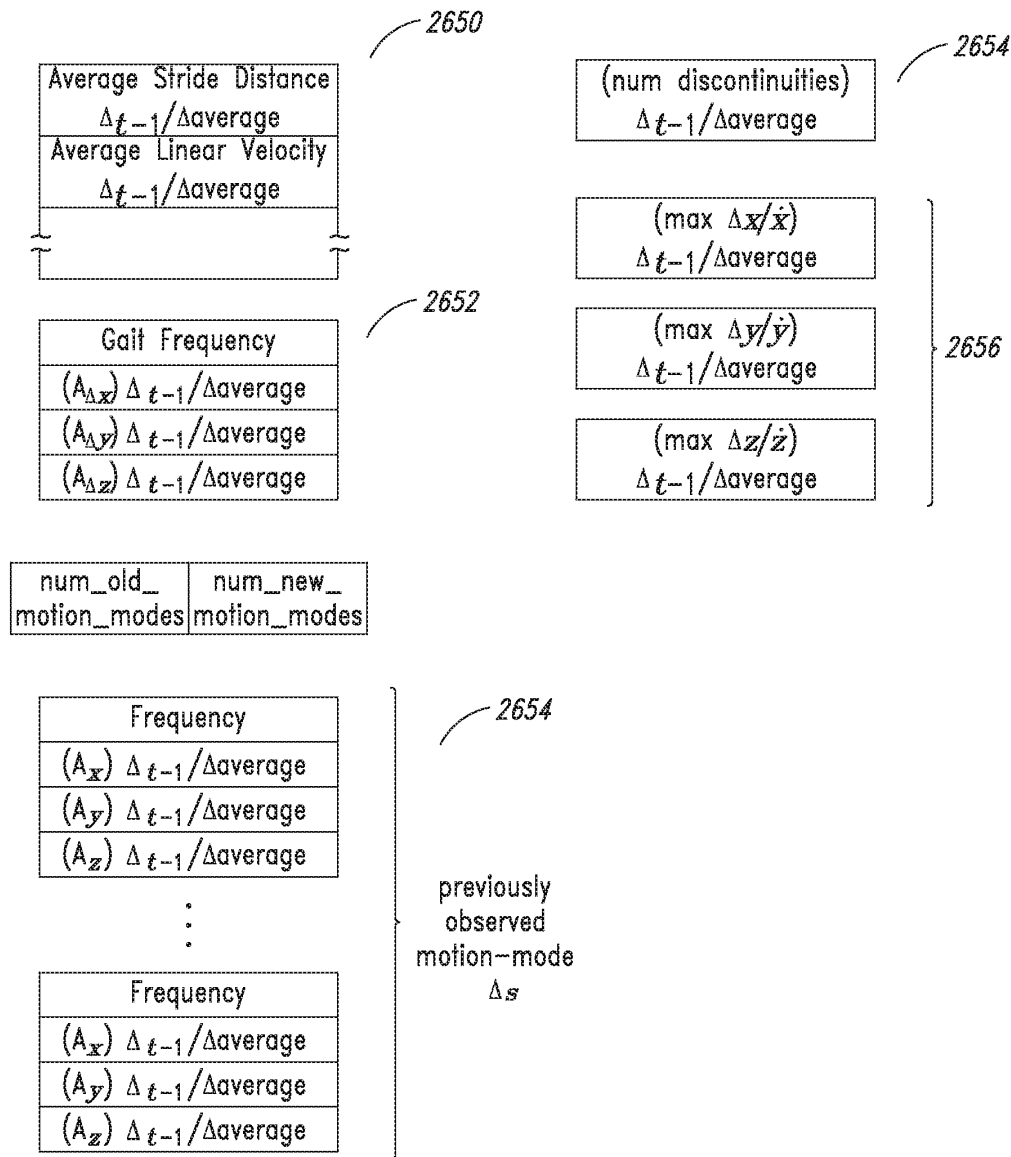


FIG. 36B

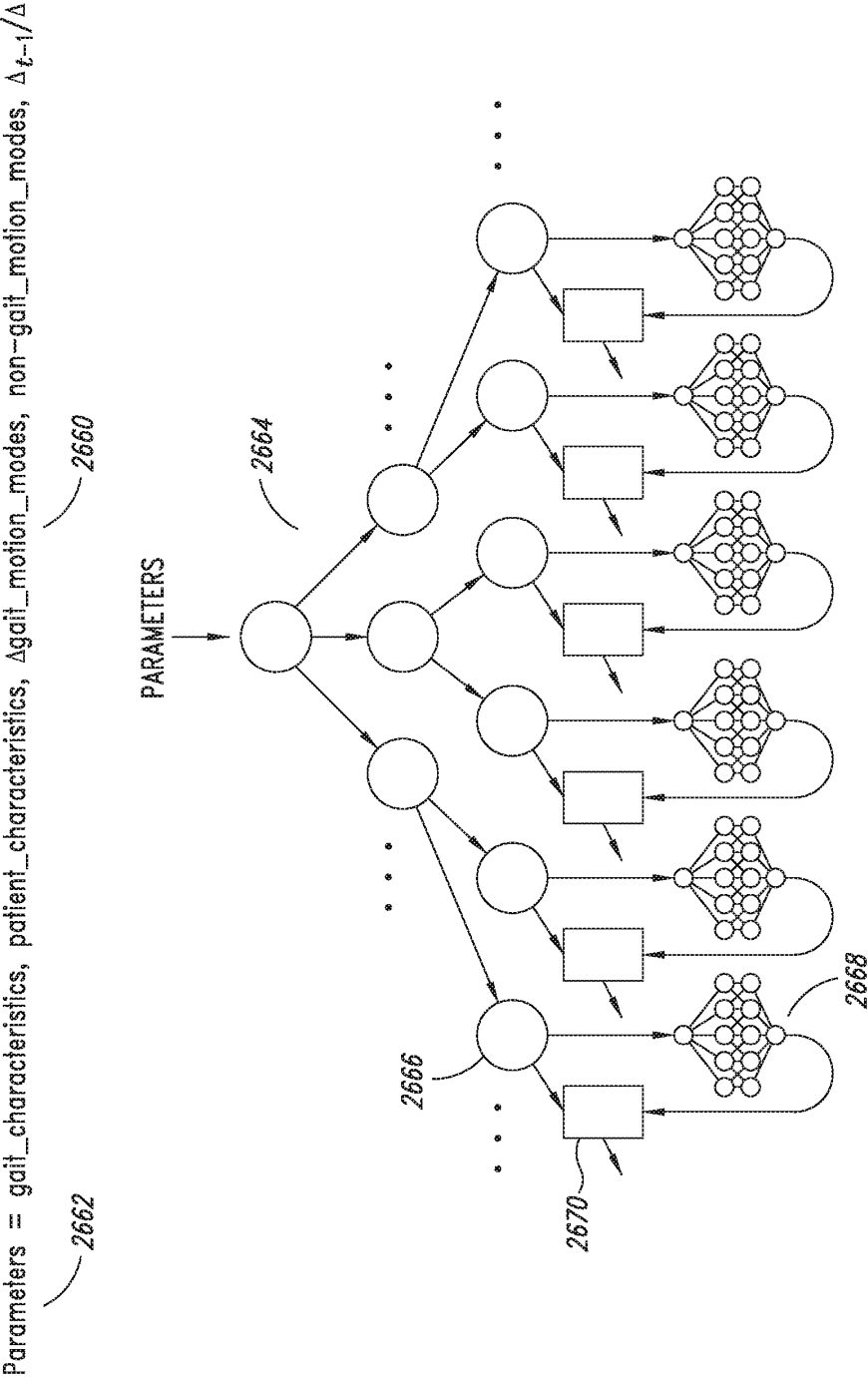


FIG. 36C

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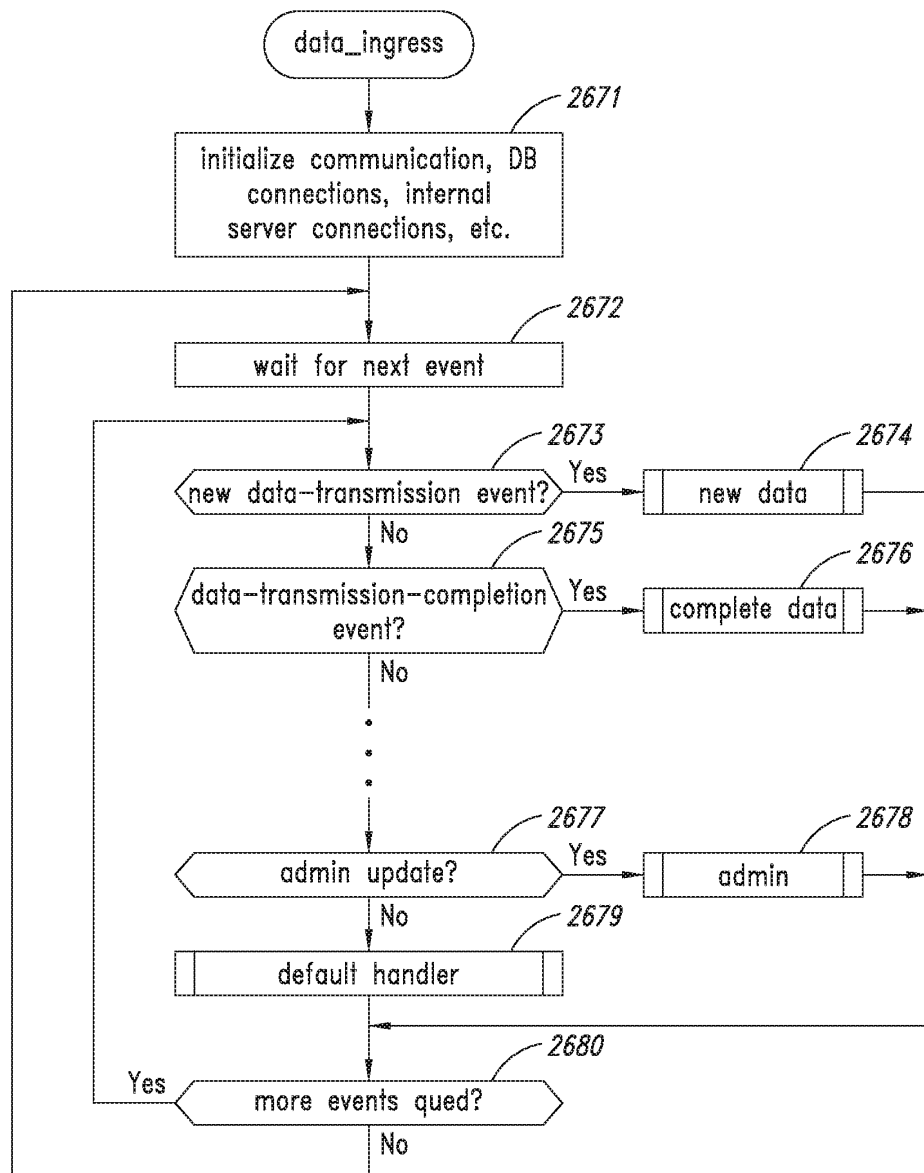
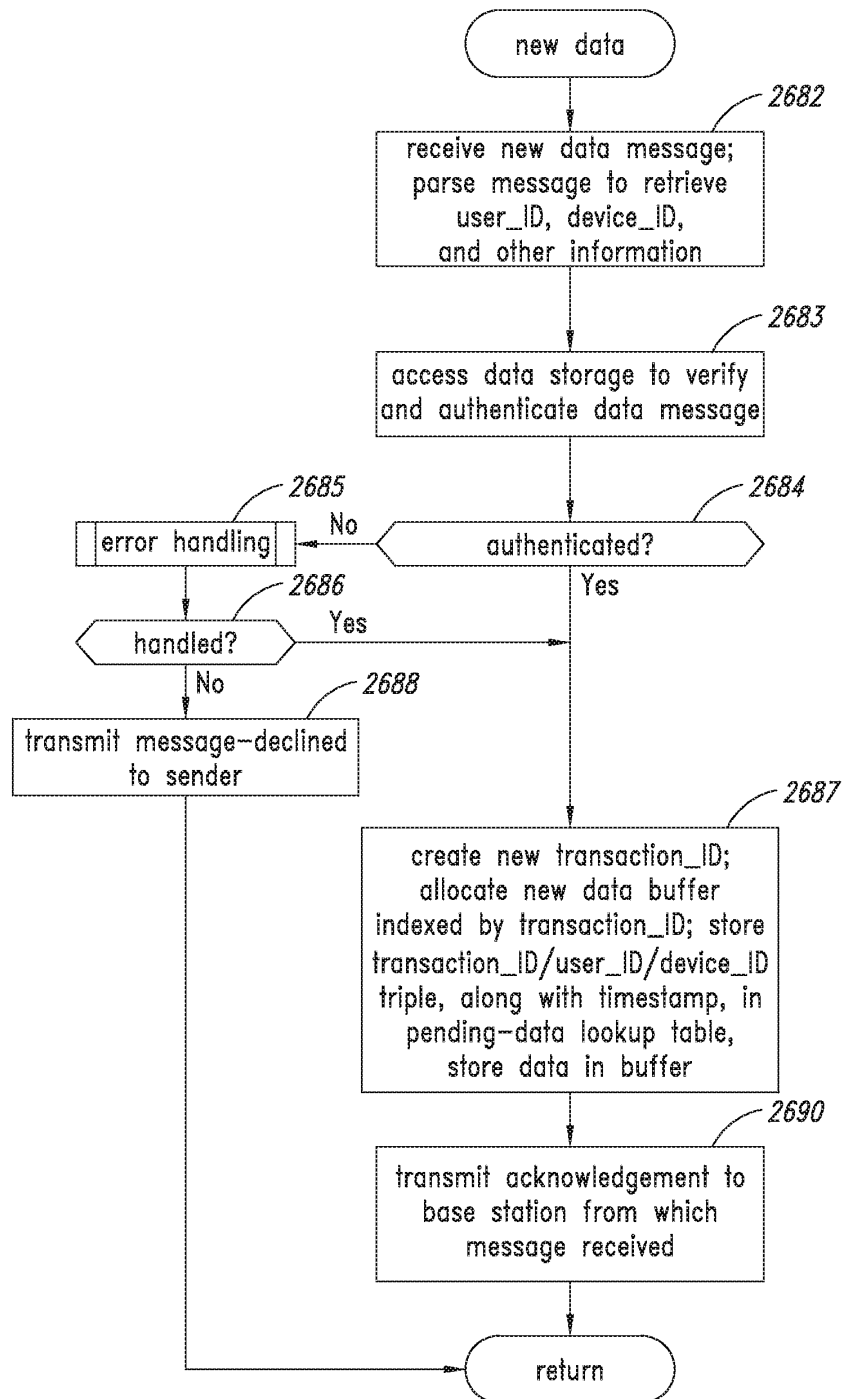


FIG. 37A

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*FIG. 37B*

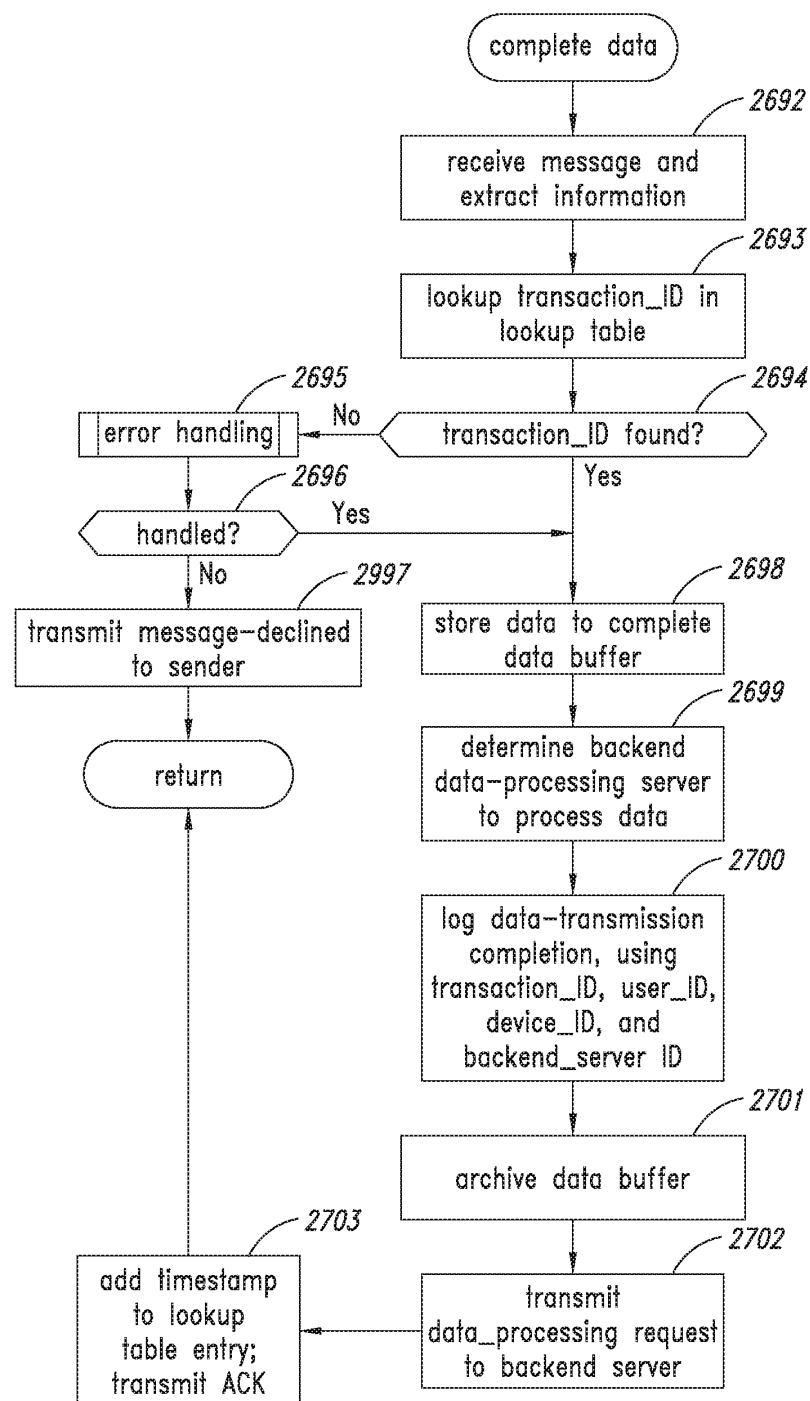
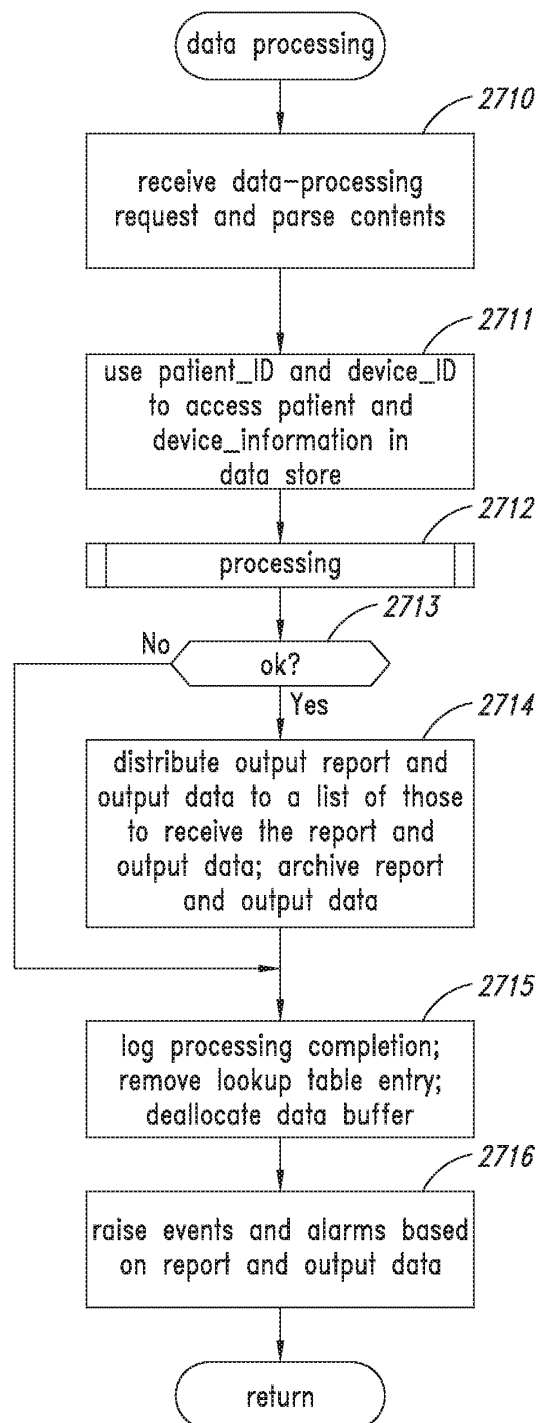


FIG. 37C

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*FIG. 37D*

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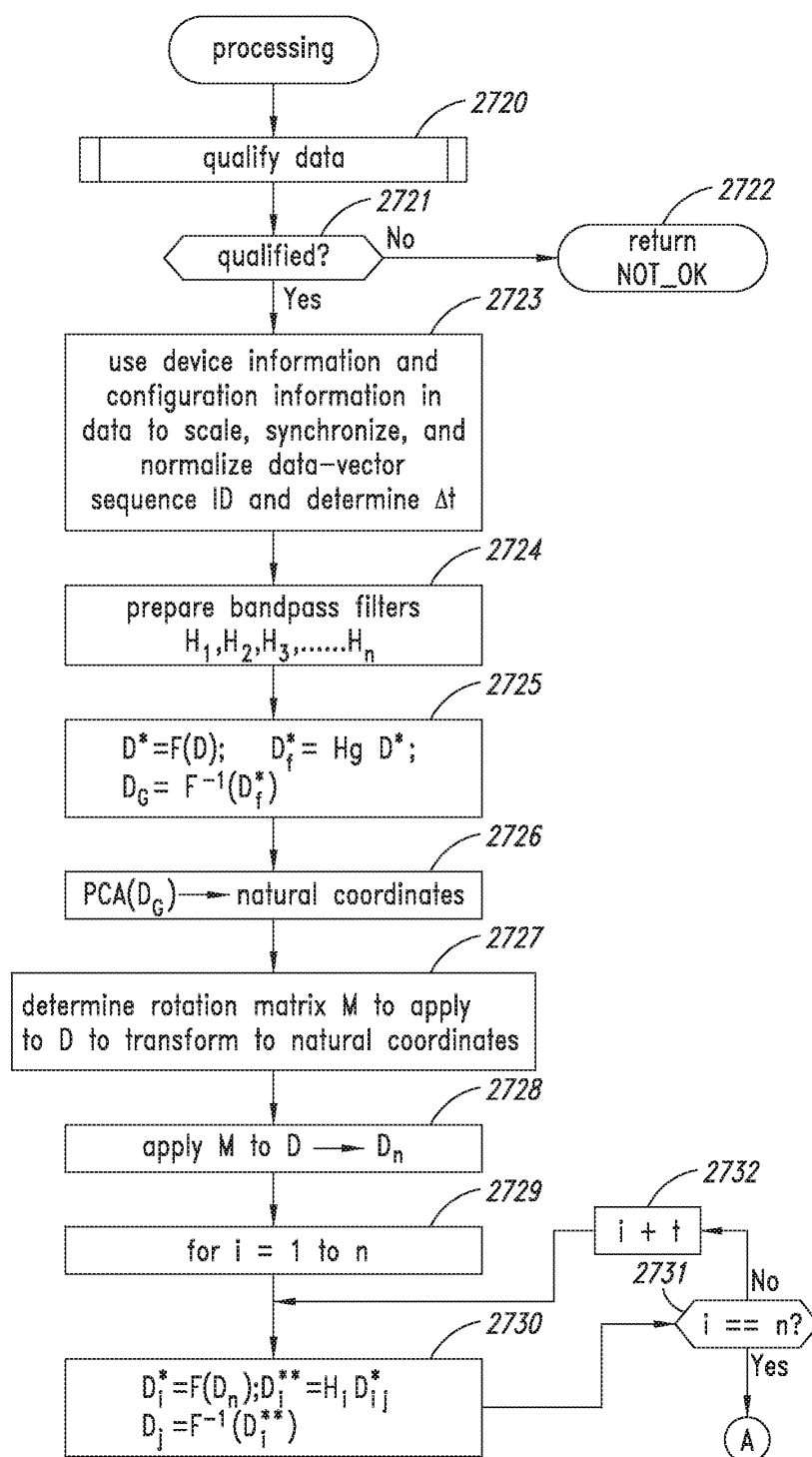
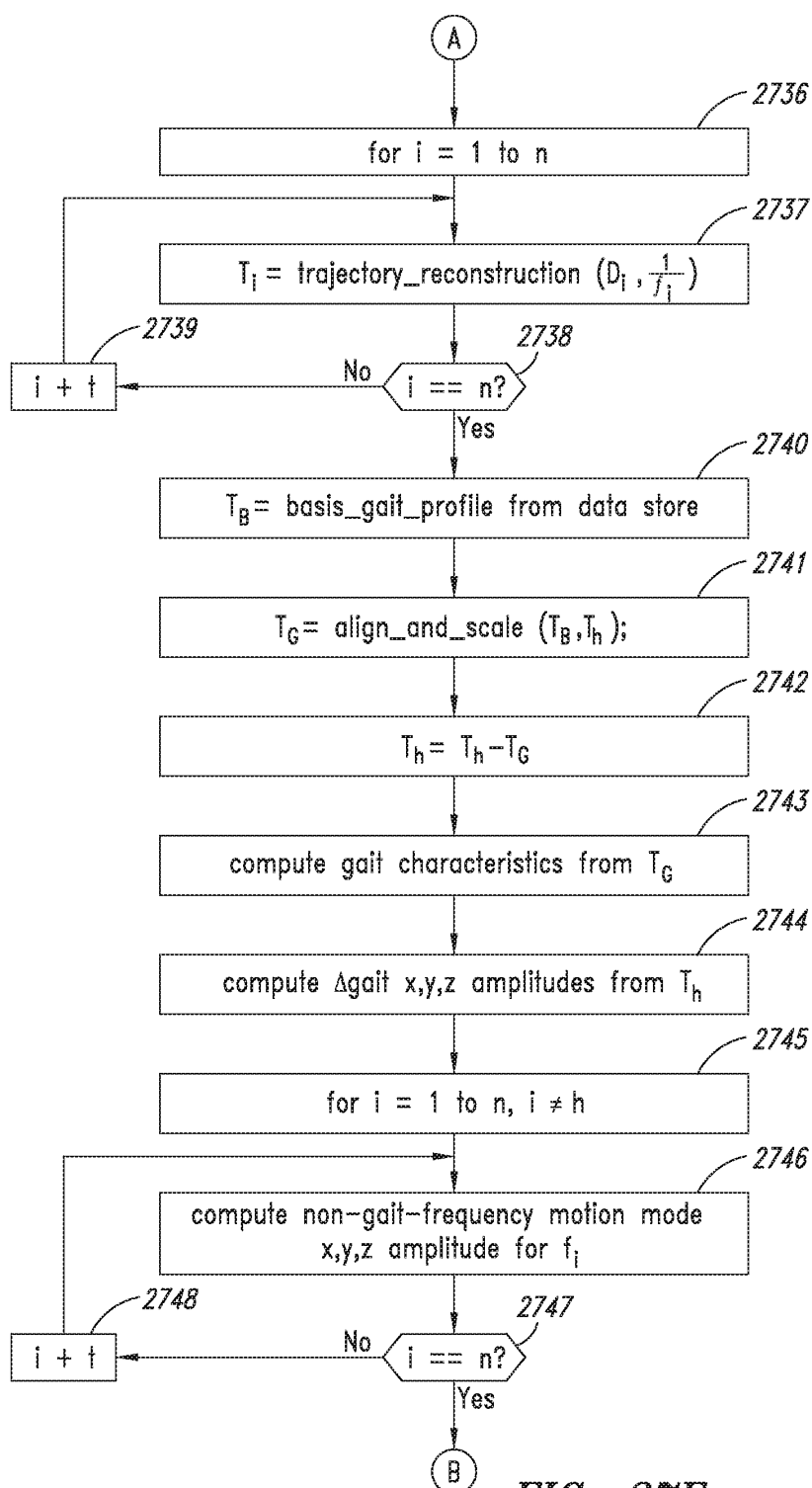


FIG. 37E

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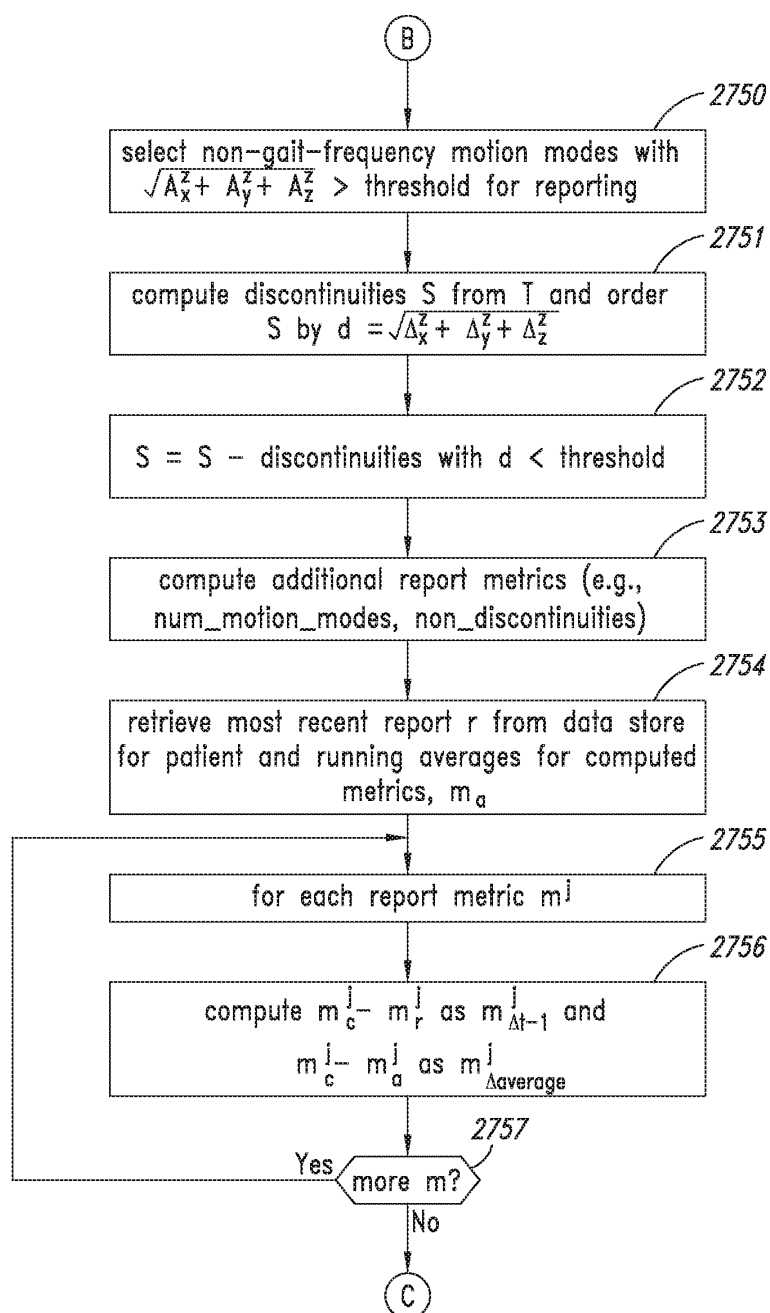
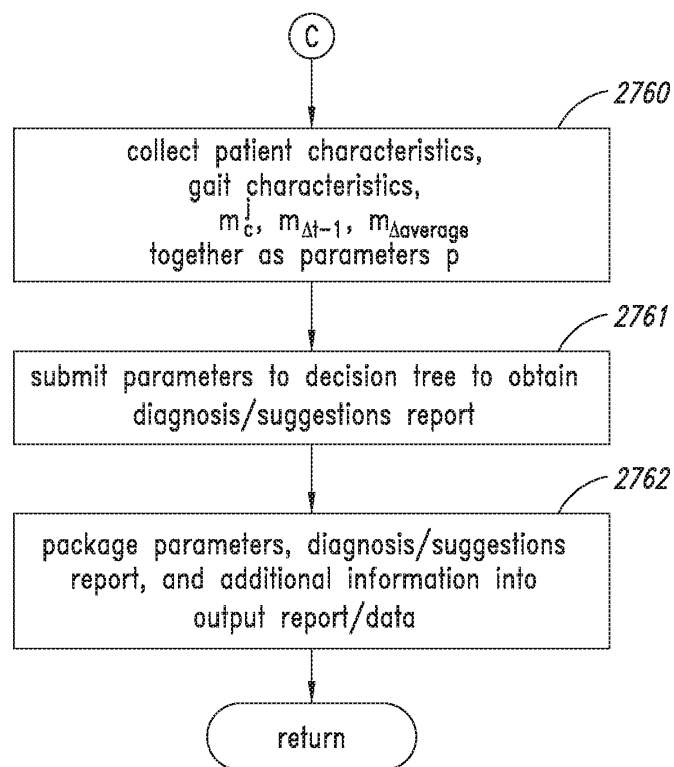


FIG. 37G

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*FIG. 37H*

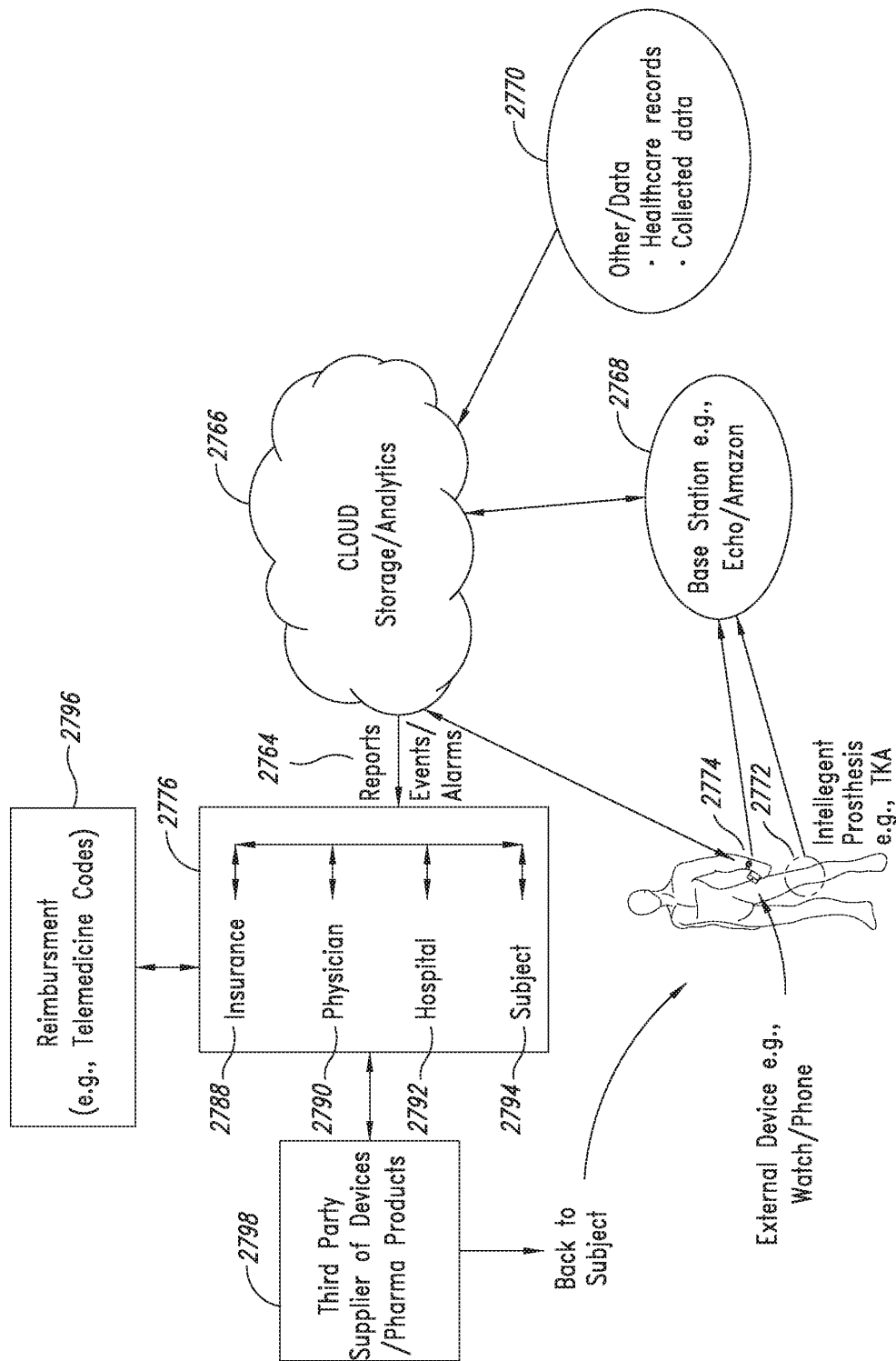
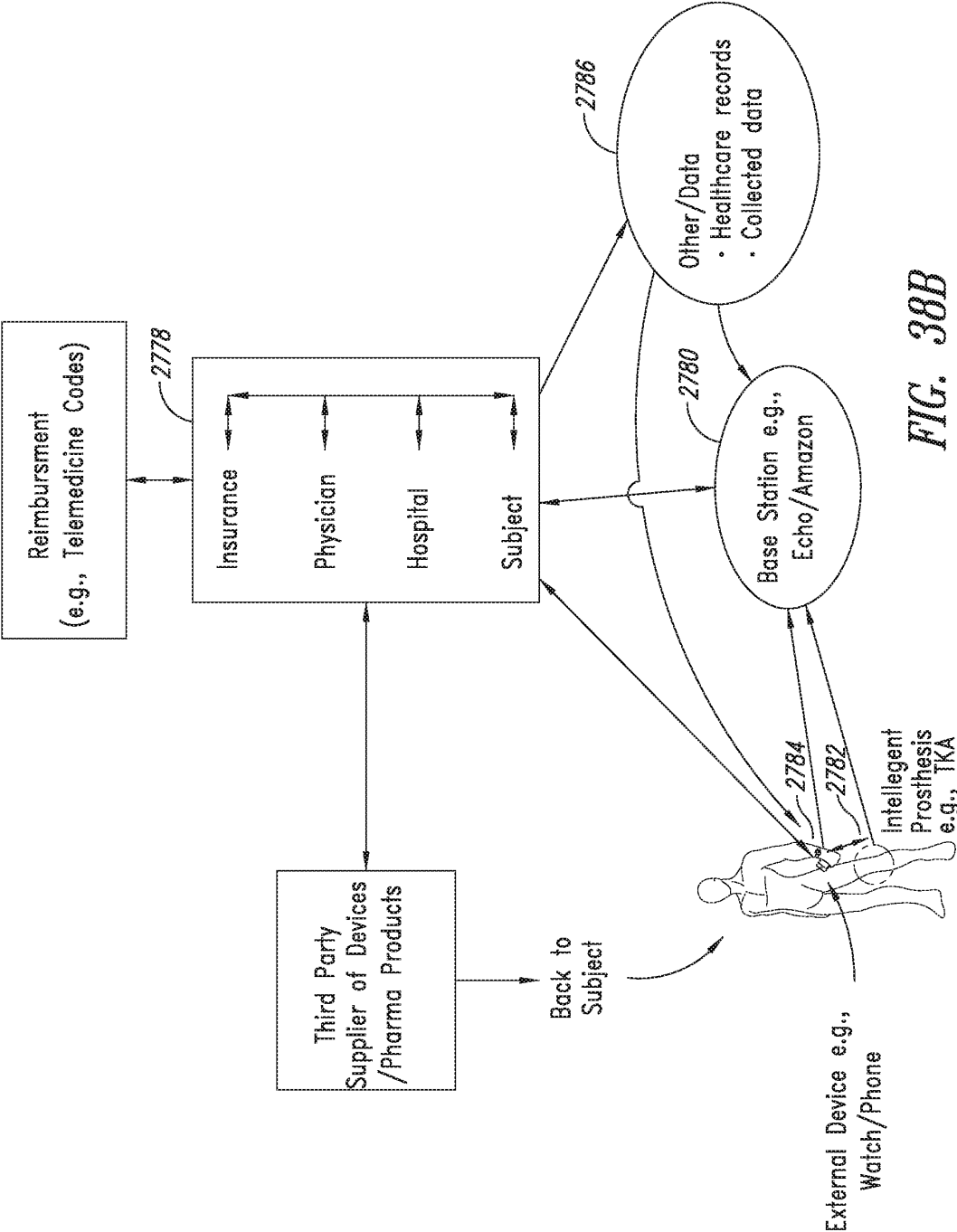
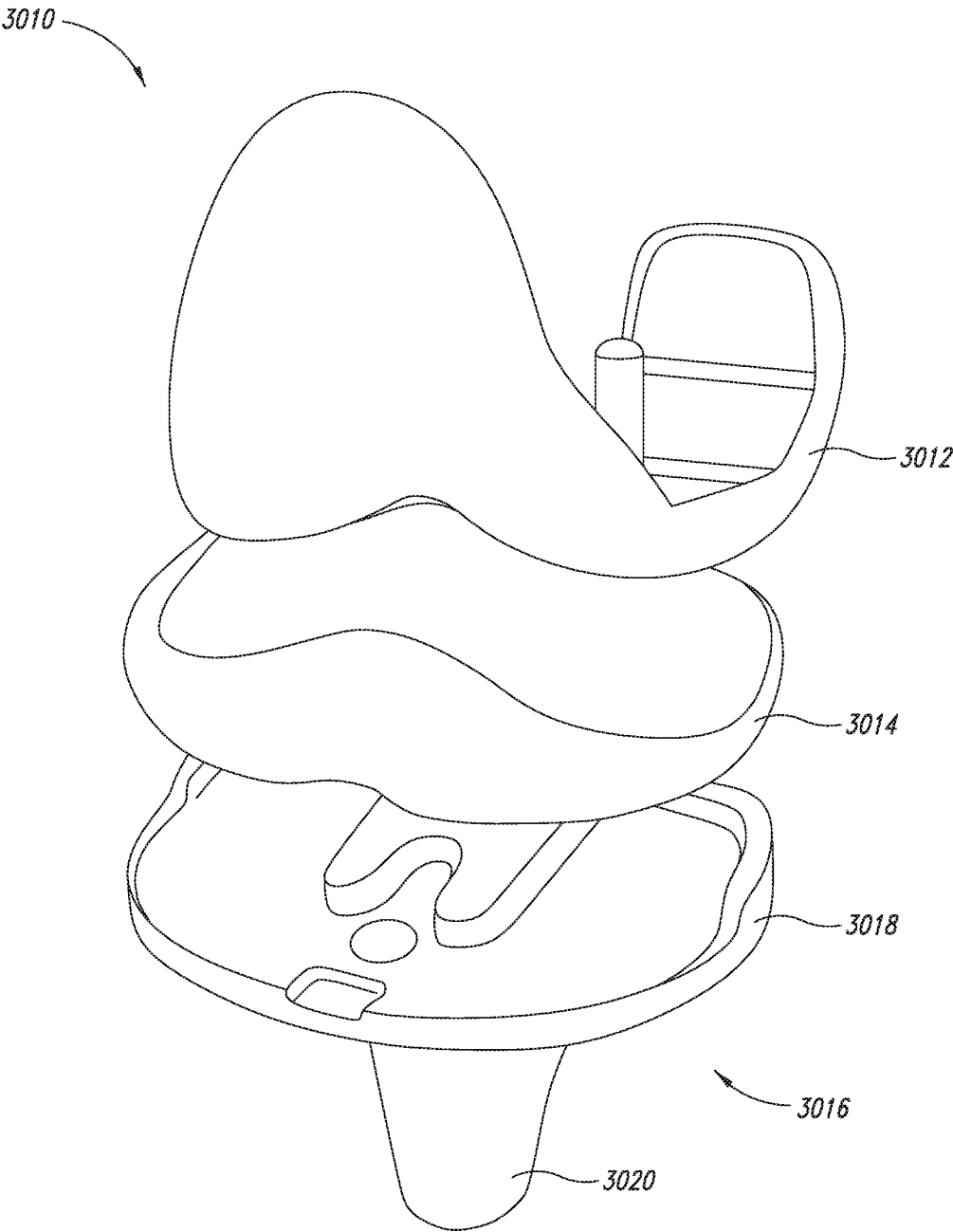


FIG. 38A





*FIG. 39*

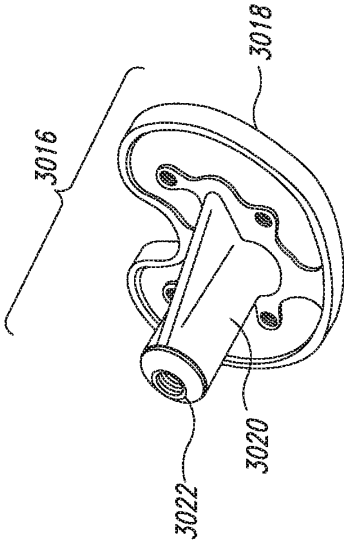


FIG. 40A

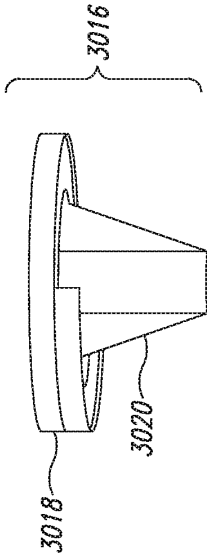


FIG. 40B

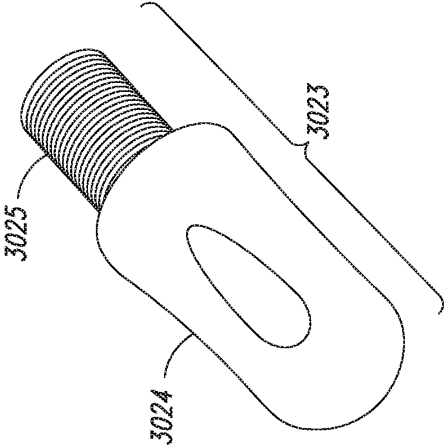


FIG. 40C

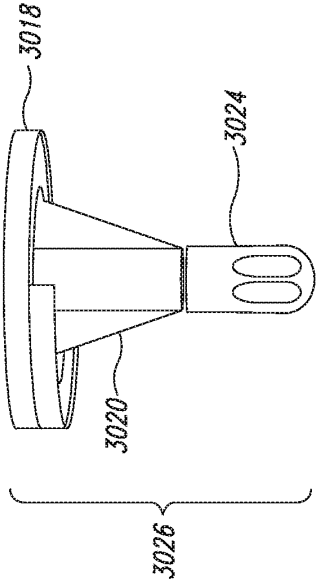


FIG. 40D

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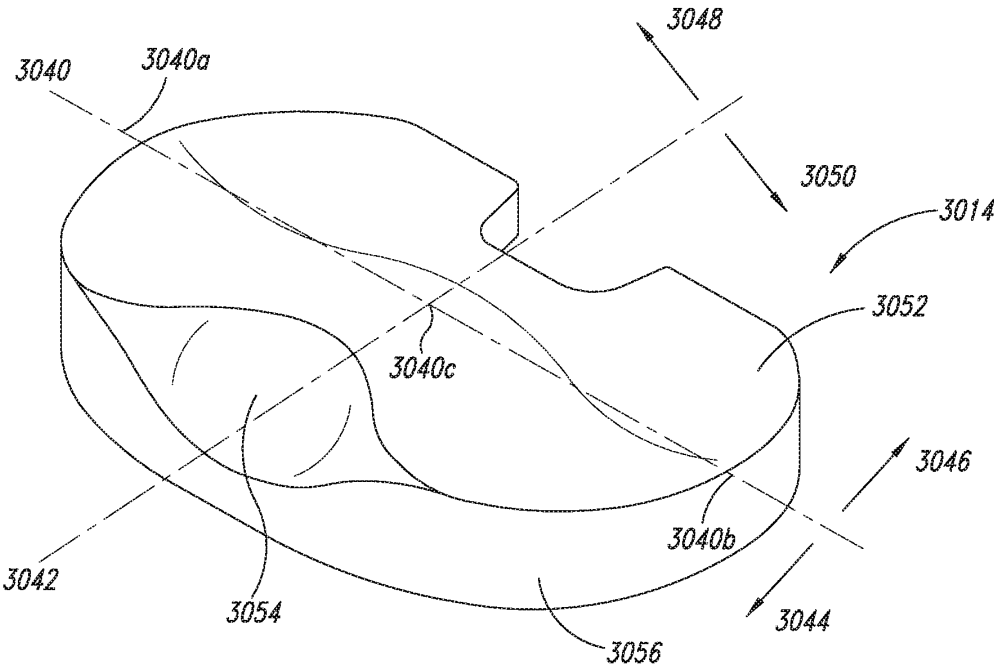


FIG. 41

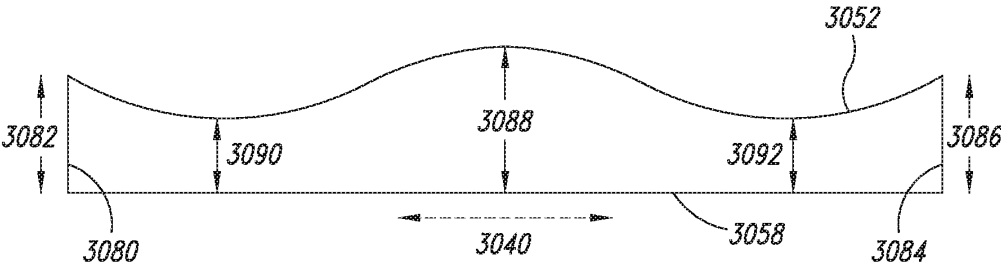


FIG. 42A

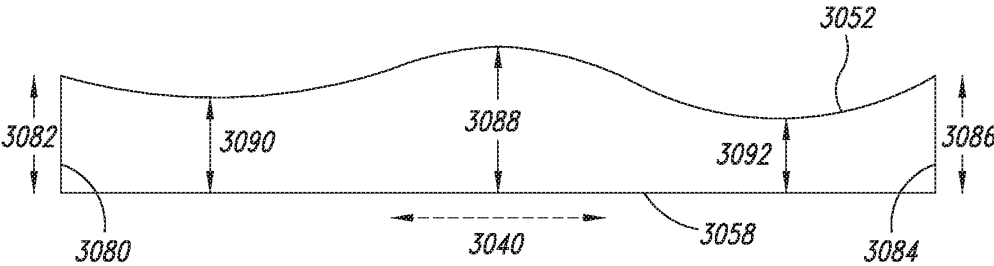


FIG. 42B

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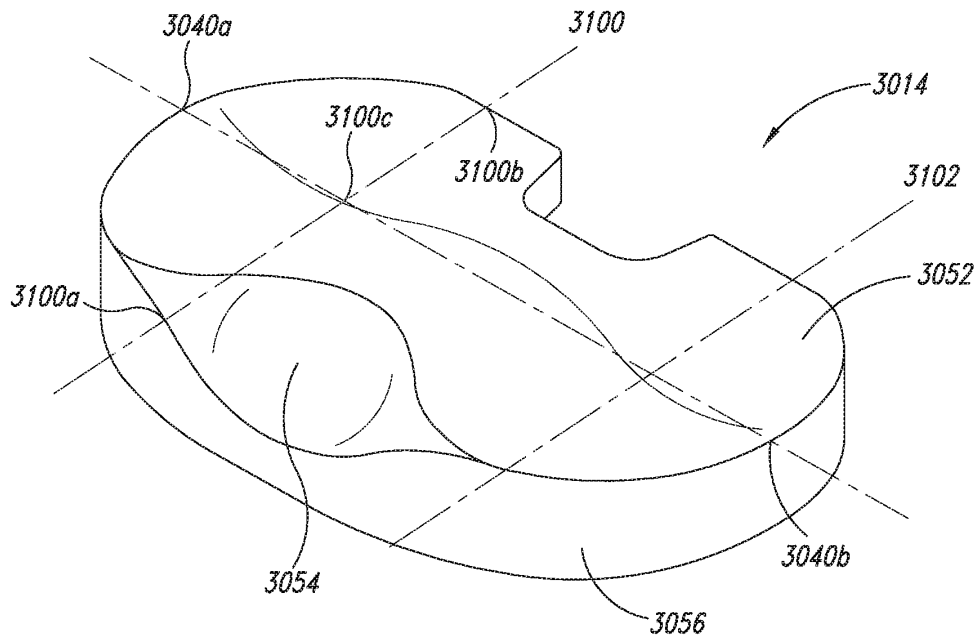


FIG. 43

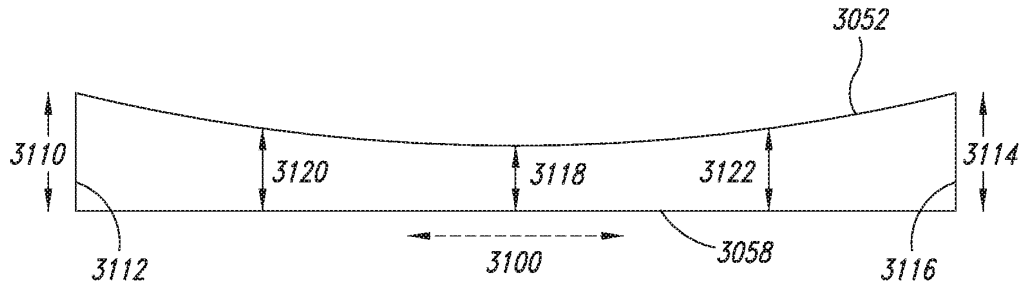


FIG. 44A

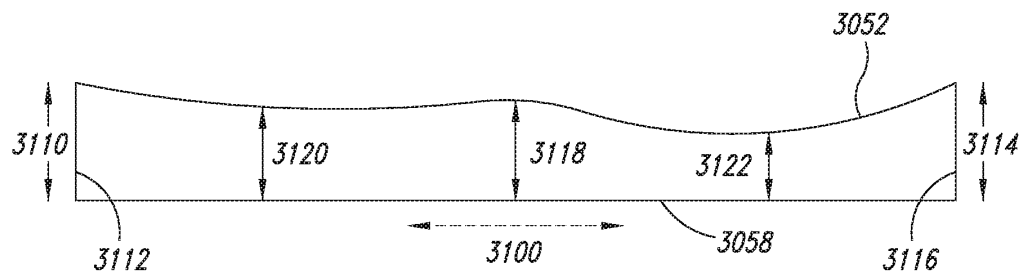
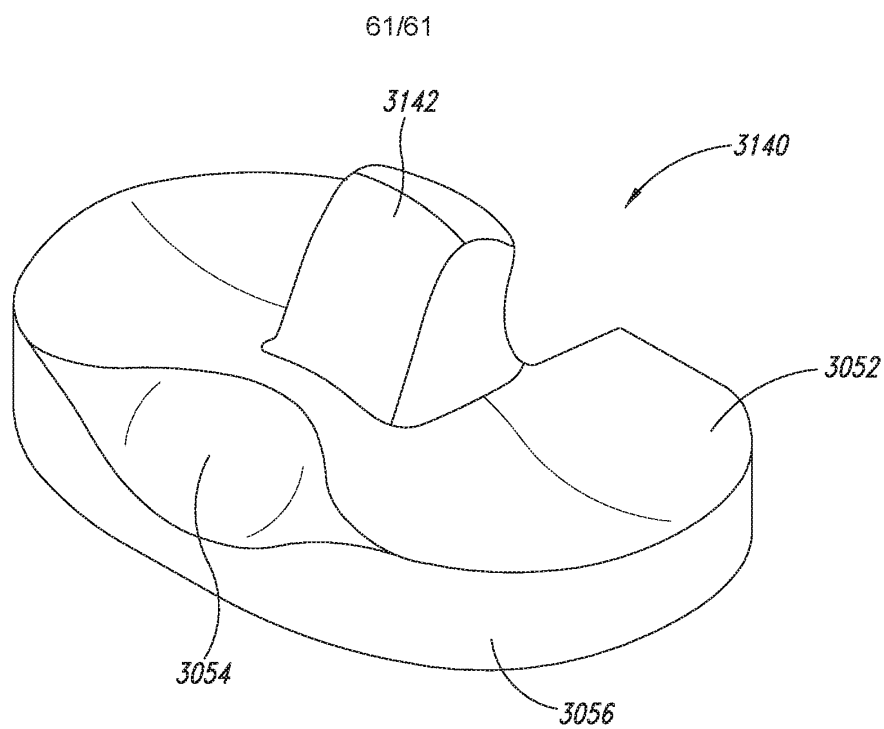
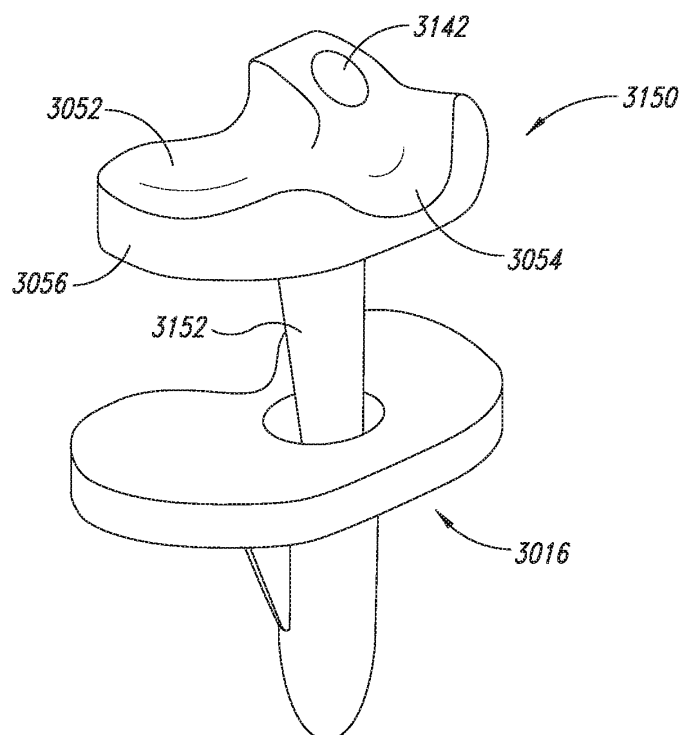


FIG. 44B



**FIG. 45**



**FIG. 46**