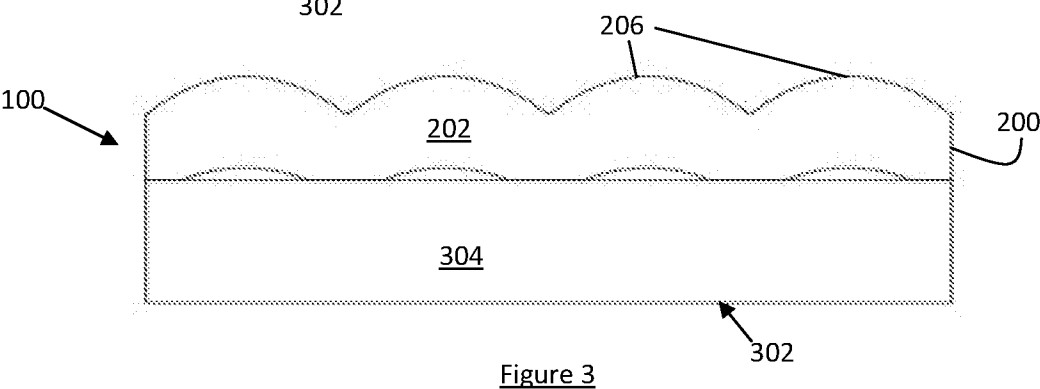
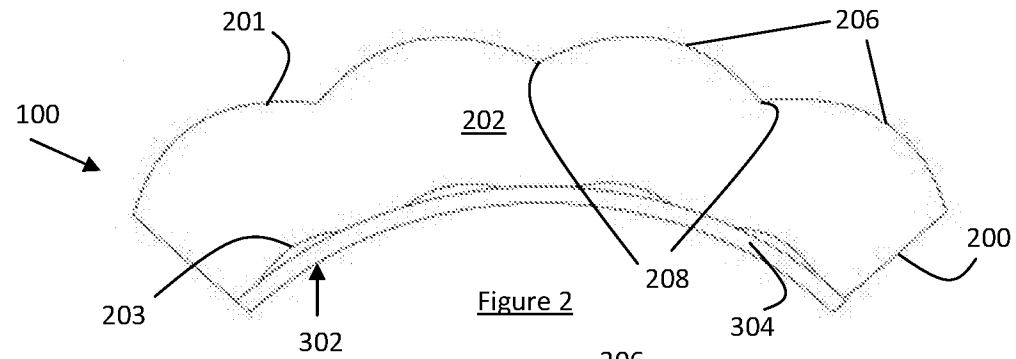
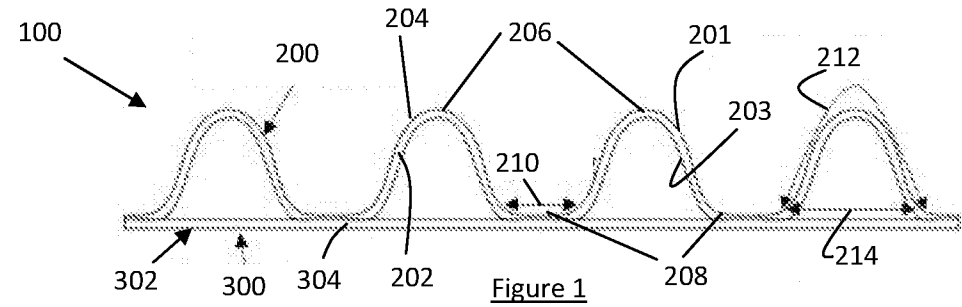




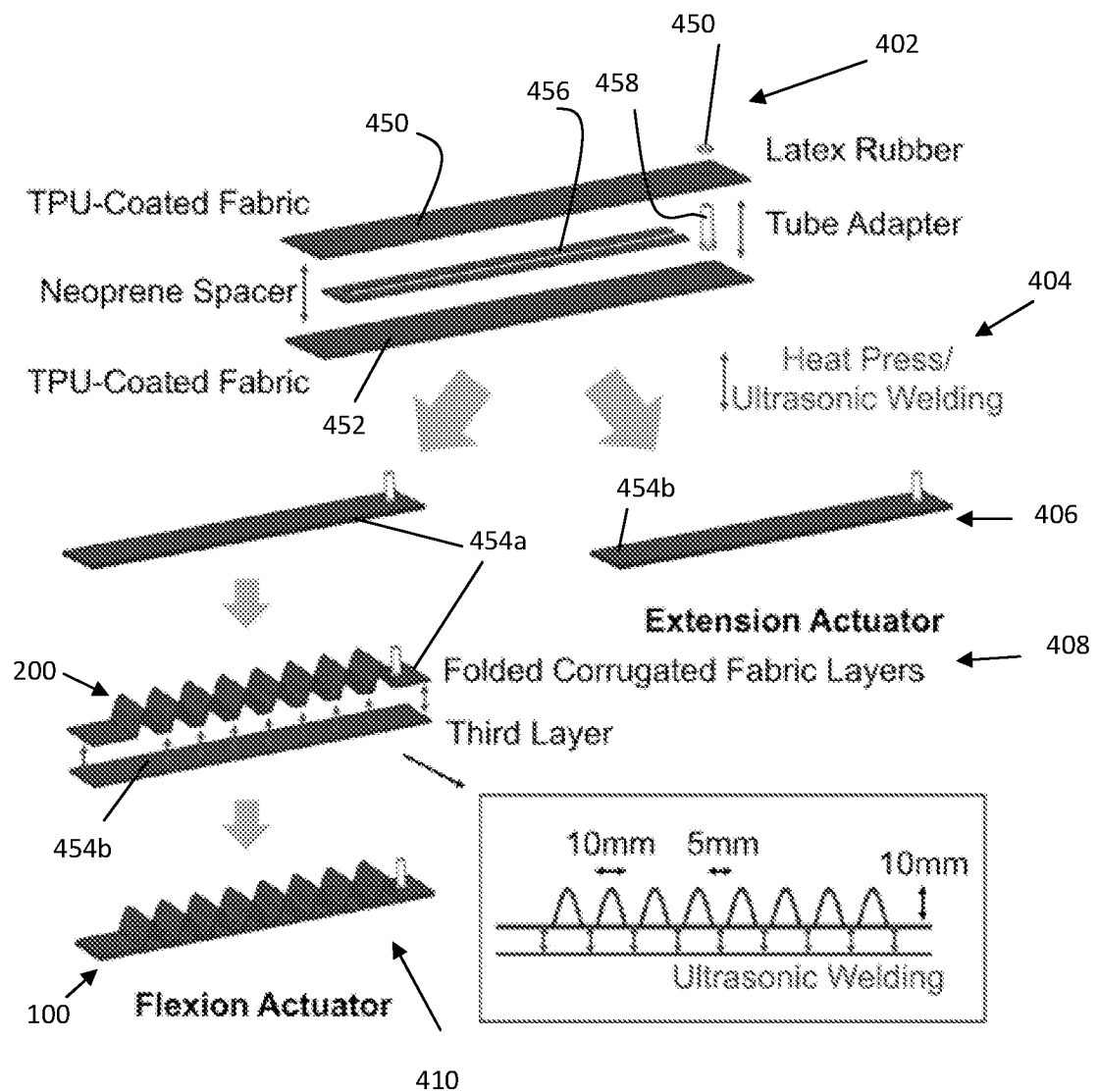


Figure 4

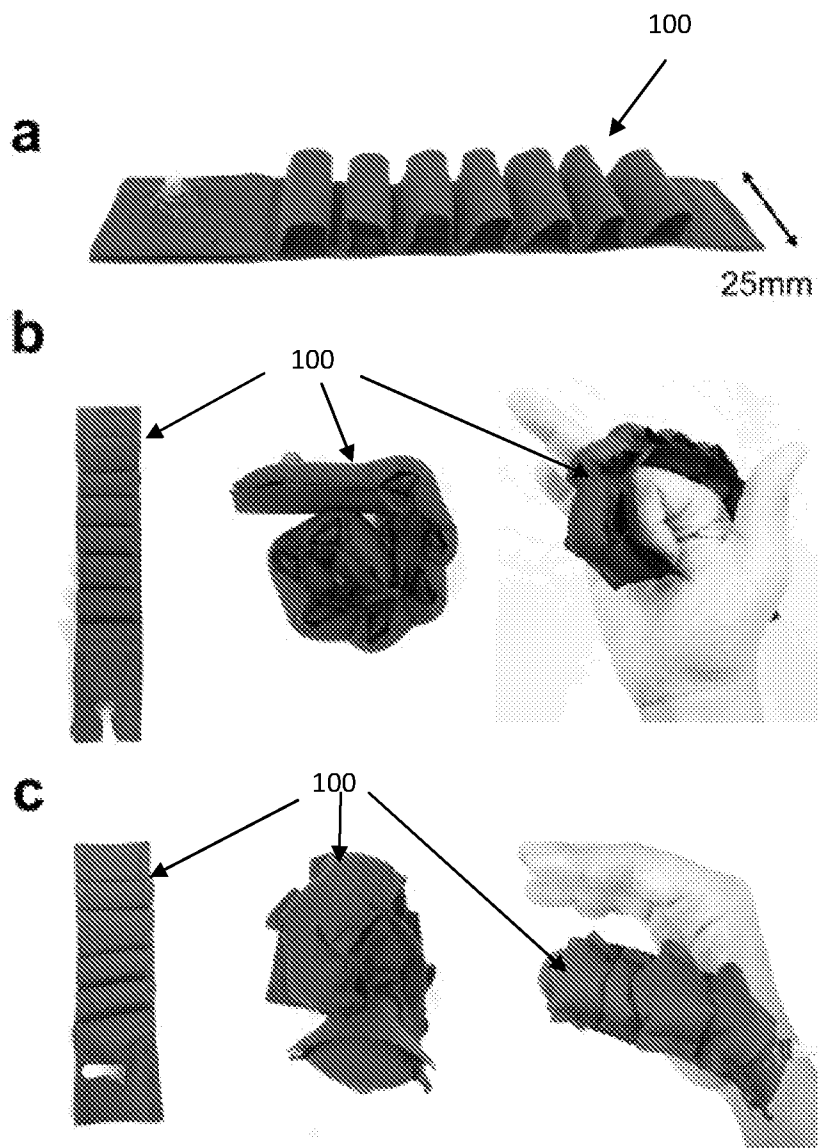
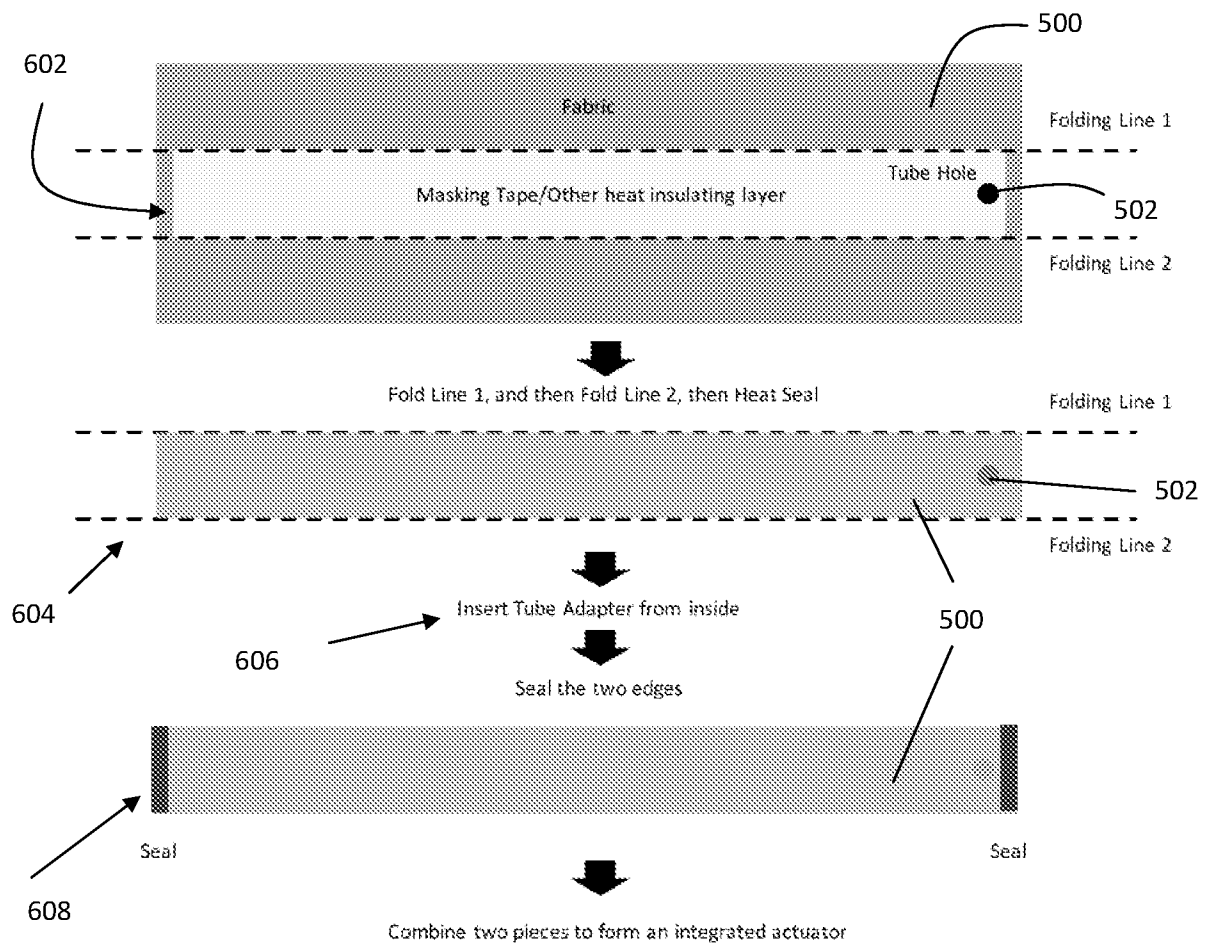


Figure 5

Figure 6a

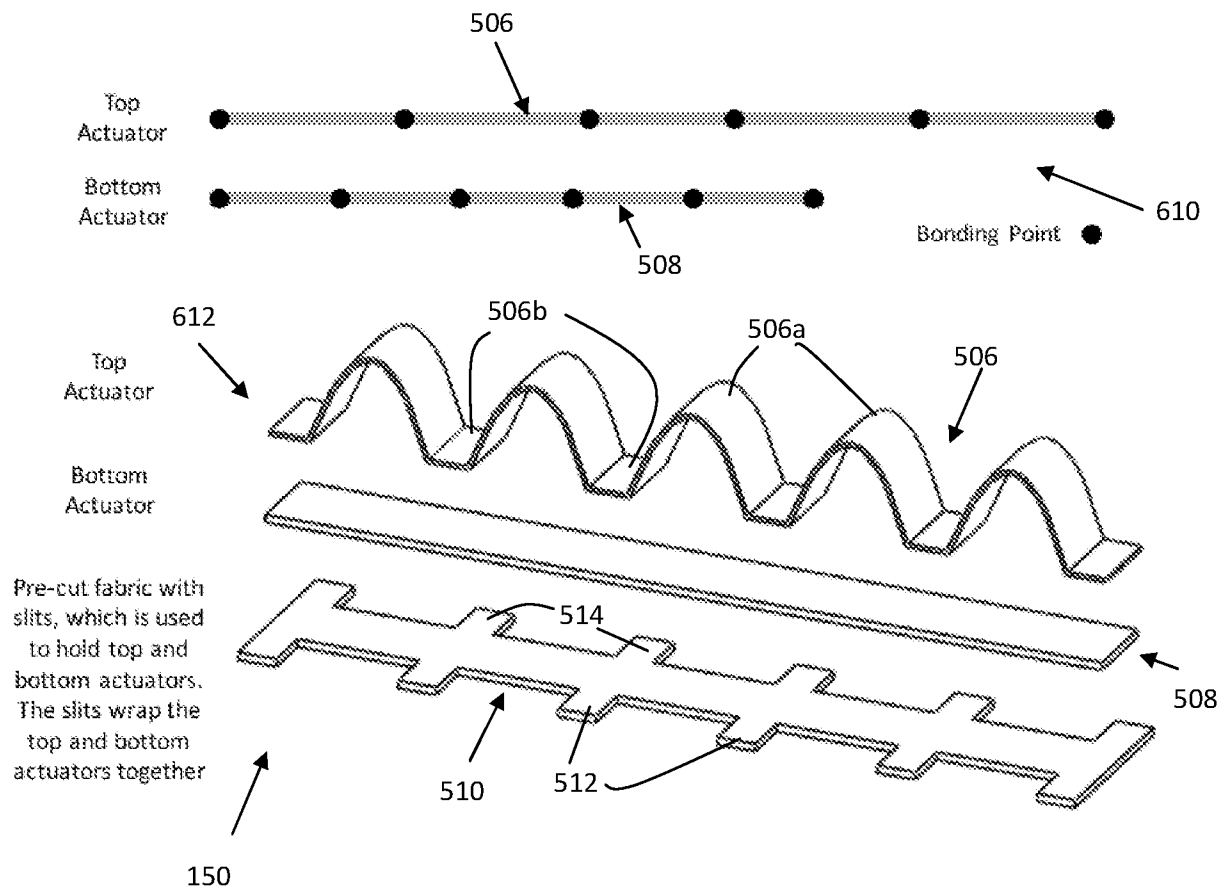


Figure 6b

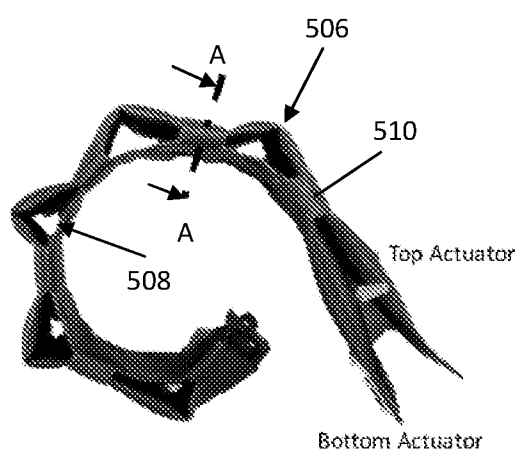


Figure 6c

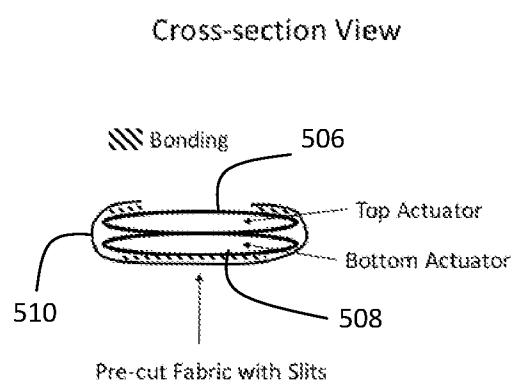
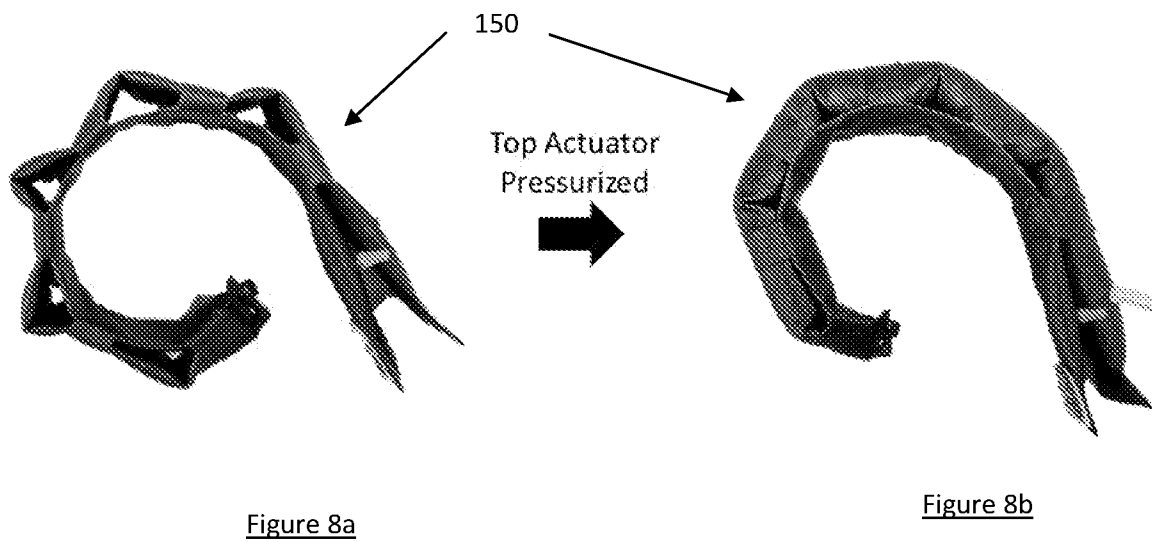
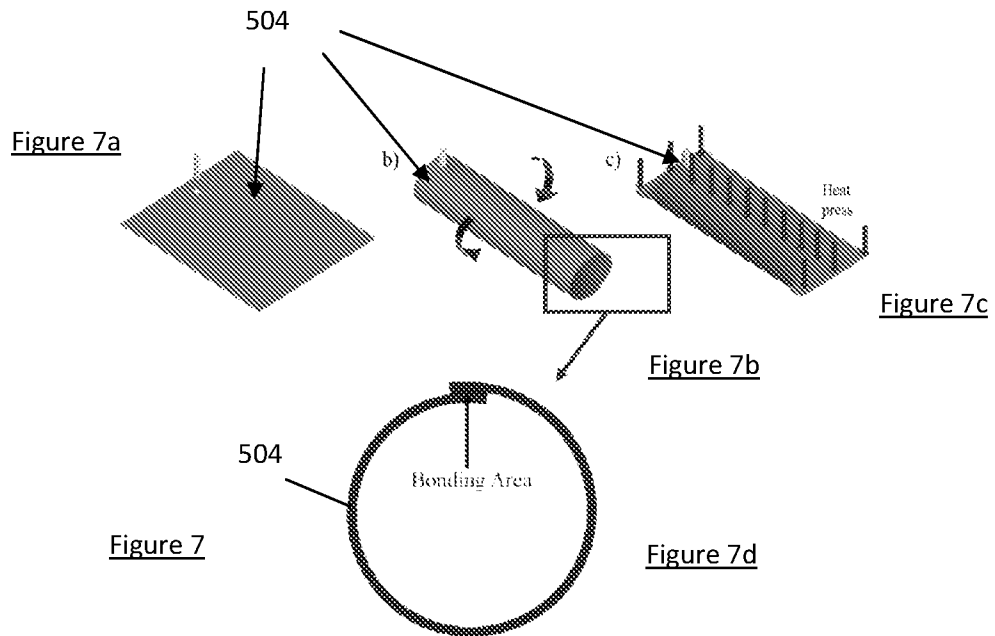


Figure 6d



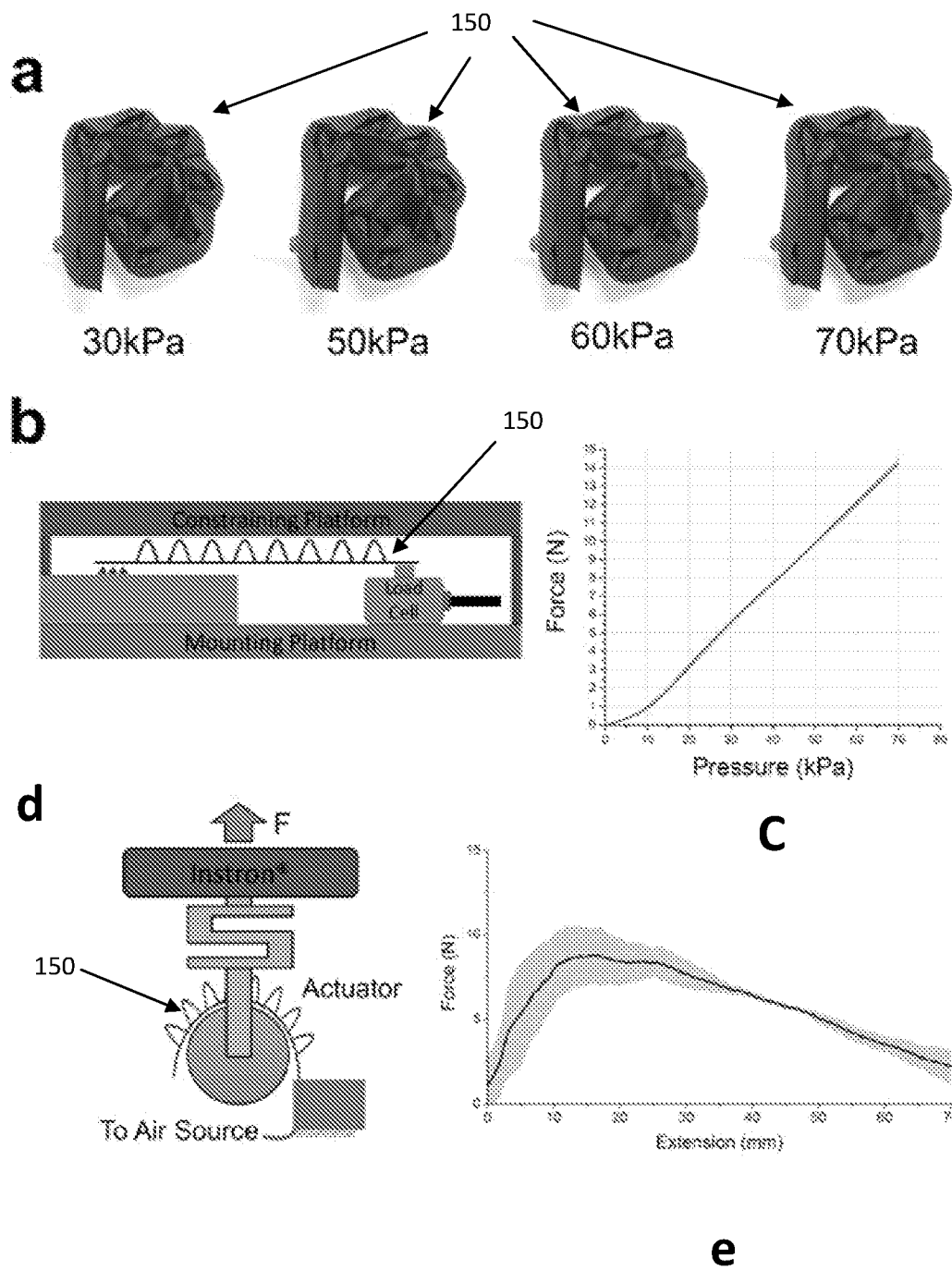


Figure 9

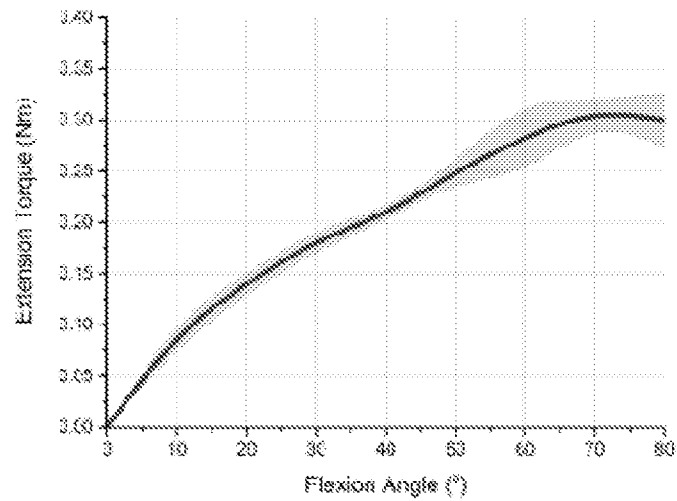


Figure 10

Figure 11a

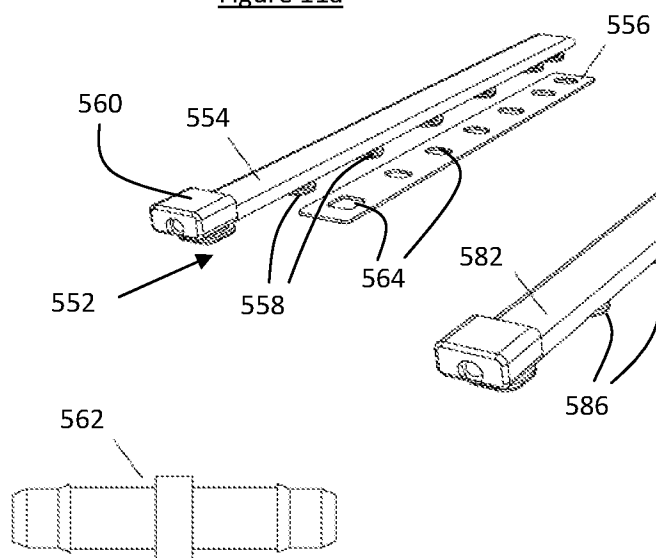


Figure 11b

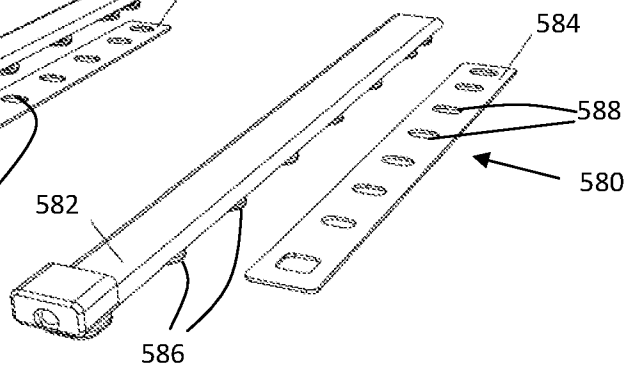
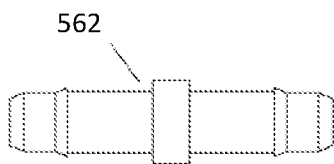


Figure 11c



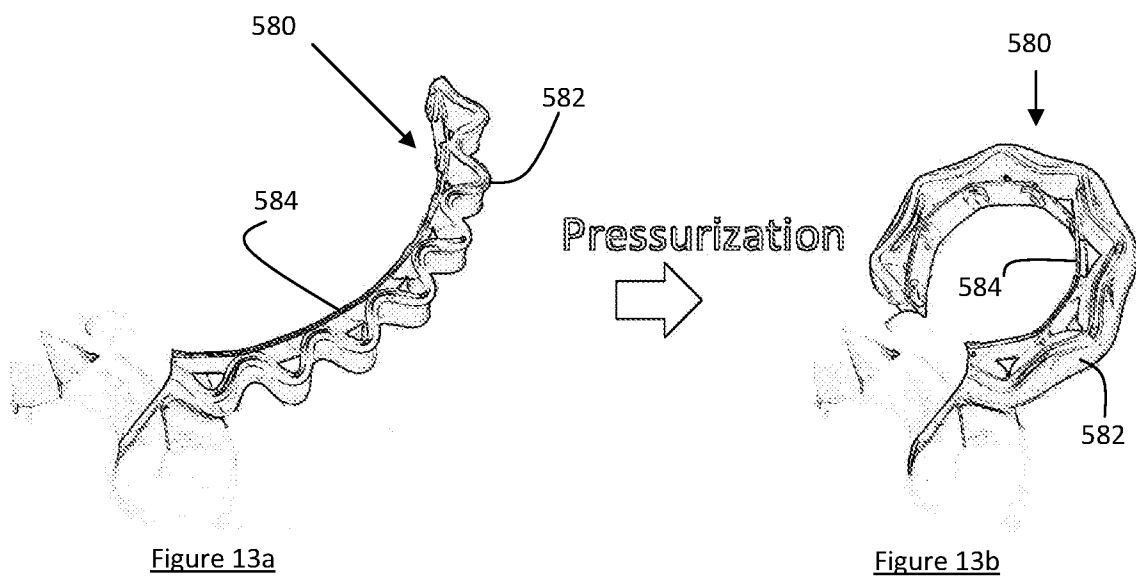
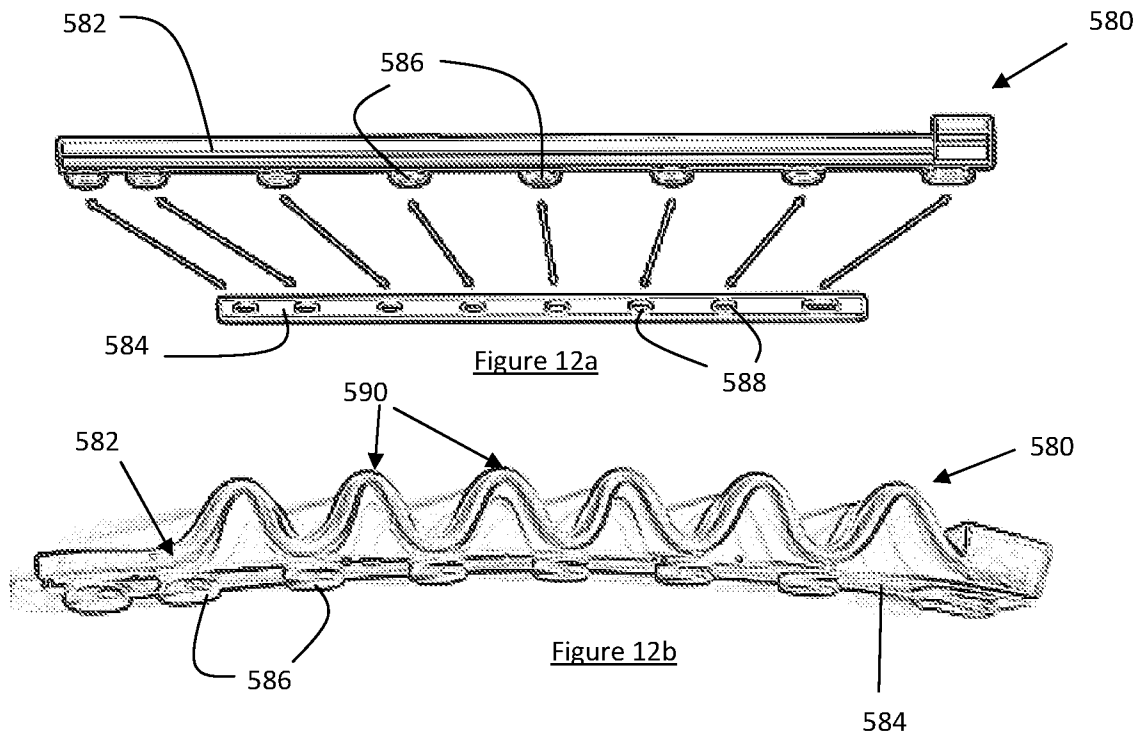


Figure 14: The settings used on the Simplify3D software that were important to a successful 3D printed actuator are as follows:

Extruder	Extrusion Multiplier	1.20
	Coasting at End	2.0 mm
Layer	Primary Layer Height	0.1mm
	Outline/Perimeter Shells	2
	Outline direction	Inside-Out
	First Layer Height	50%
	First Layer Width	120%
	First Layer Speed	60%
Infill	Fill Pattern	Rectilinear
	Interior Fill Percentage	100%
	Outline Overlap	20%
	Infill Extrusion Width	100%
	Minimum Infill Length	0.05mm
Temperature	Temperature	230 °C
Cooling	Fan Speed	0
Others	Default Printing Speed	32.0 mm/s
	Extruder Movement Speed	200 mm/s
Advanced	Avoid in crossing outline for travel movements option	Checked

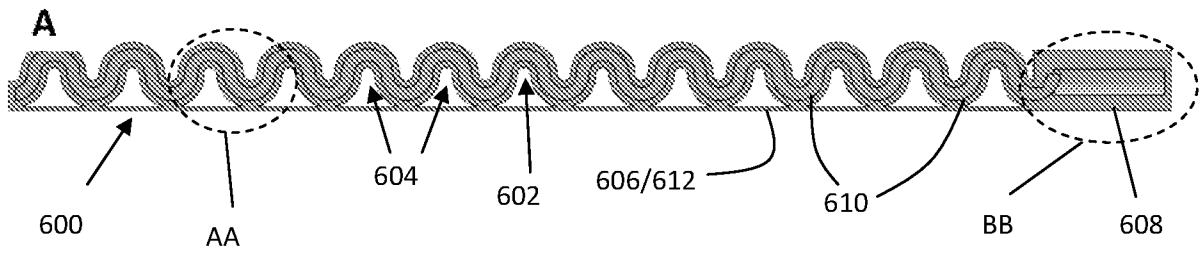


Figure 15

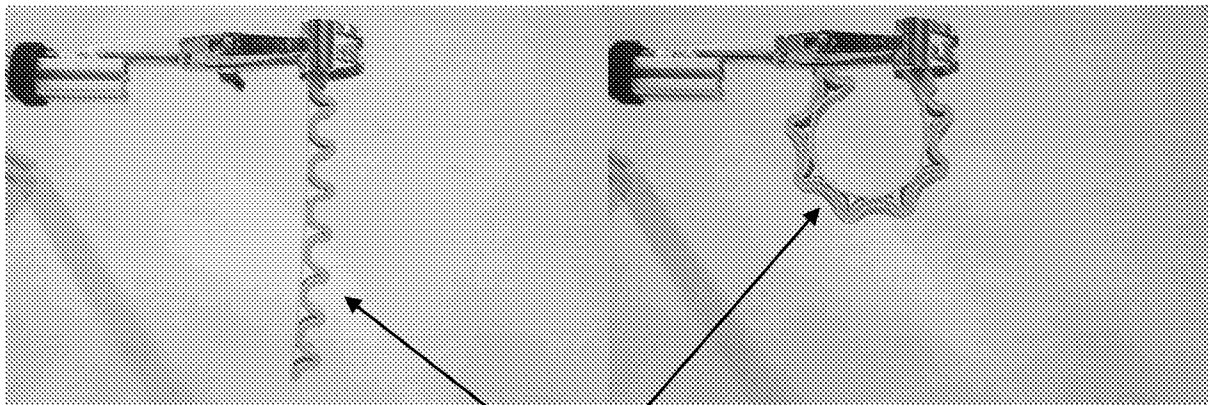
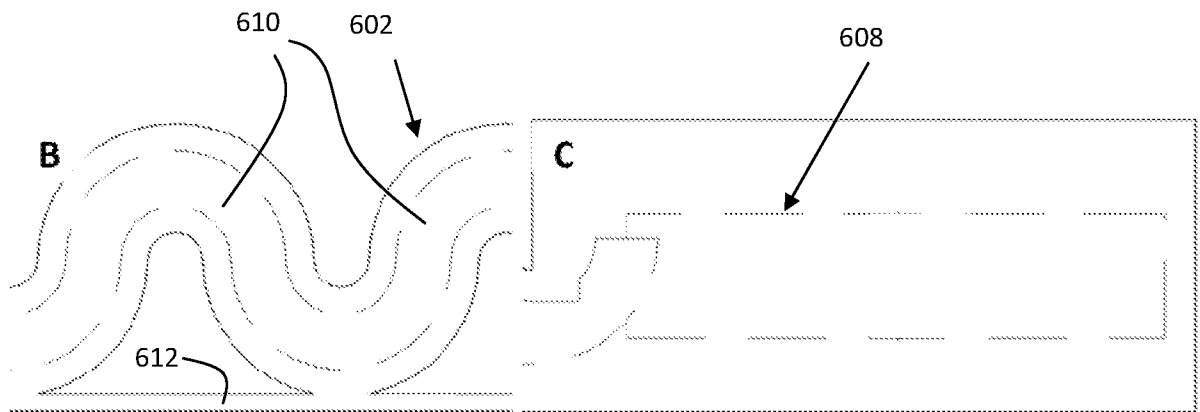


Figure 16a

600

Figure 16b

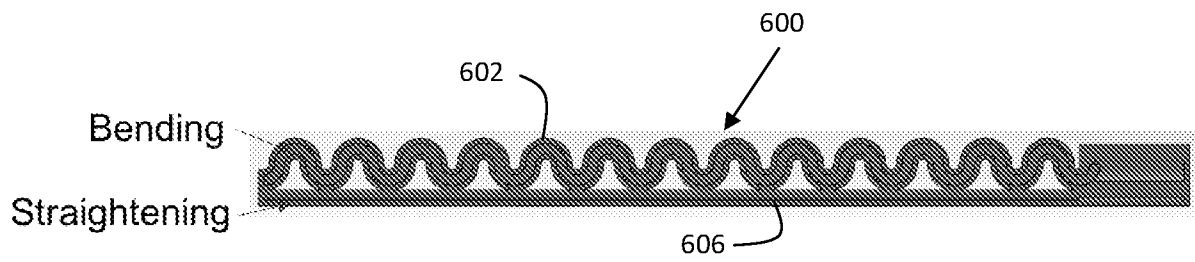
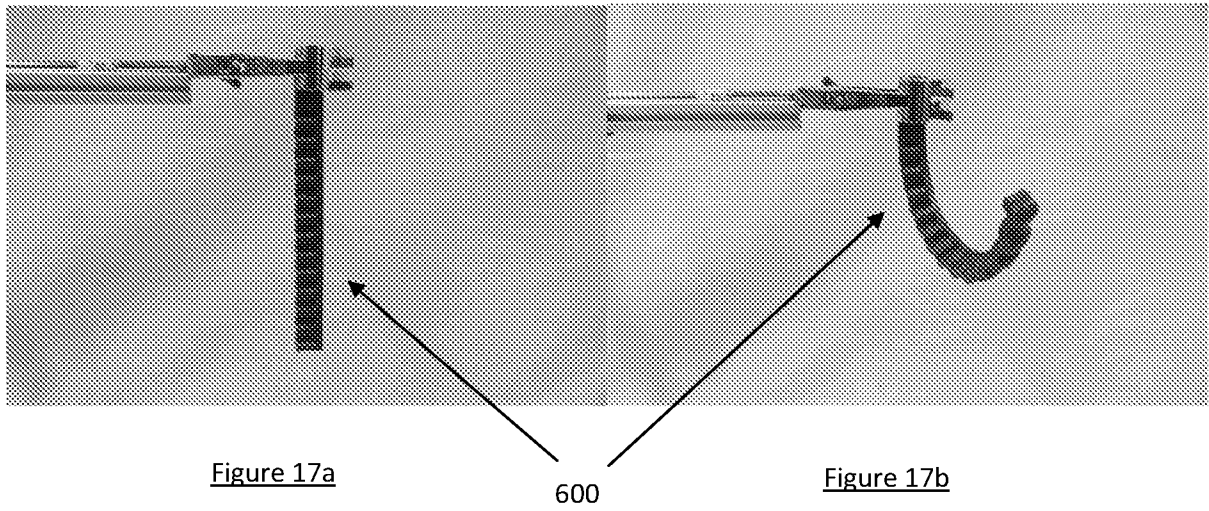


Figure 18

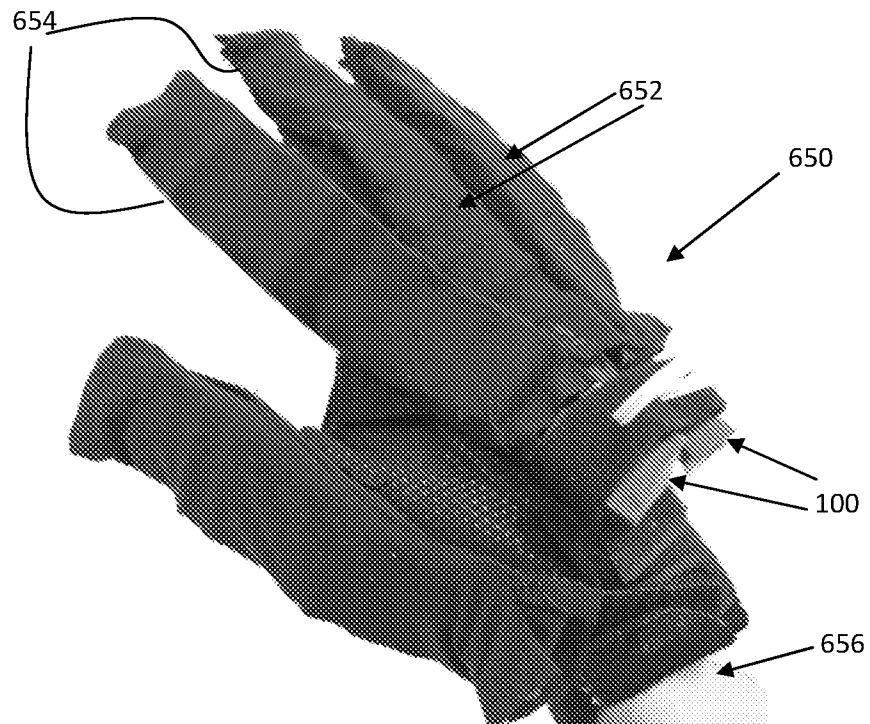


Figure 19

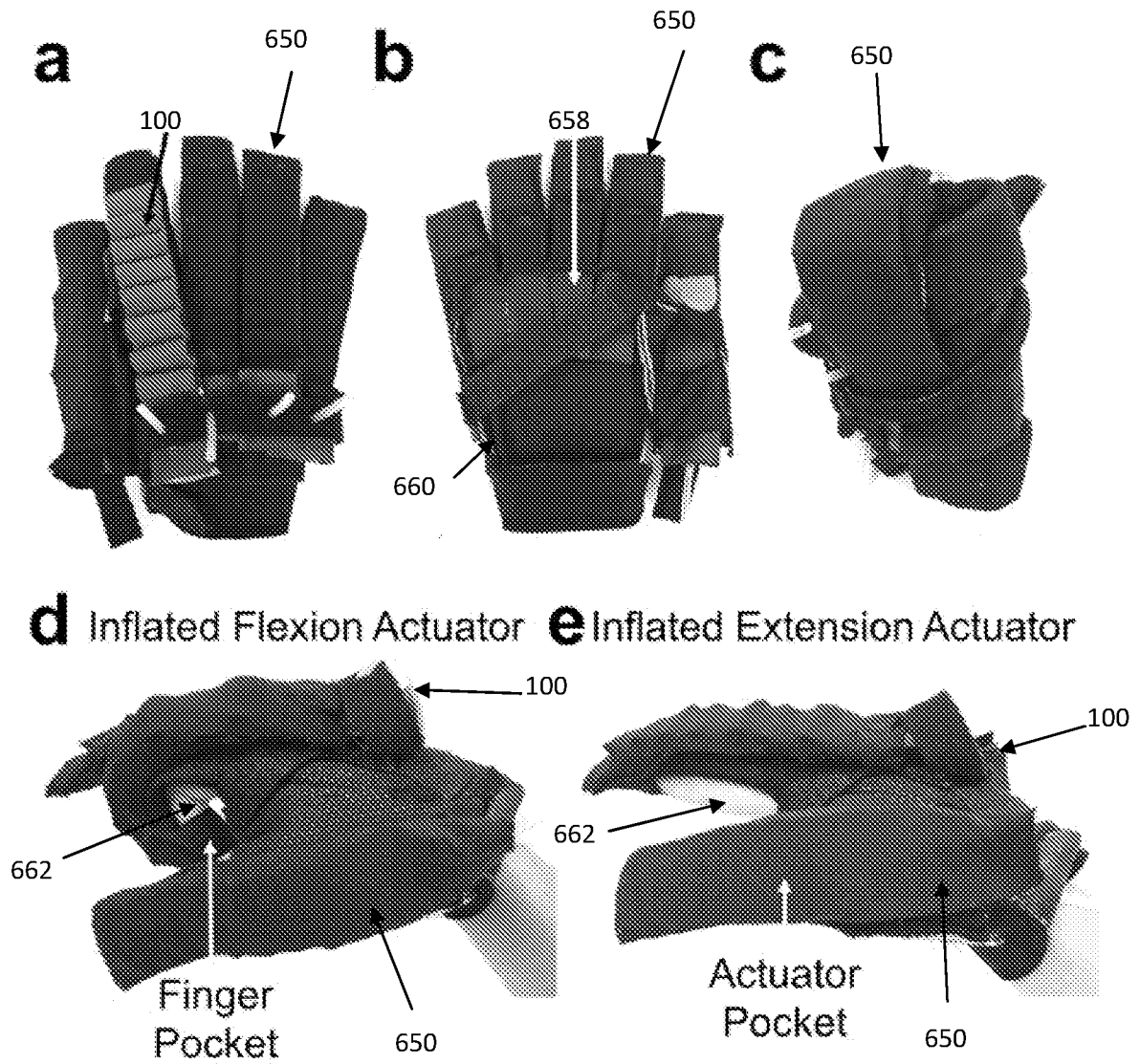


Figure 20

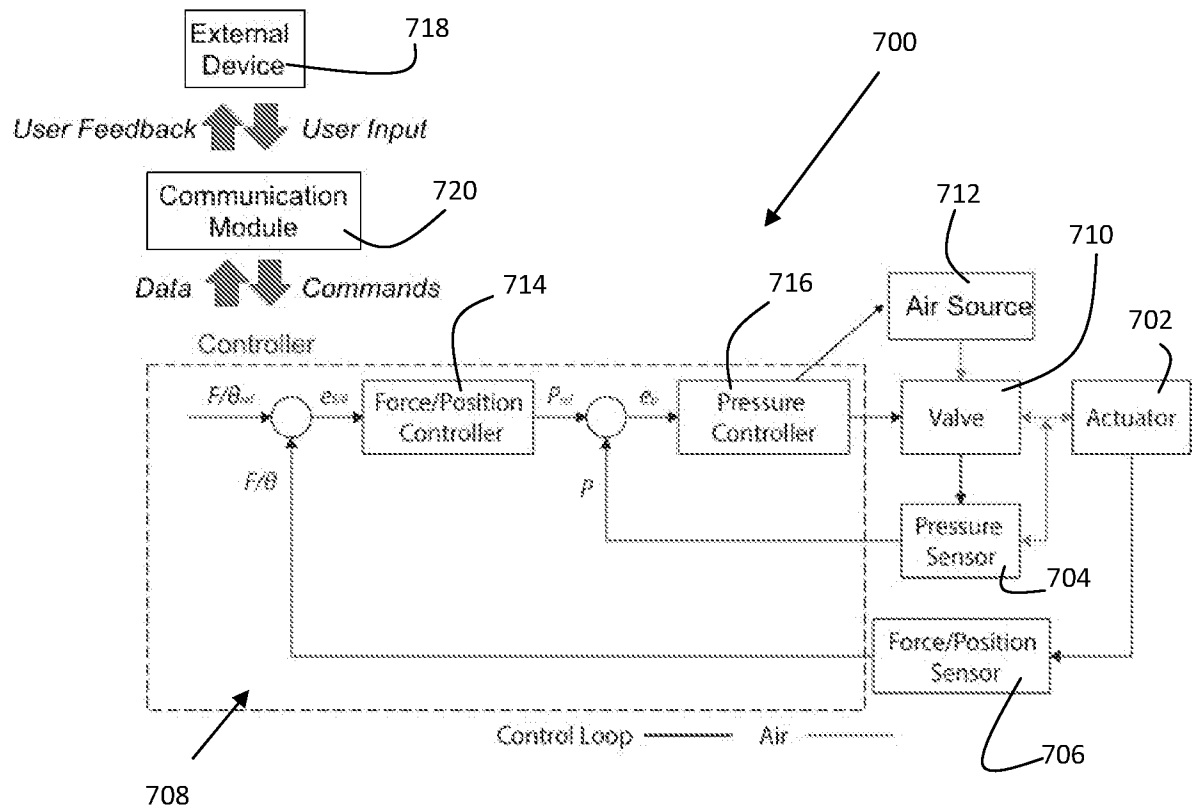


Figure 21

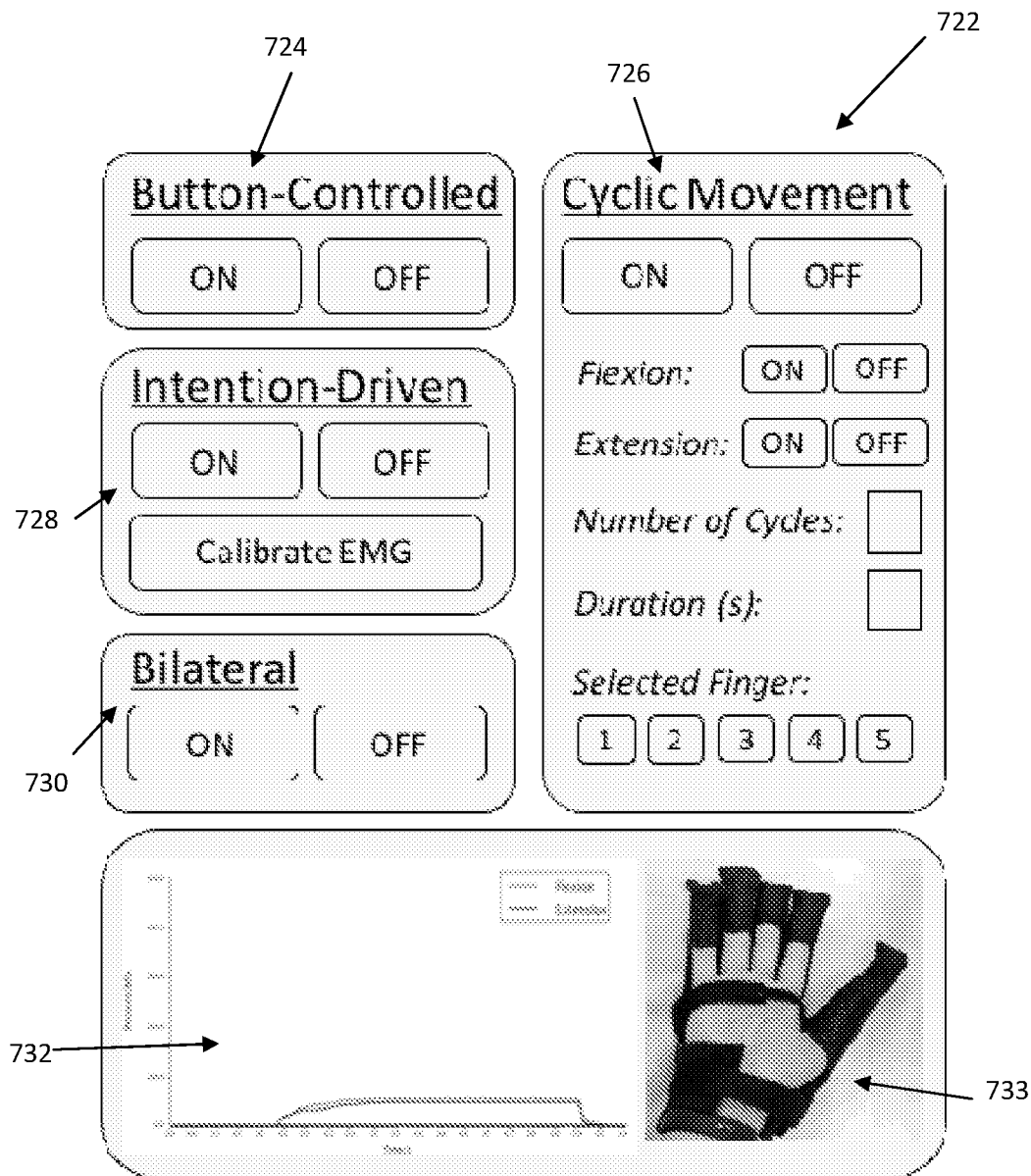
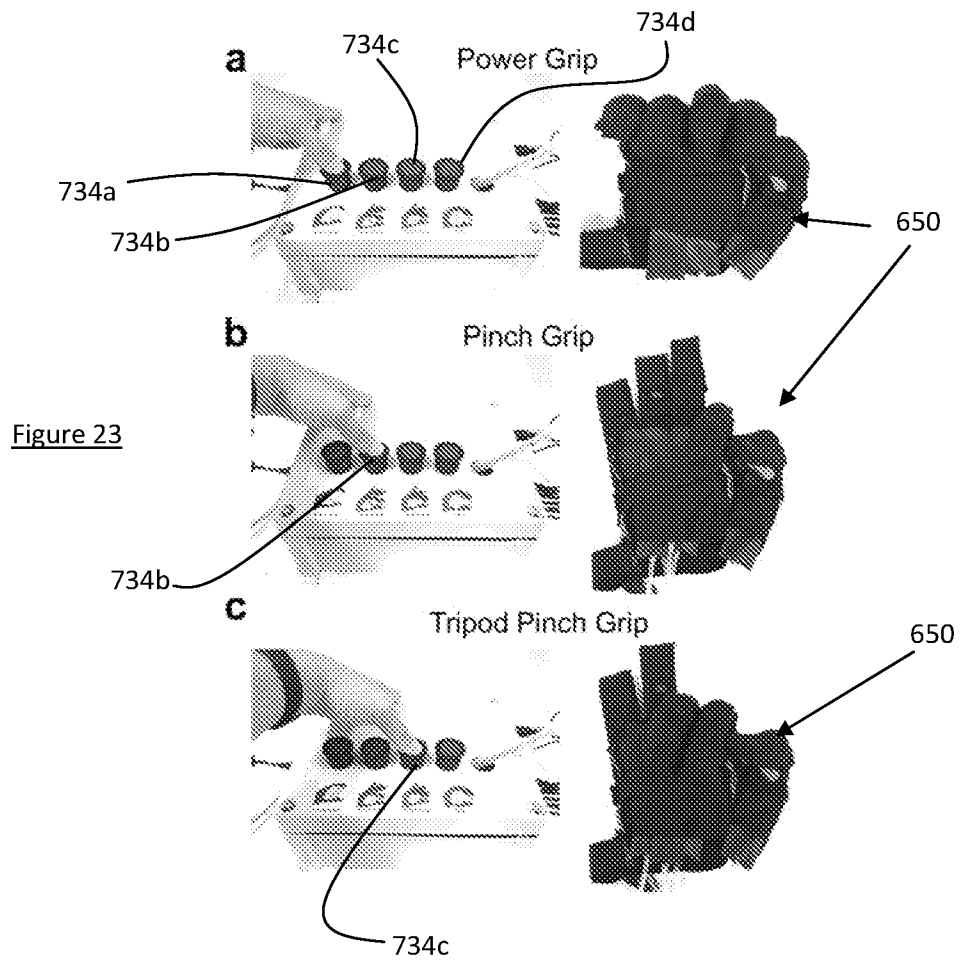


Figure 22



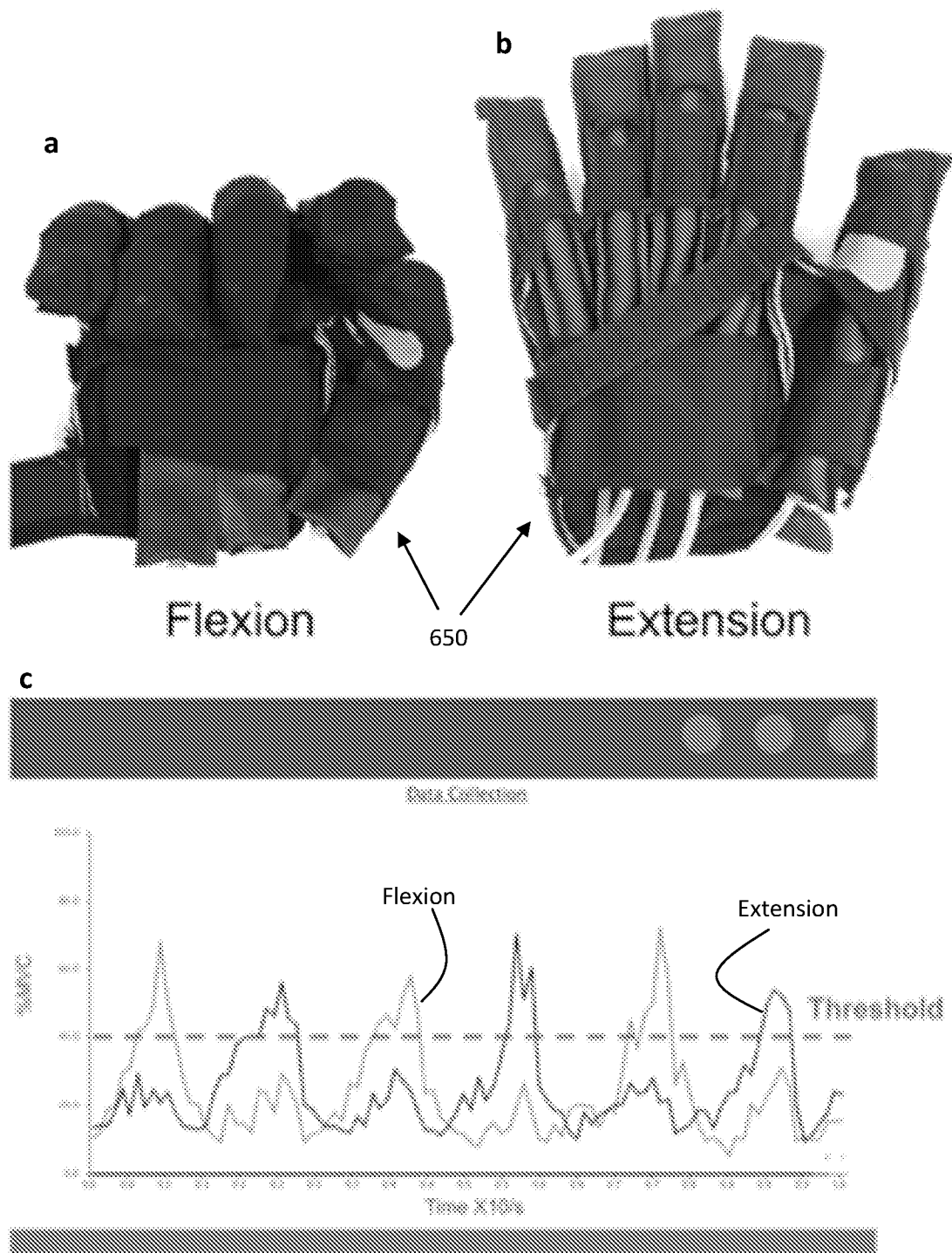
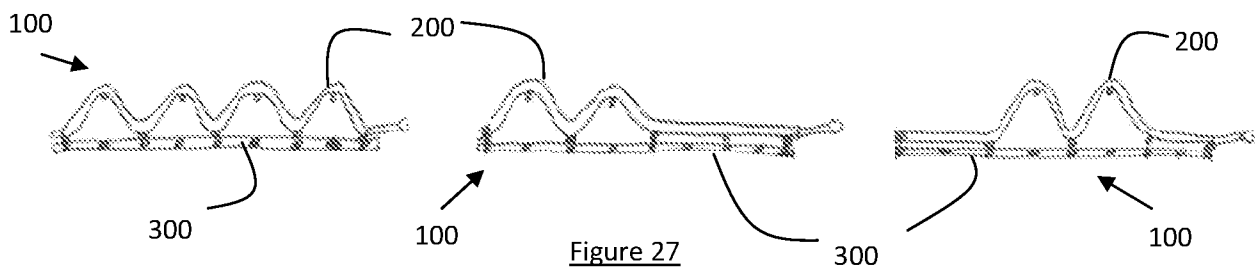
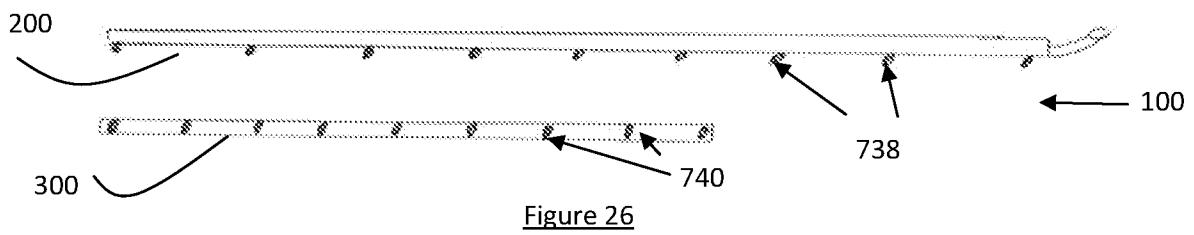
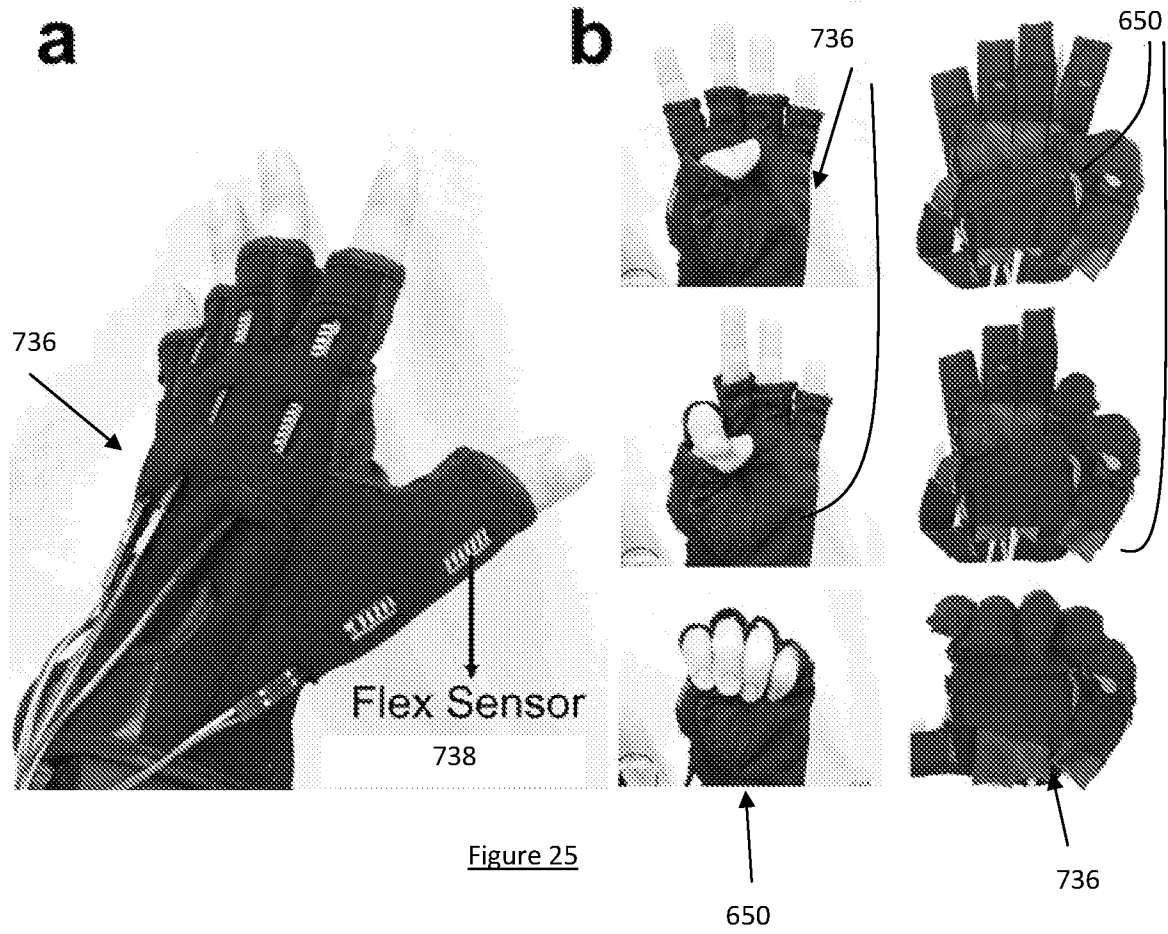


Figure 24



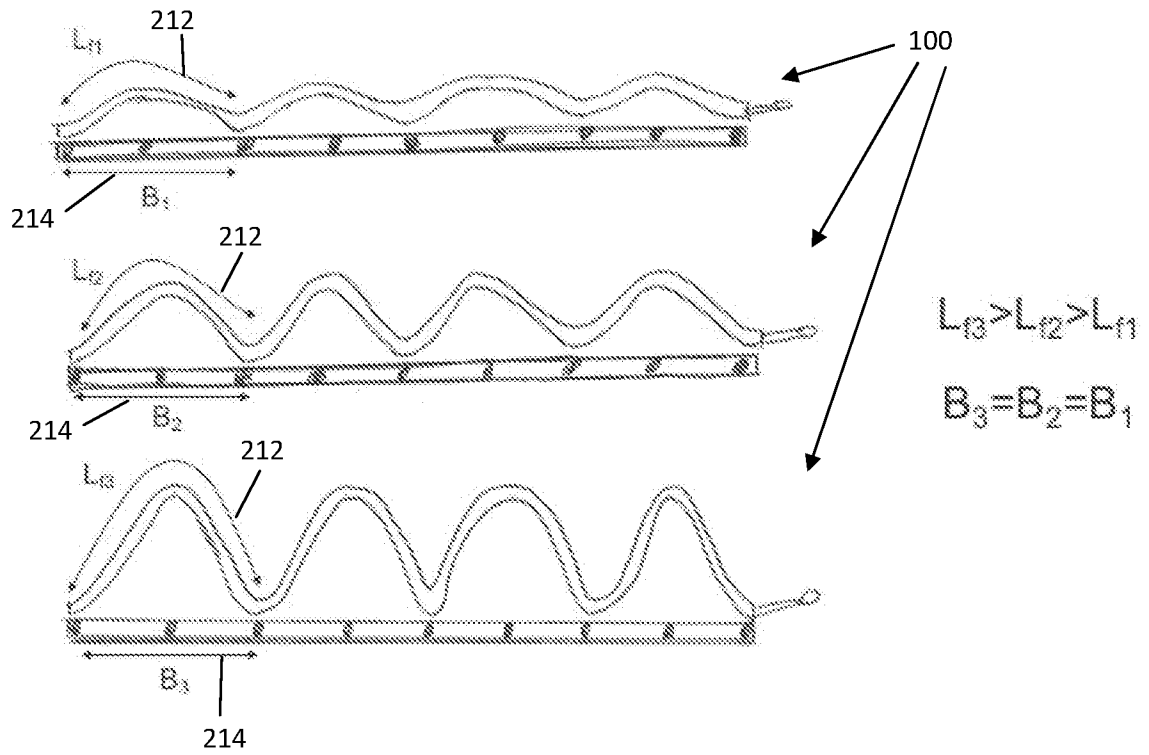


Figure 28

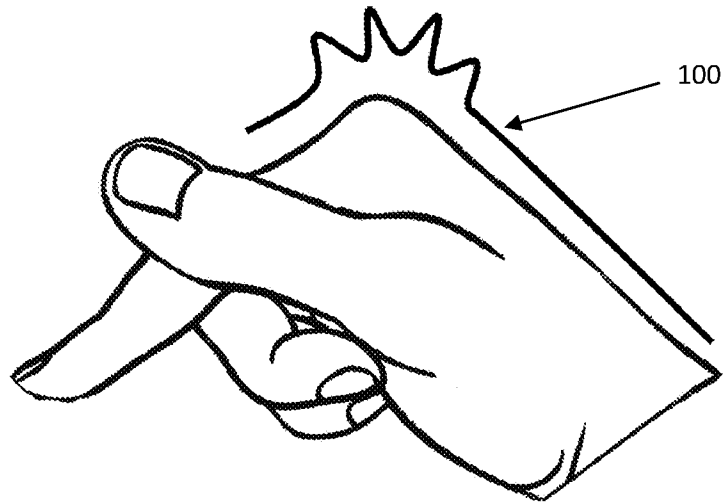


Figure 29a

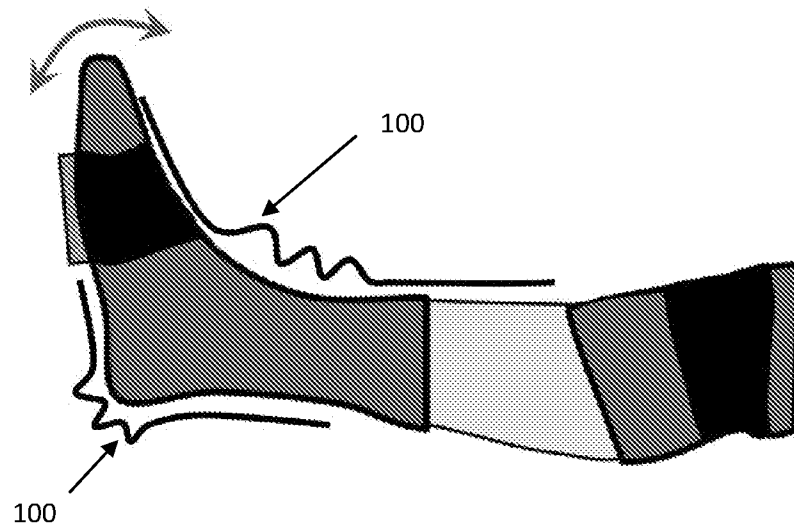


Figure 29b

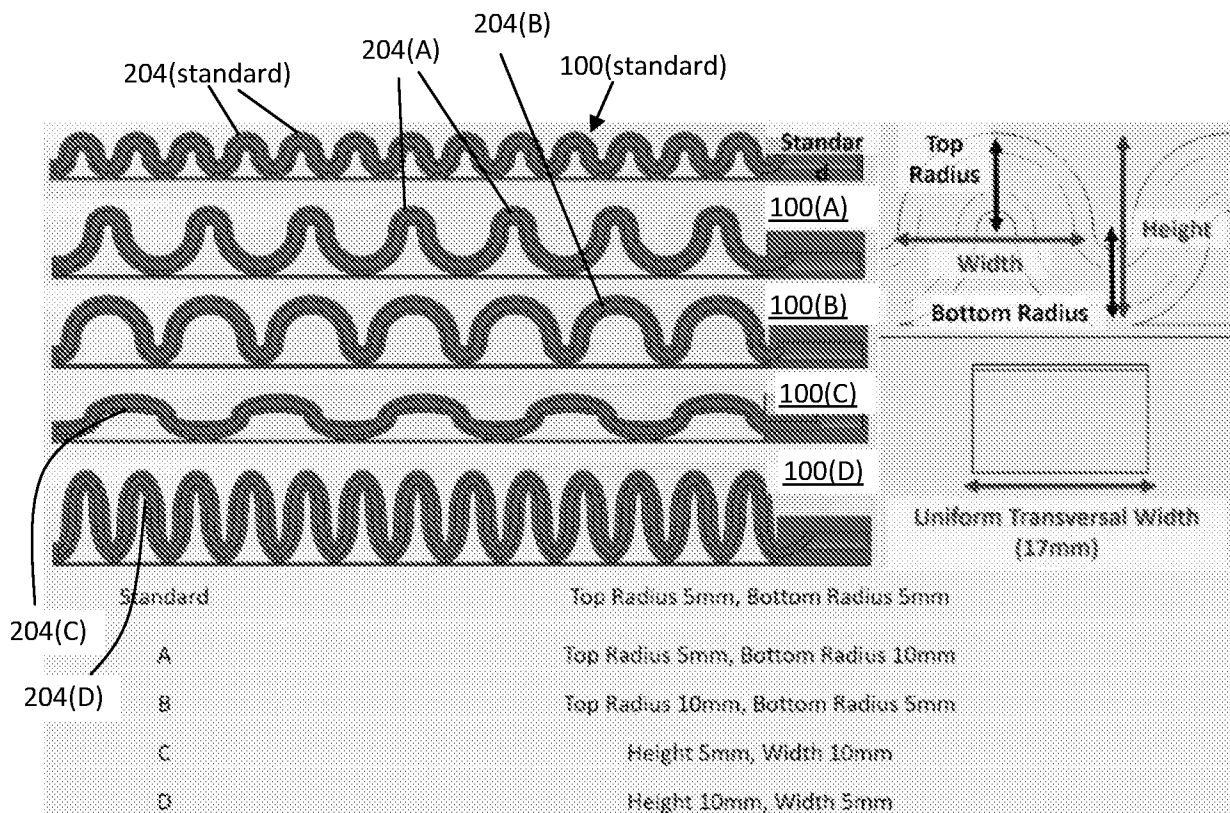


Figure 30

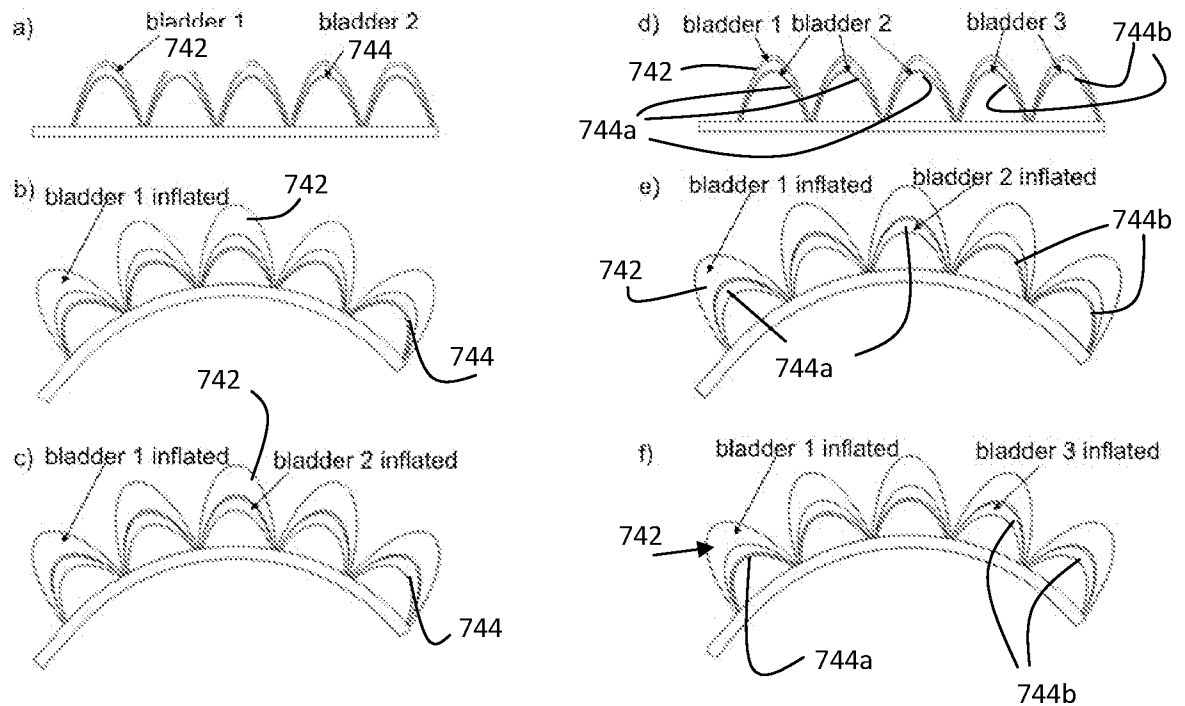
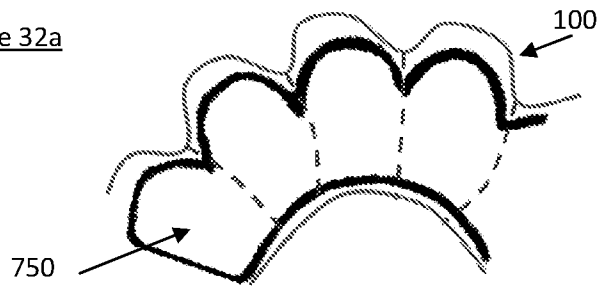


Figure 31

Enhanced Uniform Bending & Force

Figure 32a



Enhanced Distal Bending & Force



Figure 32b

Enhanced Central Bending & Force

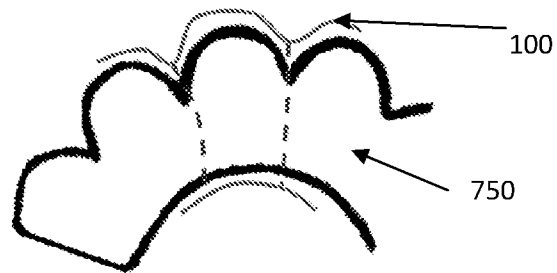


Figure 32c

Figure 33a



Front View

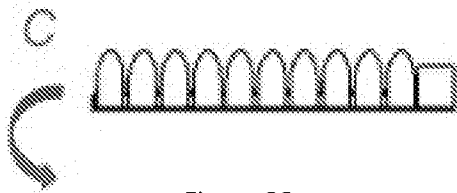


Figure 33c

Side View

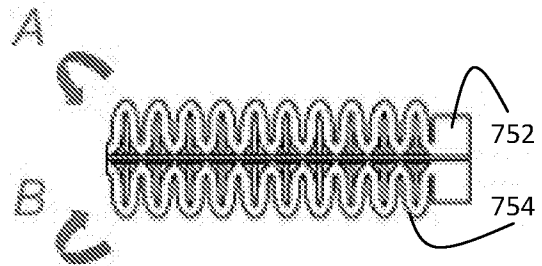


Figure 33b

Bottom View

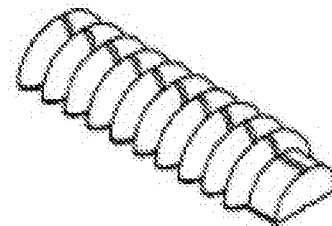


Figure 33d

Isometric View

Multi-directional Bending

Inflate A → Bend in A direction

Inflate B → Bend in B direction

Inflate A&B → Bend in C direction

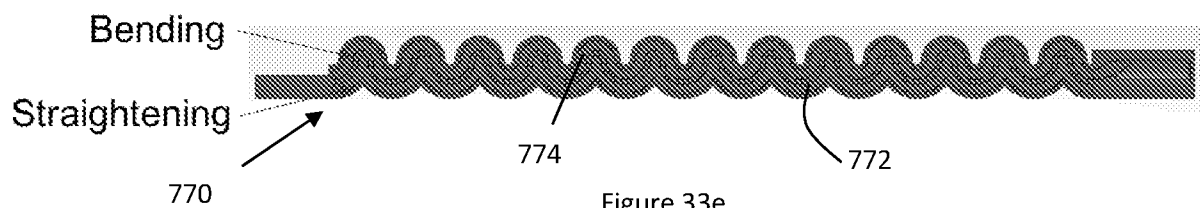


Figure 33e

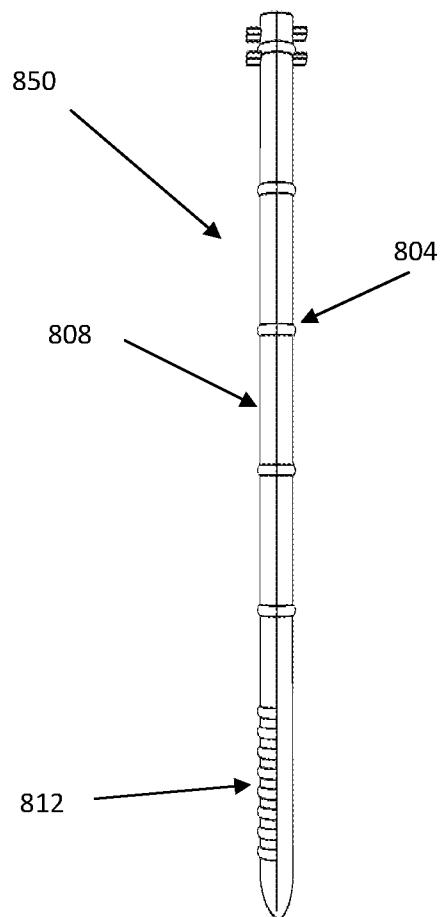
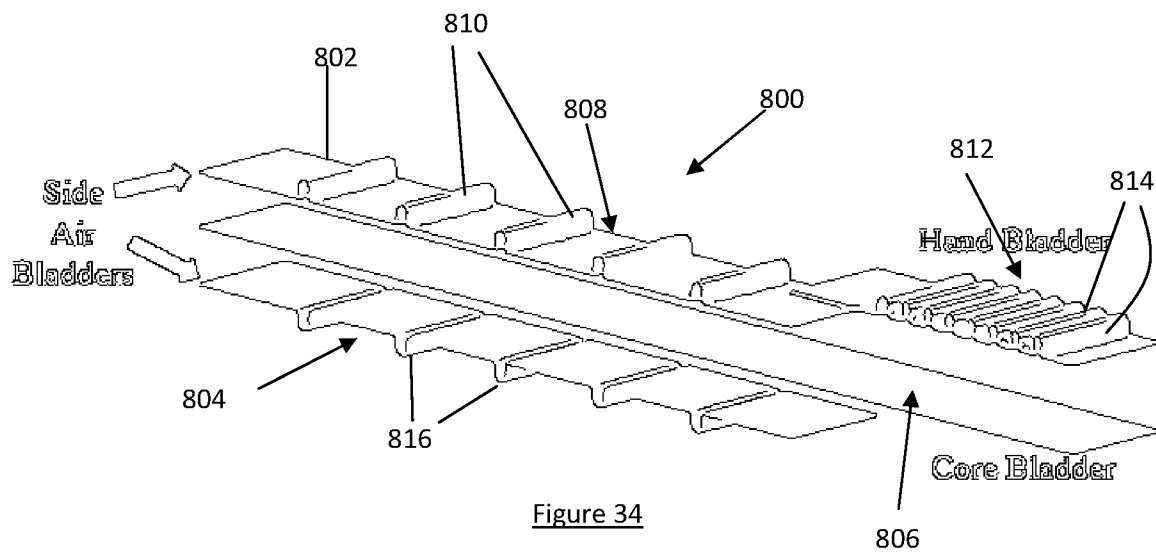




Figure 36a

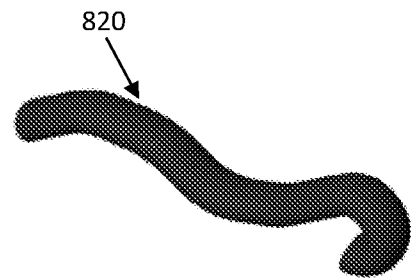


Figure 36b

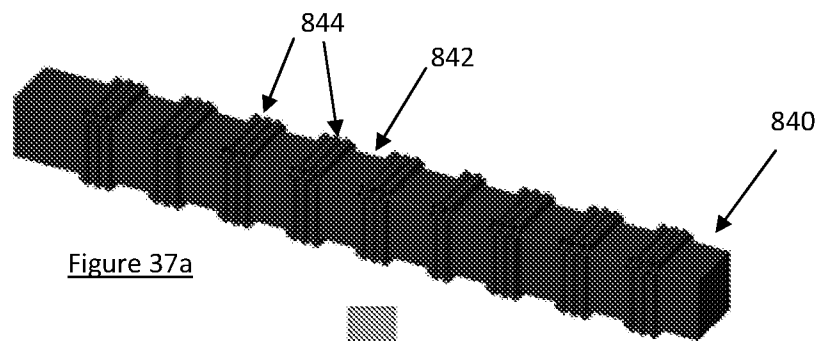


Figure 37a

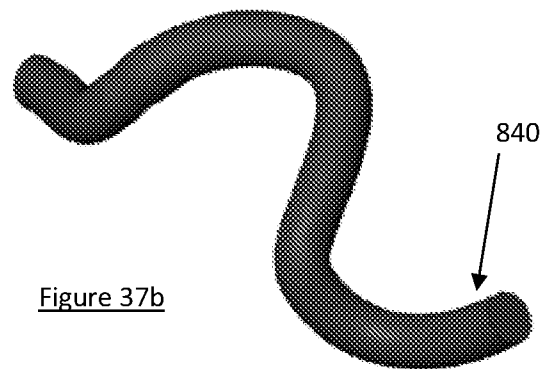
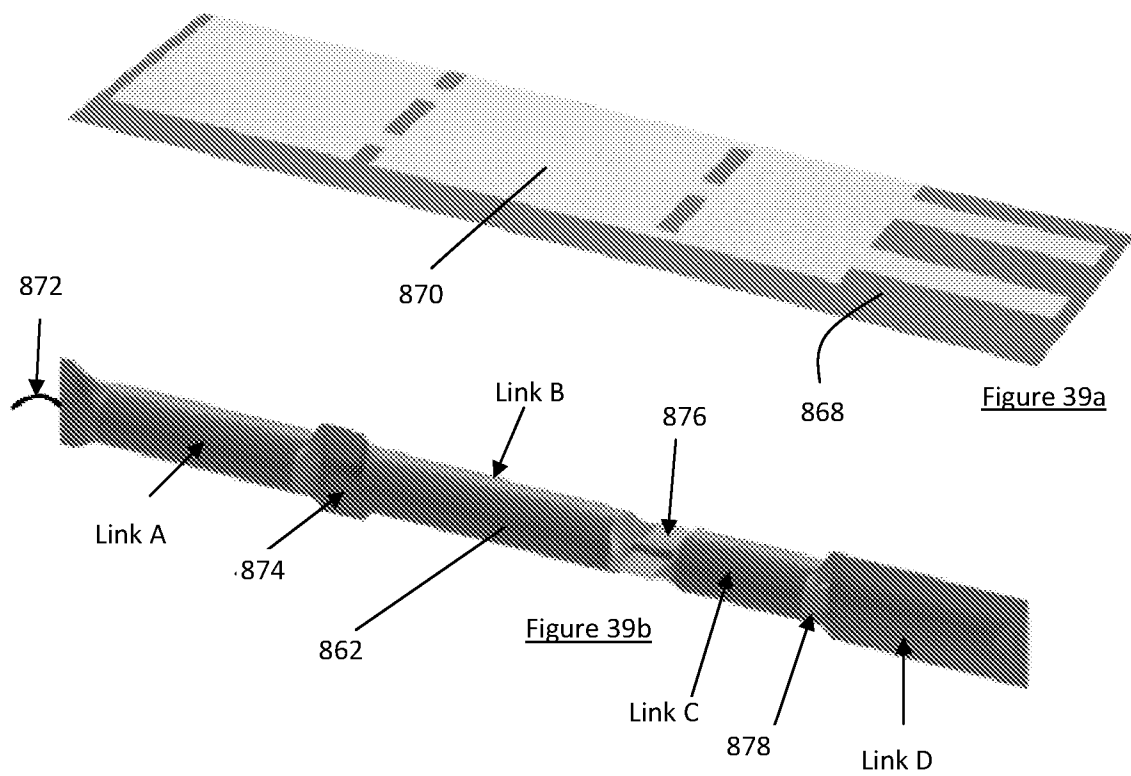
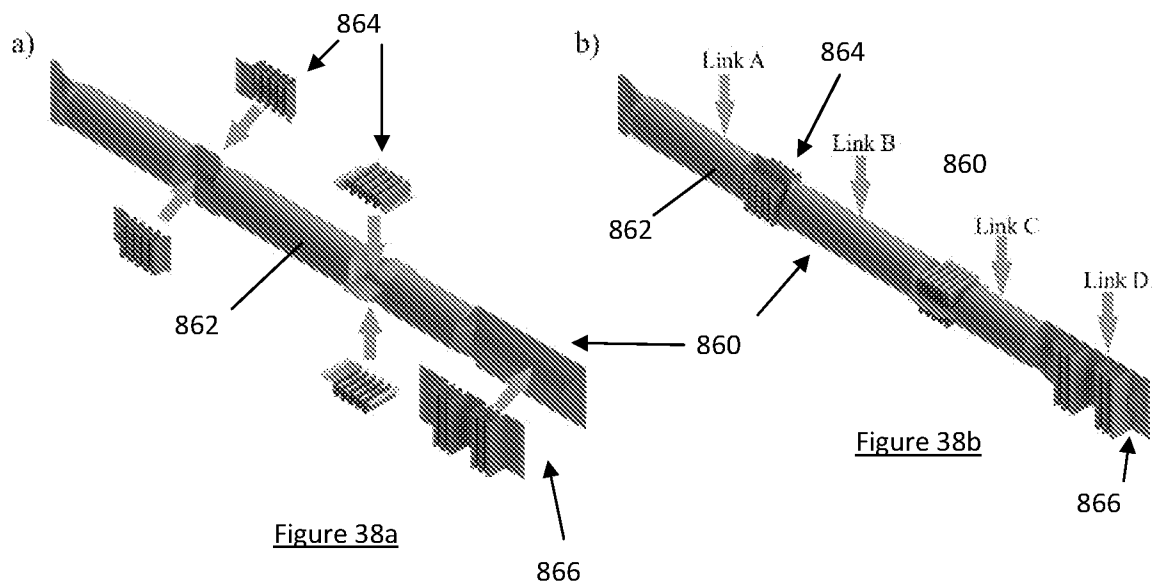


Figure 37b



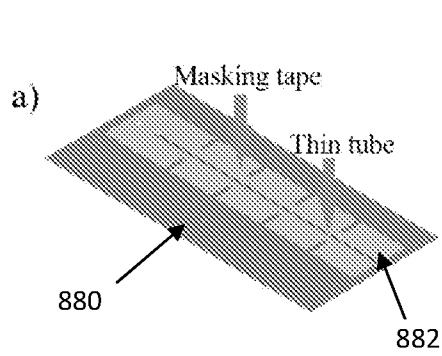


Figure 40a

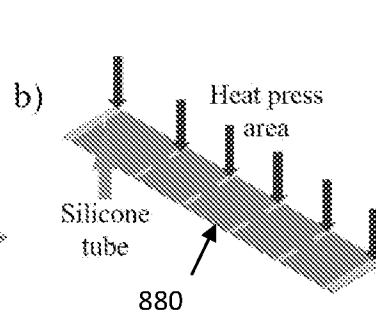


Figure 40b

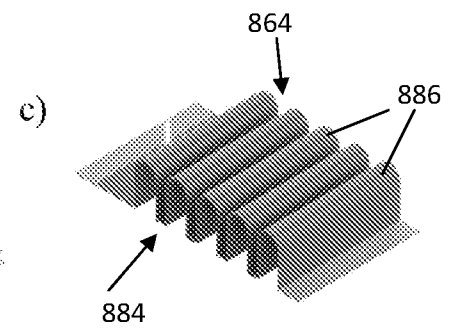


Figure 40c

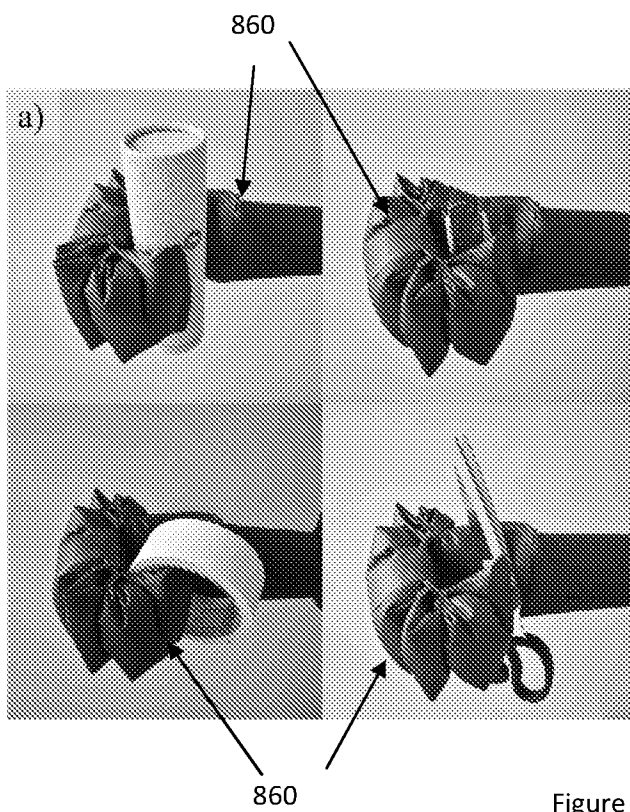
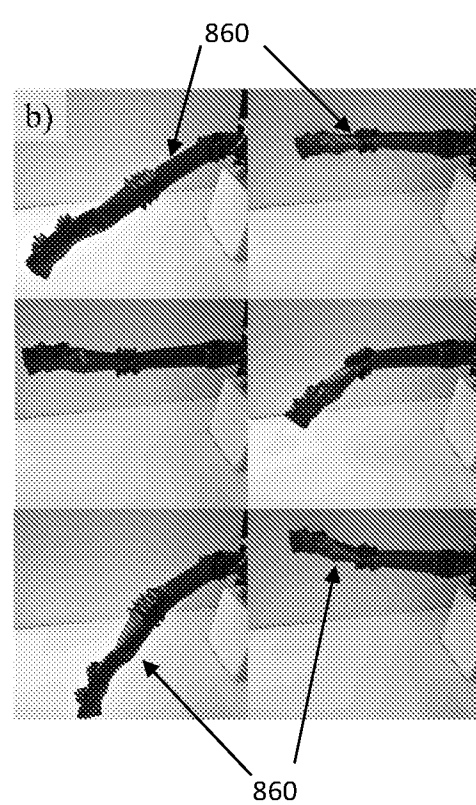


Figure 41



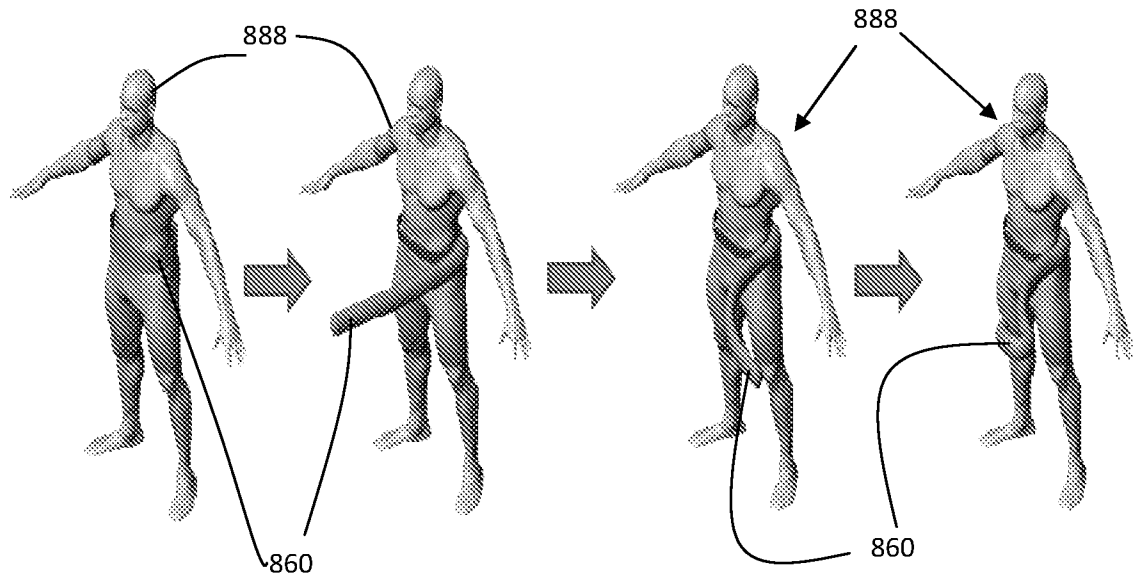


Figure 42

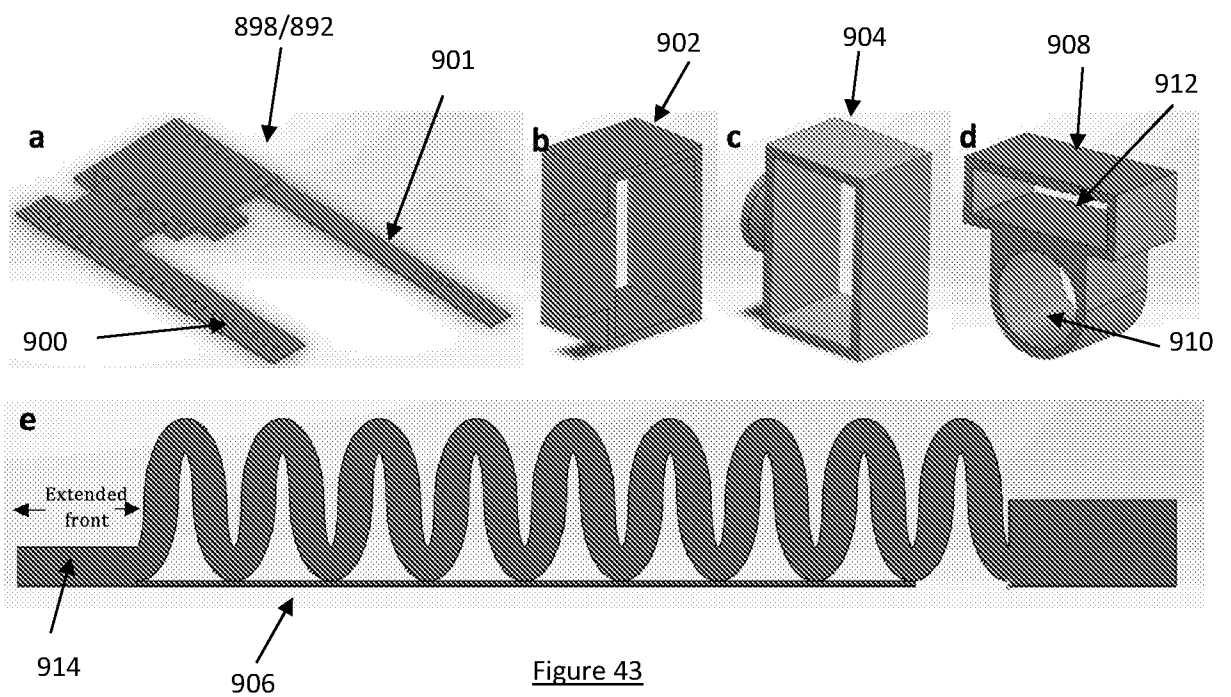
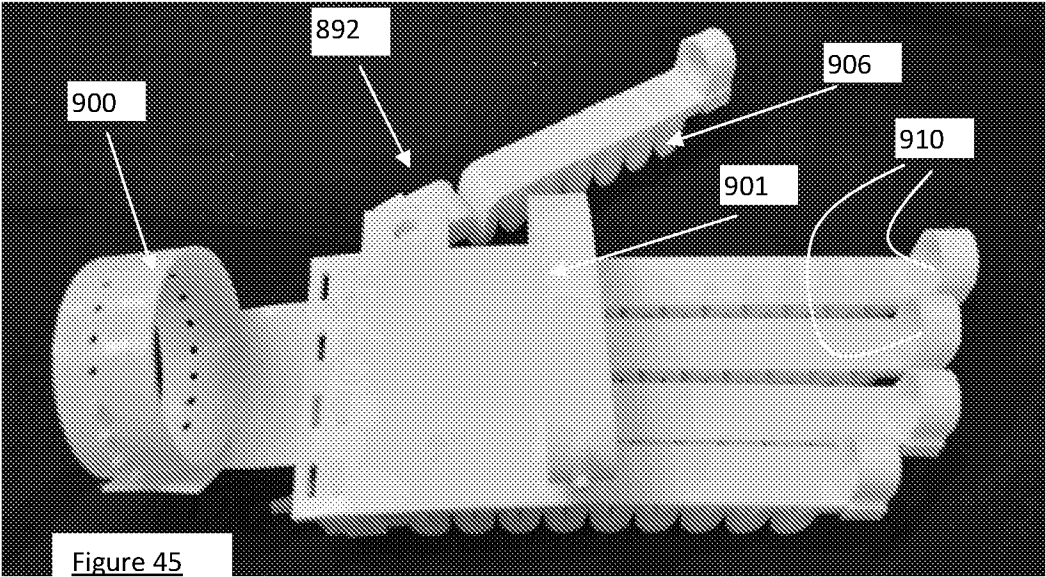
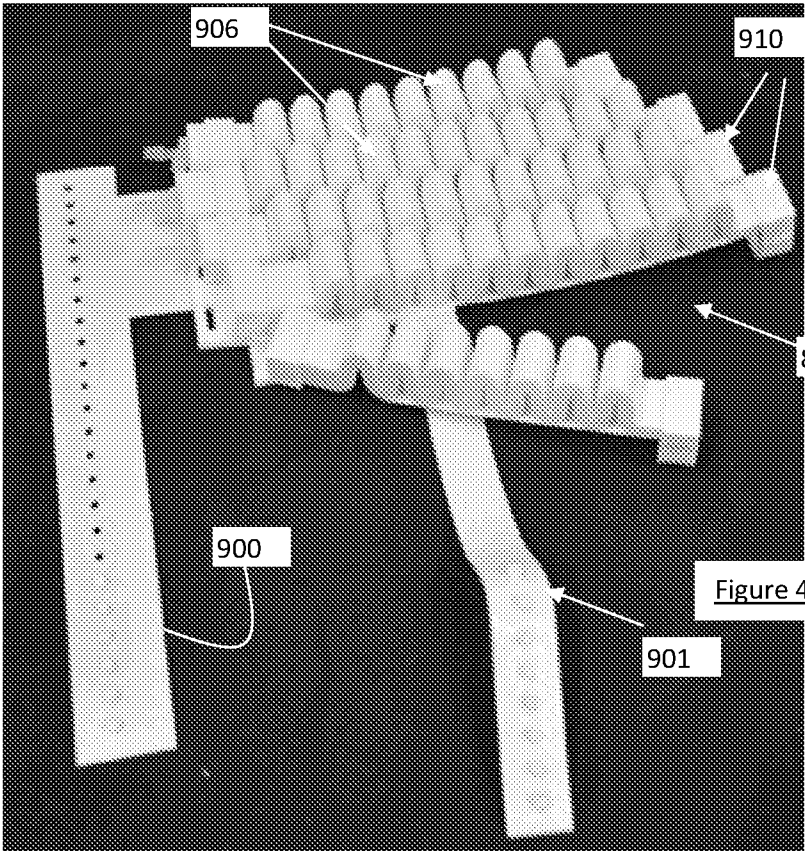


Figure 43



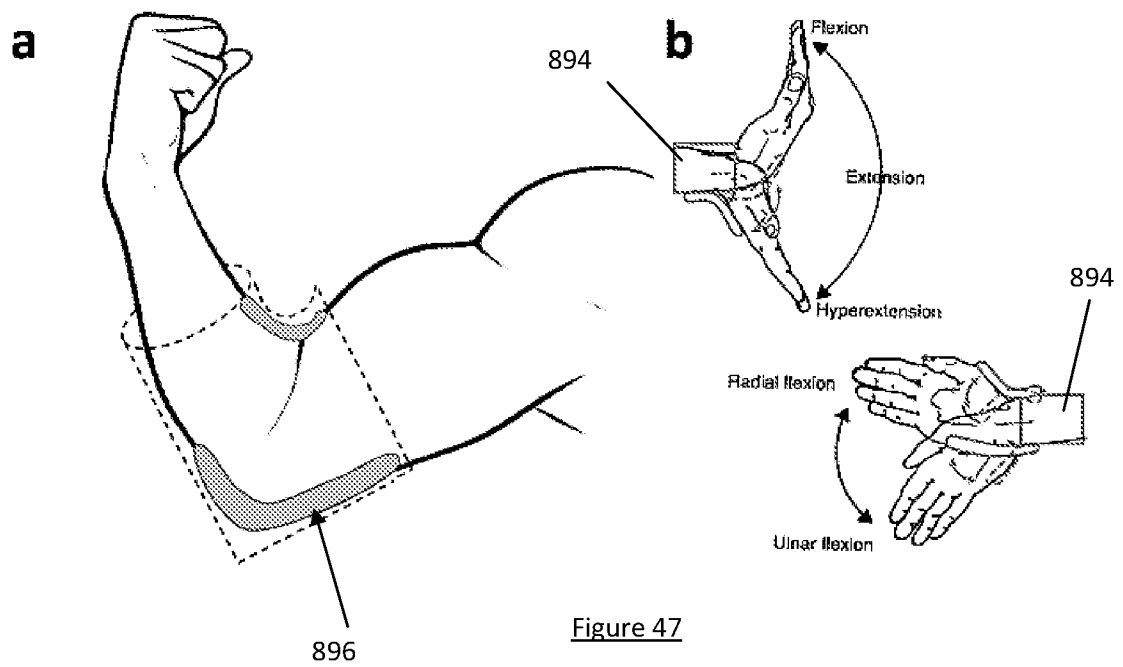
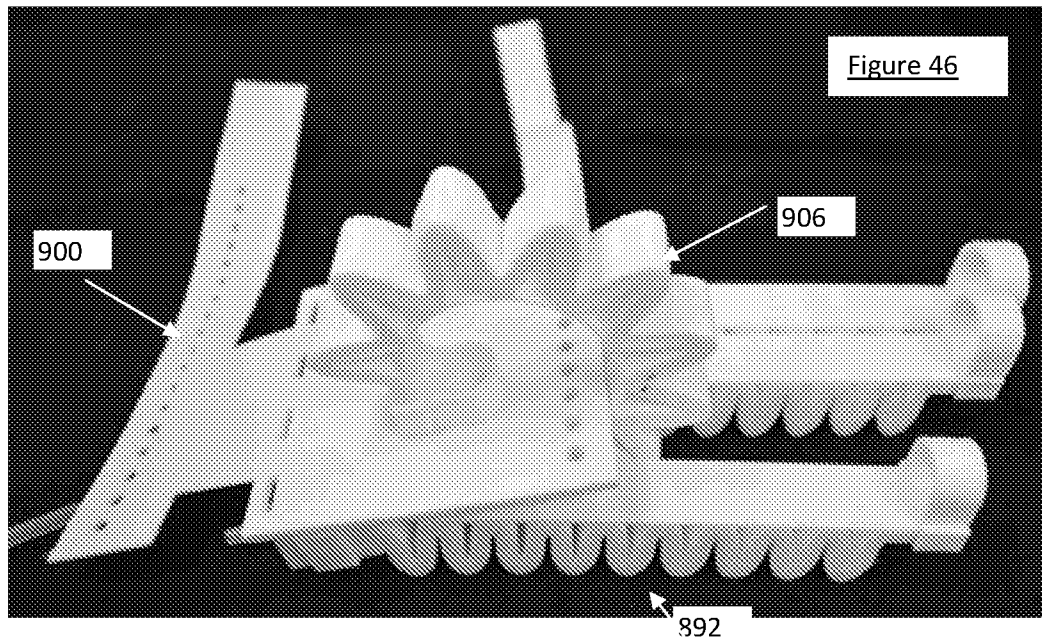


Figure 47