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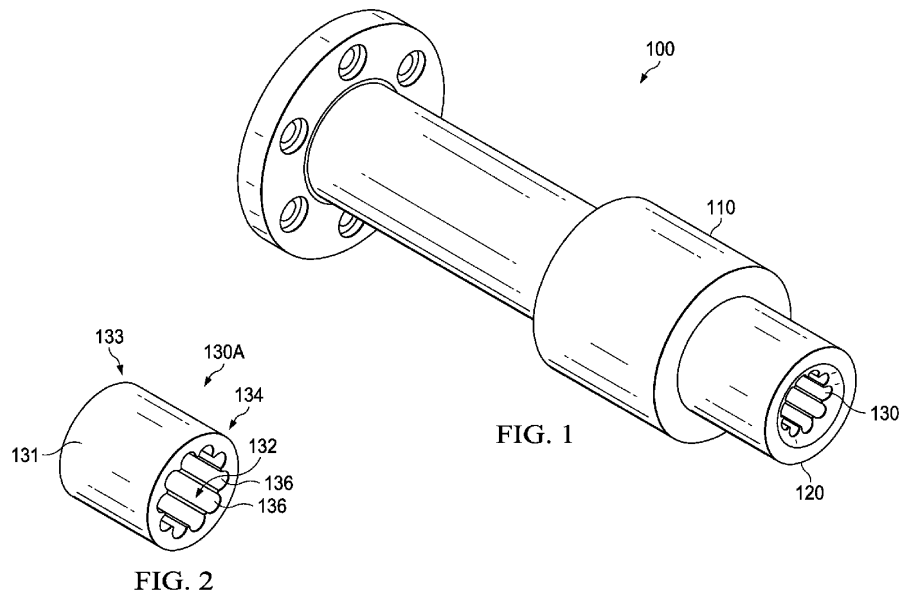
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(57) Abstract: In one embodiment, a system includes a cathode and a thermionic emitter installed at least partially within the cathode tube of the cathode. The thermionic emitter is in a shape of a hollow cylinder. The hollow cylinder includes an outer surface and an unsmooth inner surface. The outer surface is configured to contact an inner surface of the cathode tube. The unsmooth inner surface includes a plurality of structures that provide an increase in surface area over a smooth surface.

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