Lift-n-Lock

Mock-Up Presentations
October 2010
Purple A
Concept

Lift-n-Lock is an assisted-lift oven rack which facilitates bringing a dish from the oven to the countertop.

Targets independently-living wheelchair users.

From oven to counter.
Motivation

Lifting food from the side of the oven is unsafe and compromises strength.
# Product Contract

<table>
<thead>
<tr>
<th>Customer Needs</th>
<th>Product Attribute</th>
<th>Engineering Specs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Can be easily lifted.</td>
<td>Mechanical Advantage Ratio</td>
<td>At least 1:4</td>
</tr>
<tr>
<td>Fits into existing ovens.</td>
<td>Size</td>
<td>Height: 17&quot; +/- 1.5&quot;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Width: 23.9&quot; +/- 1.7&quot;</td>
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<tr>
<td></td>
<td></td>
<td>Depth: 18.7&quot; +/- 1.1&quot;</td>
</tr>
<tr>
<td>Accommodates different food sizes.</td>
<td>Height Adjustability</td>
<td>Yes</td>
</tr>
<tr>
<td>Accommodates different food weights.</td>
<td>Weight Capacity</td>
<td>2 lb tray of cookies to 30 lb turkey</td>
</tr>
<tr>
<td>Allows for gentle and stable transfer of food.</td>
<td>Vibration</td>
<td>No</td>
</tr>
</tbody>
</table>
Spring/Scissors

Features
Springs store energy to provide an assisted lift.
Two equilibrium points at the top and bottom.
Ratchet/Lever

Mechanical advantage:

\[ F_{\text{applied}} = \frac{F_{\text{weight}} \cdot \text{Ratio}_{\text{gear}}}{\text{Length}_{\text{linkage}} \cdot \text{Length}_{\text{lever}}} \]

Easy and controllable lifting motion.

A lift-n-lock
Conclusions

The vertical motion of the rack translates into a more complicated internal mechanism than expected.

Creating a simple user interface was a challenge.

Space constraints are difficult to accommodate.
Next Steps

Retrofit to existing ovens.

Refine locking mechanism.
   Accessible from both sides of oven.
   Ergonomic handle.

Address possible safety issues.

Identify materials appropriate for an oven.
Thank You