Subject: Triple gear
Posted by henryseg on Tue, 04 Dec 2012 07:03:30 GMT
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In this unusual mechanism three gears mesh together in pairs, and yet they can turn!

If you take three ordinary gears and put them together so that each gear meshes with the other two, then none of the gears can turn because neighbouring gears must turn in opposite directions. Triple gear avoids this problem by having the three "gears" arranged like linked rings - the gears then rotate along skew axes, and the opposite direction rule no longer applies (although see also Oskar van Deventer's Magic Gears for another possible solution).

This is joint work with Saul Schleimer. We were inspired by another of Oskar's designs, his Knotted Gear, which consists of two linked rings that gear with each other, and of course we wondered if it would be possible to do three linked rings!

Youtube video.
Shapeways shop.

File Attachments

1) triple_gear_hand_650.jpg, downloaded 250 times

Subject: Re: Triple gear
Posted by henryseg on Thu, 20 Dec 2012 05:09:21 GMT
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Here's a smaller, less expensive version of Triple Gear. It seems to work pretty well at this scale!

Youtube video.
Shapeways shop.

File Attachments

1) triple_gear_small_hand_650.jpg, downloaded 210 times

Subject: Re: Triple gear

Posted by bartv on Thu, 20 Dec 2012 09:25:15 GMT
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Yes, this is a truly amazing design.

Subject: Re: Triple gear
Posted by henryseg on Thu, 20 Dec 2012 09:26:30 GMT
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Thanks Bart!

Subject: Re: Triple gear
Posted by henryseg on Thu, 27 Dec 2012 09:28:35 GMT
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Here's an animated gif showing how the gears mesh into each other:

File Attachments
1) triple_gear_animation_300x240.gif, downloaded 174 times

Subject: Re: Triple gear
Posted by henryseg on Tue, 01 Jan 2013 05:02:59 GMT
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Many people have wondered if it might be possible to drive the triple gear with some sort of external mechanism. Here is a partial solution...

Subject: Re: Triple gear
Posted by henryseg on Wed, 24 Apr 2013 07:39:09 GMT
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Here is a real solution to the problem of powering the triple gear, using a central helical axle and a baseplate to keep the gears in position. Thanks to Adrian Goldwaser and Stuart Young for prototyping and construction of the motorised base shown in the video. This will be shown in the

art exhibition at the Bridges conference on Mathematics, Music, Art, Architecture, Culture in Enschede, the Netherlands in July.

Youtube video.

Baseplate and axle for Triple gear.
15cm axle for Triple gear.
30cm axle for Triple gear.

File Attachments

1) powered_triple_gear_650.jpg, downloaded 78 times

Subject: Re: Triple gear
Posted by henryseg on Tue, 14 May 2013 14:50:36 GMT
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Here is a paper on the arXiv (an electronic repository for research papers) describing how we designed the Triple gear:

http://arxiv.org/abs/1304.6859