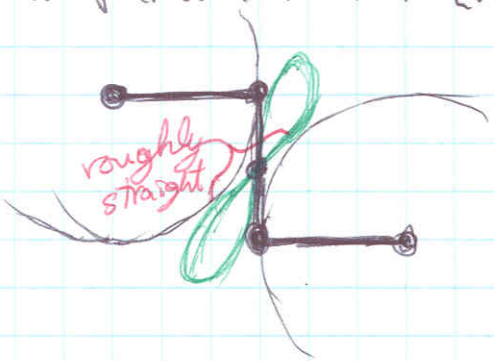
I LINKAGES

6.885
L1.2
Sept. 8, 2004

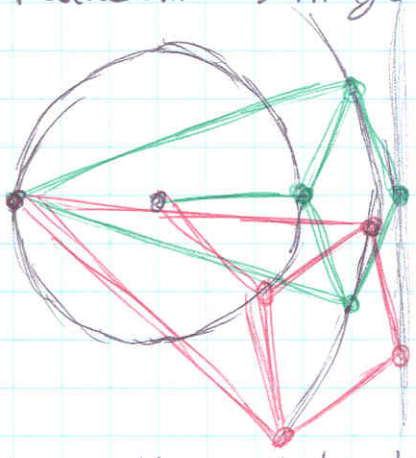
Early motivation: convert circular motion ↔ linear motion
[e.g., steam engine]

Watt parallel motion [1784]



"I am more proud of the parallel motion than of any other mechanical ~~device~~ invention I have ever made."
-Watt

Peaucellier linkage [1864]

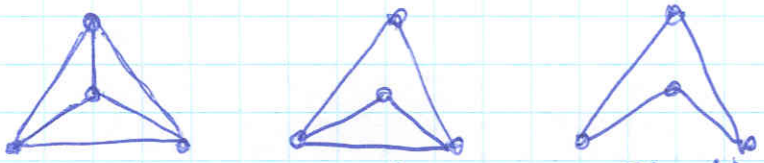


"It was the most beautiful thing I had ever seen in my life" -Lord Kelvin

- see Kempe's *How to Draw a Straight Line* [1877]

Universality (Erik) [Kempe 1876; Kaporich & Millson 2002]
- there is a linkage that "signs your name"
  ↳ traces any polynomial curve
- stronger results about entire topology of motion space

Rigidity: When can a linkage fold at all?



rigid (in 2D & 3D) | rigid in 2D (not 3D) | flexible (in 2D & 3D)

- efficient characterization & algorithms in 2D
- 3D OPEN
- generalization to tensegrities ← bars: fixed length; struts: incr. length; cables: decr. length