Toy Car Workshop

By Elias Black

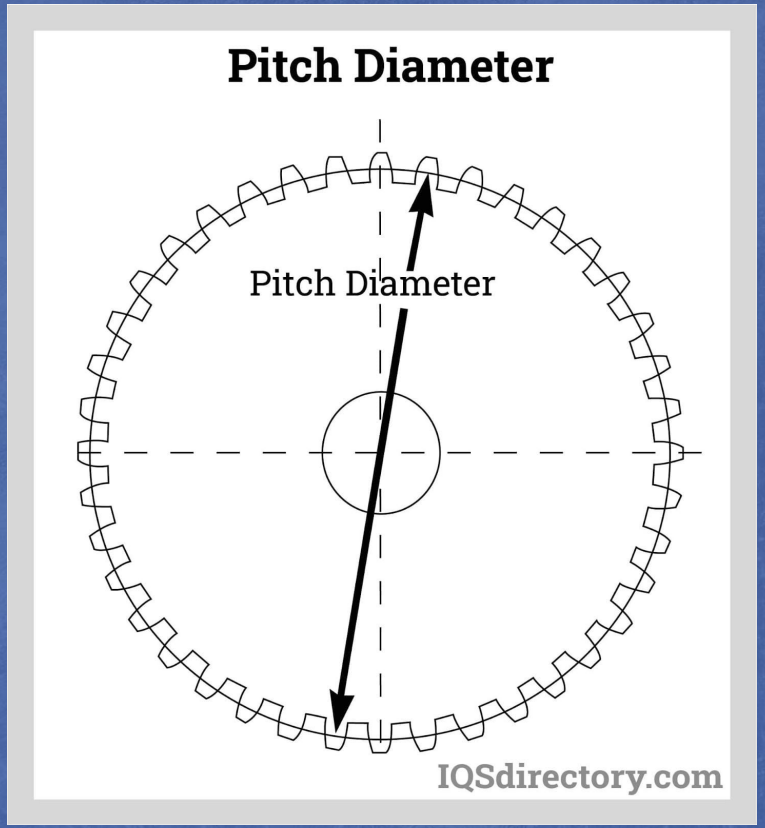
Toy Cars and Gear Ratios

How do Wind Up Toy Cars Work?

How do Gears work?

The basics:

- Gear Pitch Diameter/Modulus
  - Two terms, Imperial and Metric
  - Ratio of the pitch diameter to the number of teeth
  - How gears mesh correctly



The basics:

- Gear Speed
  - n1 and n2 represent the number of teeth of the gears
  - w1 and w2 represent the angular velocities of the gears

$$\text{Gear Ratio} = \frac{\omega_1}{\omega_2} = \frac{n_1}{n_2} = \frac{d_2}{d_1} = \frac{T_2}{T_1}$$

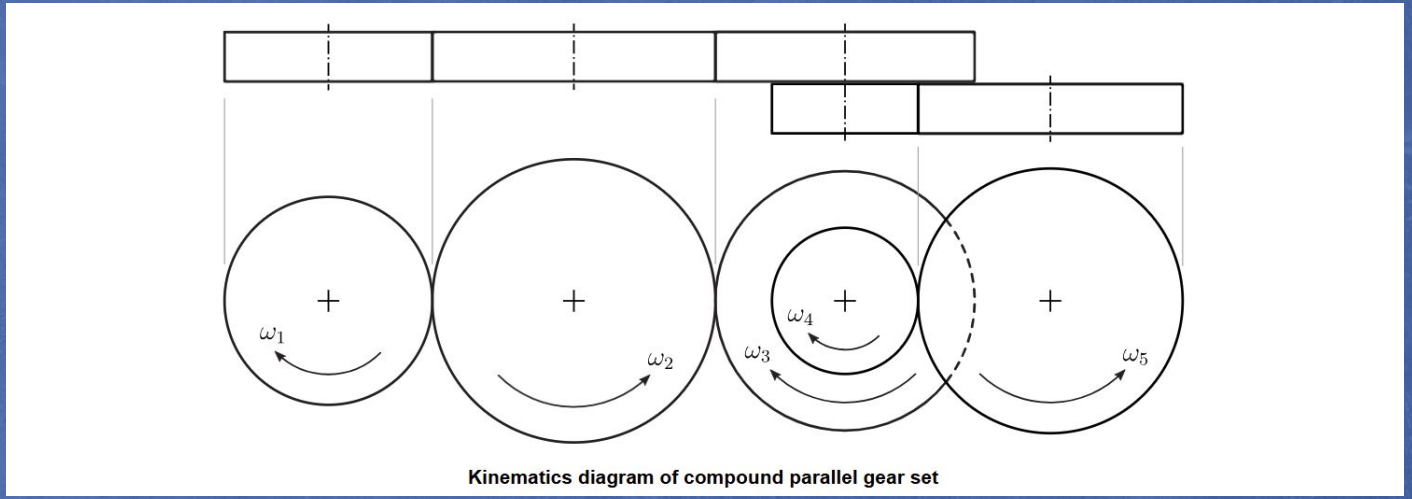
The basics:

- Gear Torque
  - d1 and d2 represent the diameters of the gears pitch circles
  - T1 and T2 represent the torque of the gears

$$\text{Gear Ratio} = \frac{\omega_1}{\omega_2} = \frac{n_1}{n_2} = \frac{d_2}{d_1} = \frac{T_2}{T_1}$$

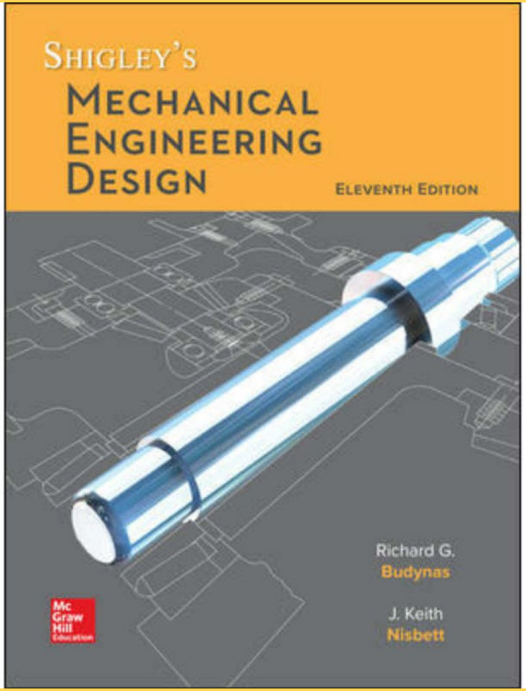
The basics:

- Manipulating Gear Angular Velocities to form Gear Chains



Kinematics diagram of compound parallel gear set

How do Gears really work?



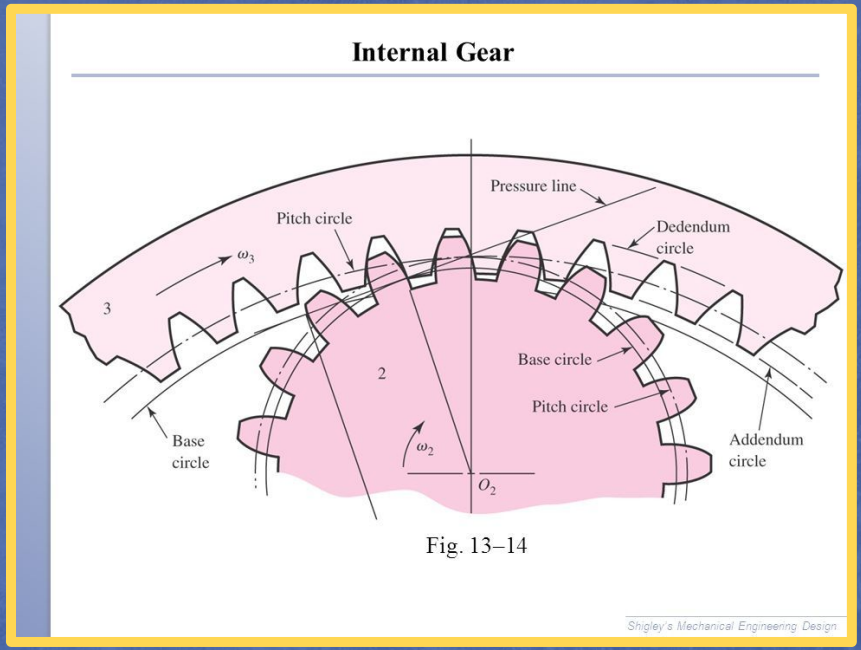
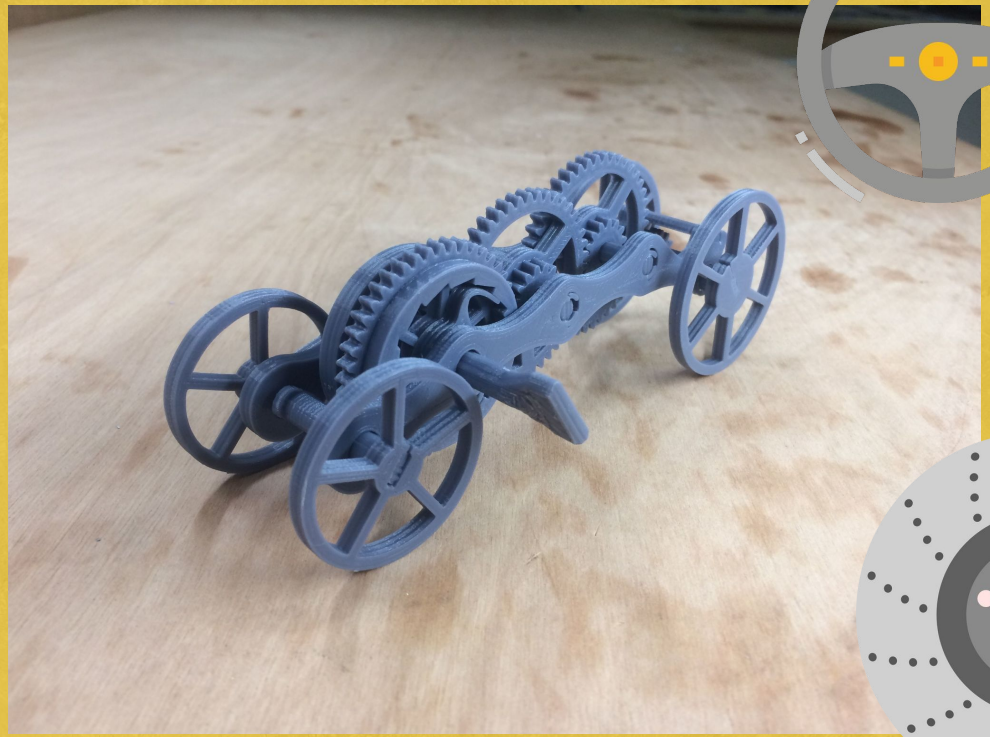
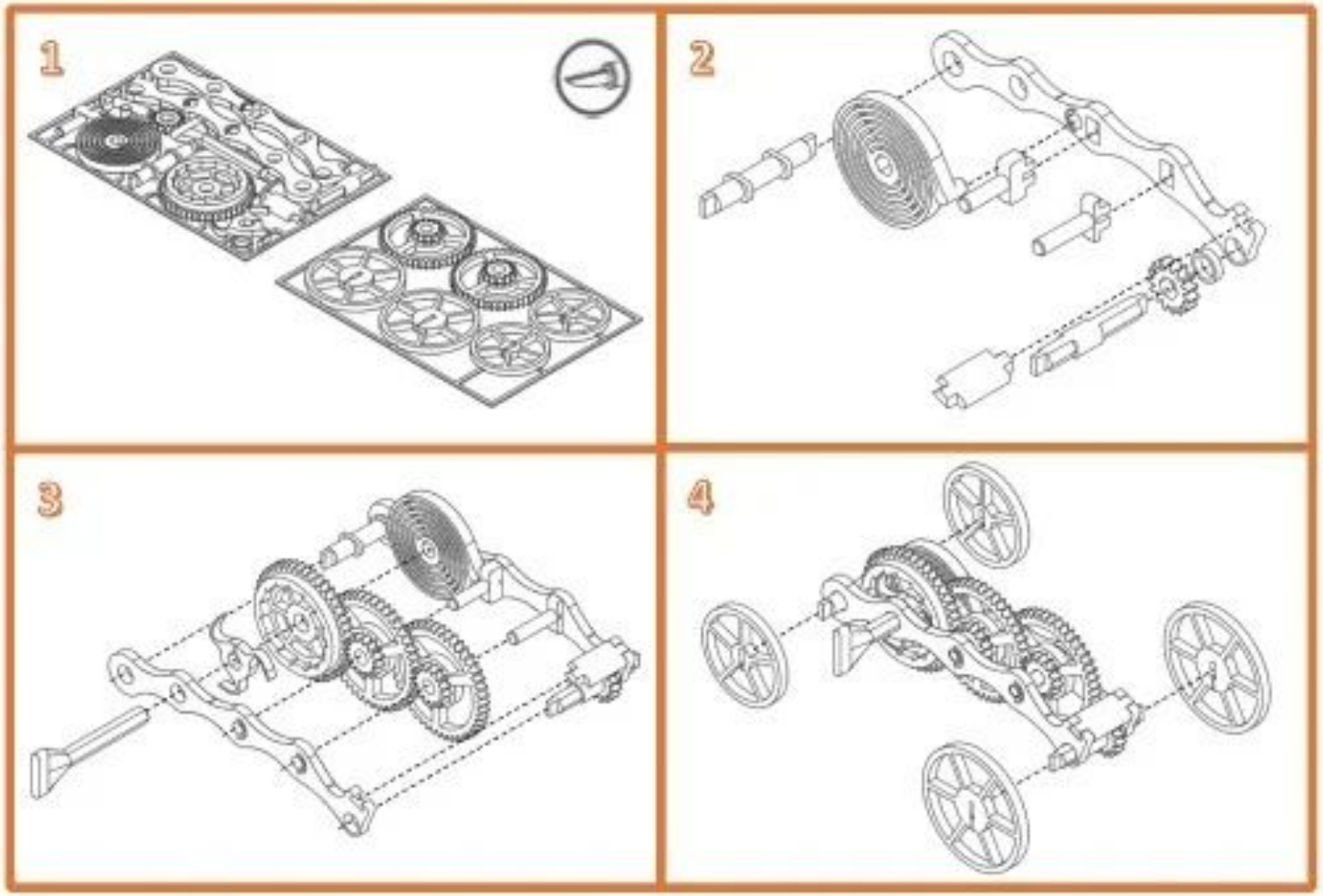


Fig. 13–14

Shigley's



Wind Up Car Instructions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