

ST

Transformations/Links In Class Exercise

1. a) Describe the position of the chain on a bike when it's in its highest gear.
The chain is on its largest gear next to the crank and on the smallest gear on the back wheel.
This gives the highest n_{in}/n_{out} ratio.
 - b) Describe the position of the chain when it's in its lowest gear.
The chain is on its smallest gear next to the crank and on the largest gear on the back wheel.
This gives the lowest n_{in}/n_{out} ratio.
2. Use the table to find the highest 5 gears.

gear		34	24	22	20	18	16	14		
3	48	1.4	2.00	2.18	2.40	2.67	3.00	3.43		3
2	38	1.1	1.58	1.73	1.90	2.11	2.38	2.71		2
1	28	0.8	1.2	1.3	1.4	1.6	1.8	2.0		1
teeth on cranks	teeth on cranks									
		1	2	3	4	5	6	7		

3-7, 3-6, 2-7, 3-5, 3-4

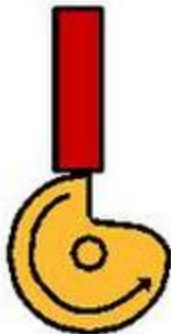
3. a) The wine bottle opener represents what kind of transformation system? rack and pinion
- b) Is the transformation from circular to linear? Why?

pinion= circular motion; rack =linear or translational



4. a) What did they include on the cam to hold it in place? guide
- b) Is the link direct or indirect? indirect

c) In this system, they did not use a teardrop –shaped cam or an off-centered cam. Instead, what did they design?



<http://www.youtube.com/watch?v=UpS8OjdXSow>

d)

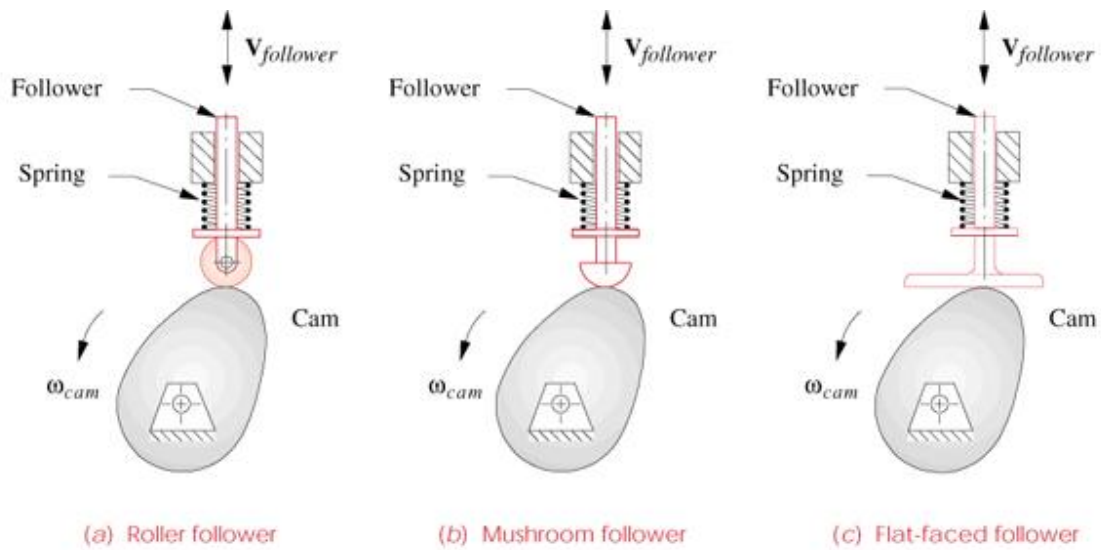


FIGURE 8-3

Three common types of cam followers

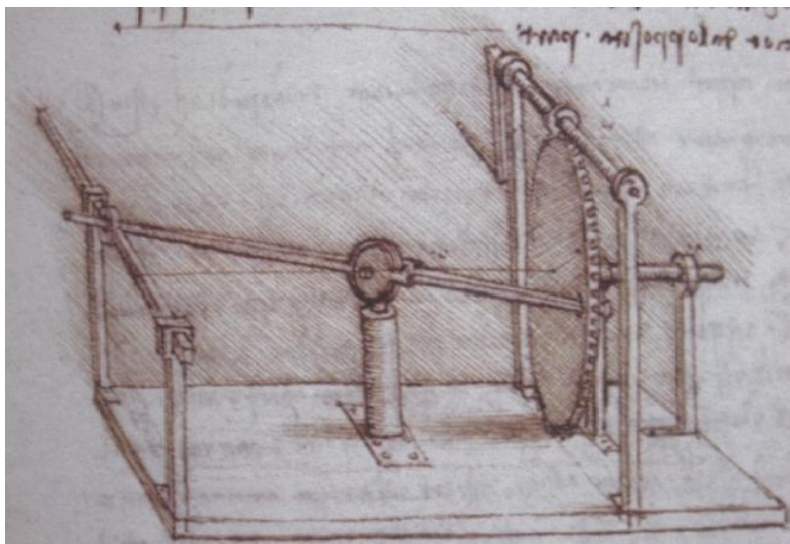
Why are the above links indirect? _____ spring and guide(block) are 3rd and 4th parts _____

What variations have they used for the follower? _____ roller, mushroom and flat tips _____

5. a) Where's the slider in this electric toothbrush? **On the left attached to the toothed crank by the arm (red)**

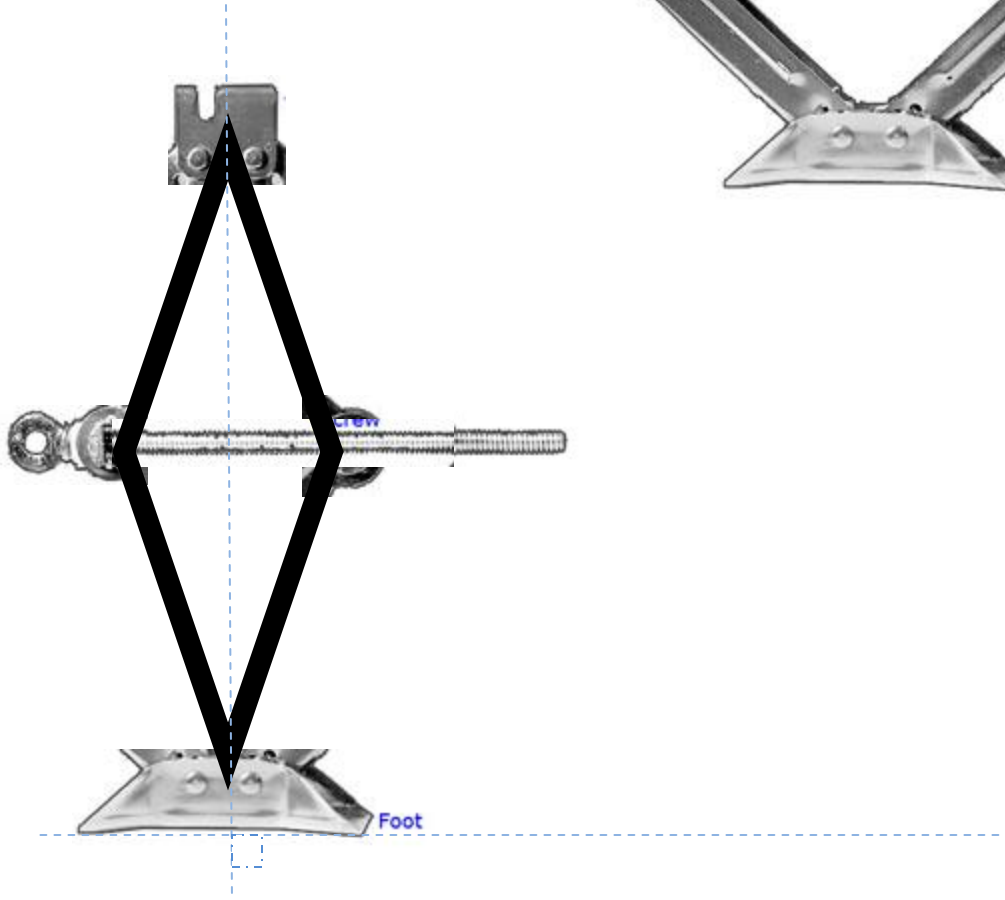
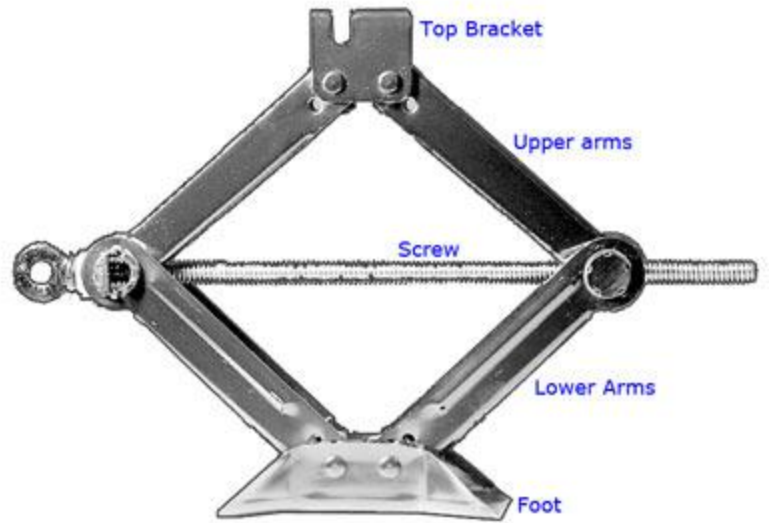
b) What famous artist and inventor came up with this design of a crank-slider mechanism?

Leonardo Da Vinci



6. a) As you turn the screw clockwise on a car jack, what happens to the lower and upper arms?

The gear at the two joints(circles) will raise the top bracket as they will make the following shape:



- b) How do you place the jack so that you don't hurt yourself?

The edge of the grey part has to be in between the lips of the top bracket. And the bracket has to be positioned inside the gap as far from the wheel as possible (see arrow), so that when the car and wheel lift, the pressure of the bracket against the sides will prevent the jack from sliding. It's also important that the jack's vertical line of symmetry is perpendicular to the ground.

