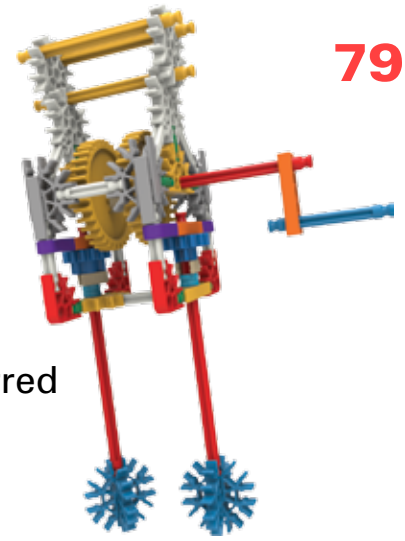
Experiment #3

79318

Using a Crown Gear System on an Eggbeater



Objectives: Observe how rotational motion is transferred from one plane to another using a crown gear system.

Materials You Will Need:

- built **EGGBEATER** model
- paper or notebook

PROCESS:

1. Build the **EGGBEATER** model by following the step-by-step building instructions.
2. **NOTE:** to complete the following experiment, it will be helpful if you have already completed experiment 1 with the Crank Fan.
3. A spur gear system is just one type of gear arrangement. You will now explore the gear mechanism used in an egg beater. The arrangement of gears in an egg beater differs from that used in a crank fan.
4. Looking at your built egg beater model, locate and identify the gear train.
5. Draw a diagram of the egg beater in your notebook, clearly identifying the following parts: crank, driver gear, driven gear and mixing blades. Draw arrows on your diagram to show the direction of motion of each moving part as the crank turns.

6. Investigate the following and record in your notebook:

a. Where is the effort force applied?

b. What type of motion is the input motion (or effort force)?

c. Where does the output motion take place? What type of motion is it?

d. Compare input and output motions. How are these motions the same? How are these motions different?

e. Observe and describe the motion of each moving part. Is the part rotating in a vertical plane or a horizontal plane?

f. Try to identify where the motion changes from moving in a vertical (up and down plane to moving in a horizontal (or flat) plane.

g. How can you control the speed of the output movement?

h. Will the mechanism be easier to turn without the crank handle?

7. Does this gear system increase speed or change direction of motion? Record your observation in your notebook.

8. You have been exploring a crown gear system. Notice how the yellow gears have teeth that are set at 90-degrees to the surface of the gear. If you look at it from the side, it resembles a crown. These teeth mesh with those on the rim of a second gear to give a 90-degree change in direction.

9. Let's review the way in which energy is transferred from one plane to another (or through 90-degrees) using a crown gear. Respond to the following in your notebook:

a. Where is the effort applied?

b. What type of movement is the effort?

c. Why does the driver gear turn?

d. What name is given to this particular driver gear?

e. Does the driver gear lie in a vertical or horizontal position?

f. How is the position of the driven gear different from that of the driver?

g. How does the driver transfer energy to the driven gear?

h. Where is the output motion produced?

i. What type of output motion is it?

10. A crown gear system helps do work by changing the direction of motion. This means that the effort force can be applied in the direction that is easiest and have the work take place in a different direction.