

## THE SPINNING CAN

*Source: Physics Teacher Greg Potratz, Modified for the EAA*

### Concepts Illustrated:

- (1) Newton's 3<sup>rd</sup> Law
- (2) Torque and rotational dynamics

**Time Requirements:** 10 minutes

**Grade Level of Audience:** This qualitative demonstration is best suited for students in grades 9-12.

### **I. Materials and Equipment Utilized**

1. An empty aluminum soda can
2. Mono-filament fishing line
3. Small swivel hook (found in fishing supply area)
4. Metal punch or awl.
5. Duct tape.

### **II. Description of Set-up and/or Construction of Apparatus**

1. Measure up about 1" from the bottom of the aluminum soda can.
2. Using the awl, carefully punch four, equally spaced, holes 1" above the bottom of the can.
3. Using the awl, carefully twist the holes so they all are facing somewhat tangentially in the same direction (as opposed to pointing radially outward).
4. Connect the ends of four, 6" pieces of mono-filament fishing to the top of the aluminum soda can using duct tape. Space out the connections equidistant around the top of the can.
5. Connect the other ends of the 6" pieces of mono-filament fishing line to each other and to one side of a swivel hook.
6. Attach the other side of the swivel hook to another piece of mono-filament fishing line that may be held or supported by another structure.



### III. Details of Student Implementation

1. With the four holes covered, fill the can with water. Remove the covering from the four holes and allow the can to move. Have students discuss the and interpret their observations.



**The photograph shows the can spinning, based on the blurred image of the can.**

2. The general idea being demonstrated is that the can pushes the water tangentially away from the can. According to Newton's 3<sup>rd</sup> Law, the water must push tangentially IN THE OPPOSITE direction on the can. The resulting twisting force which occurs due to the force being applied at 90° to a line drawn from the axis of rotation to point of application is referred to as a torque. All four holes produce torques in the same direction, resulting in the initiation of rotational motion. Torques are considered to be either clockwise or counter clockwise.