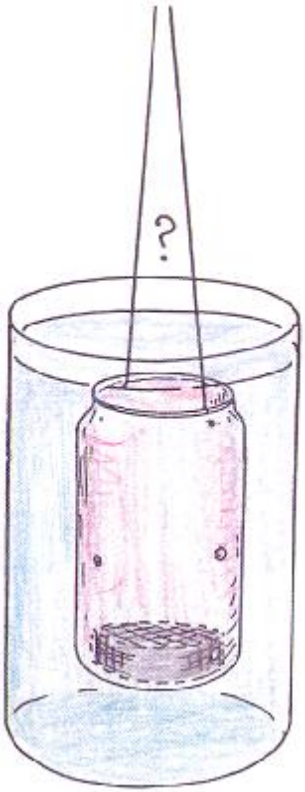
NEXT-TIME QUESTION

With a nail poke 4 holes in an aluminum pop can as shown. In each hole bend the nail sideways and dent the holes so that when water is put in the can it will spurt out with a tangential component. Suspend the can with strings and watch it rotate as water spurts from it—noting its direction of rotation. Now empty the can; weigh it down at its bottom so that when you suspend it in water it remains upright as water flows into the holes.



QUESTION: What's the direction of rotation?

a) Same as before.
b) Opposite.
c) Not at all.

thanx to Robert Ehrlich and Peter Hopkinson

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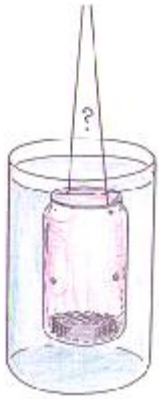

QUESTION: What's the direction of rotation?

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b) Opposite.
c) Not at all.

Answer: b

In Case 1, water is pushed radially outward due to pressure difference from inside to outside the can. But on its way out it is deflected by the dented hole and gains a tangential component of velocity. In action-reaction fashion, the water pushes tangentially back on the can, giving it a torque that sets it into rotation. In Case 2, the water is also deflected by the dented hole as it enters the can, but in the opposite direction. This time the water's reaction force on the can gives the can a torque opposite to that of Case 1, rotating the can in the opposite direction. (In Case 1, the can, once set rotating, slows down gradually because very little friction acts on it. In Case 2, friction of the swirling water with the inside surface of the can applies a torque that slows the rotation more quickly.)

Can you see that angular momentum is conserved in both cases? And wouldn't Feynman have loved this simple demo of the inverse lawn sprinkler that he pondered for years.

Be sure to DO this one!

There's usually more than one good explanation in physics. What others can you think of? How stimulating it is to figure physics!

CONCEPTUAL Physics

ARBOR SCIENTIFIC
TOOLS THAT TEACH.

Hewitt Drew it!