How To Build And Fire A Tennis Ball Cannon

The tennis ball cannon used in the Cannon Lab requires the following materials:
* three empty steel food cans in which a tennis ball will fit snugly (aluminum cans are rounded at the bottom)
* duct tape
* a momentum or collision cart or equivalent
* premium lighter fluid that allows the lighter fluid to be squirted through a hole
* a gas lighter
* tennis balls

Building Directions

One can will form the firing chamber and will be closed on one end and have an opening in the other for the explosion to push on the tennis ball. Two more cans will form the “barrel” of the cannon and will allow the force of the escaping gases to accelerate the ball and keep it straight. We want to find the velocity of the ball as it leaves the cannon. One way of doing that is to allow the cannon to recoil and measure its mass and velocity. Therefore, we will place the cans on a momentum or collision cart so that the cannon can recoil.

The best fit for the tennis ball in the cans will be when the tennis ball fits snugly and can be shaken out but with extreme difficulty.

Following are step by step directions:

1) Cut the tops and bottoms out of two of the cans, making sure that there are no sharp corners remaining
2) Cut a hole about half the diameter of the can in the bottom of the third can – this will be the firing chamber
3) Drill a small hole in the side of the third can near the top of the can which does not have the hole cut in it
4) Tape the cans together securely using the duct tape making sure that the hole in the third can is pointing out thought the opening in the first two cans
5) Tape the cans securely to the momentum or collision cart. You may need a shim under the cans to keep them from bending in the middle

Firing Directions

1) Squirt a small amount of lighter fluid into the firing chamber through the hole in the third can
2) Shake the cannon to allow the lighter fluid to vaporize and mix with oxygen in the air
3) Position the cannon on a table so that it is horizontal and correctly located
4) Push a tennis ball into the open end and at least one can deep into the cannon using a meter stick
5) DO NOT STAND IN FRONT OF THE CANNON AT ANY TIME
6) Light the firing chamber by bringing a lit gas lighter up to the hole in the third can
7) Be ready to catch the recoiling cannon (it may be pretty fast) before it rolls off of the table and onto the floor.

You may have to tinker with the amount of lighter fluid and how long you allow the fluid to oxygenate. If you over saturate the firing chamber with lighter fluid, you may have to shake out the excess and give the chamber a chance to recover.