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Potato Cannon
First Published by Information Unlimited
Transcribed to the Electronic Media by Swedish Infomania

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The potato cannon is a fun device which is constructed of common materials that can be obtained at almost any hardware store. It uses a common "fuel" and can shoot a potato over 1000 feet. It is not, however, at
toy. It can almost be considered a firearm. Therefore it should be treated
with respect. It should be used by minors only under strict adult supervision. Always wear protective clothing which is available.

I: Materials

A Hardware

1. Four inch PVC pipe (approx. 2 feet)
2. Four inch threaded (female) cleanout
3. Four inch threaded (male) cleanout plug
4. Four inch by four inch coupling
5. Four inch to one inch reducer bushing
6. One inch PVC pipe (approx. 2 feet)
7. Piezo ignitor (the type used on BBQ grills)
8. Two 2 1/2 inch machine screws #10
9. PVC cleaner and glue



CAUTION! Because of an explosion risk, all pipe should be schedule 40!

B Miscellaneous Accessories

1. Drill
2. 1/8 inch drill bit
3. Screwdriver

II: Chamber Assembly

A Materials

1. Four inch PVC pipe (Number 1 on the I:A list)
2. Four inch cleanout (Number 2)
3. Four inch cleanout plug (Number 3)

B Construction

1. With PVC cleaner, clean the inside of the cleanout. :-)
2. Clean approx. four inches of the pipe.

3. Spread an even amount of glue on the clean areas (be liberal, better safe than sorry).
4. Immediately place them together and apply pressure.
5. Allow to dry.

III: Size Reduction

A Materials

1. Chamber
2. Four inch by four inch coupling (Number 4 on the I:A list)
3. Four inch to one inch reducer bushing (Number 5)

B Construction

1. Clean the inside of the coupling
2. Clean the unused portion of the four inch pipe
3. Apply glue
4. Allow to dry
5. Clean the unused portion of the four inch pipe
6. Clean the four inch end of the reducer bushing
7. Apply glue
8. Allow to dry



IV: Barrel Assembly

A Materials

1. One inch pipe (Number 6 on the I:A list)
2. PVC cleaner and glue

B Construction

1. Clean the one inch portion of the reducer bushing
2. Clean two inches of the one inch pipe
3. Apply glue
4. Allow to dry

Now that the actual gun is constructed, it is time for the most important part of the gun. The ignition system. There is alternative ignition systems available, but this piezo system is easy to construct, and is therefore recommended. Any HV source will do, but as always piezo is the smallest and safest. The most important part of the ignition construction process is the correct spark gap. It must be as long as possible, yet it must spark every time. It should be tested before ANY fuel is introduced into the chamber.

V: Ignition system

A Hardware

1. Piezo ignitor (Number 7 on the I:A list)
2. 2 1/2 inch machine screws (Number 8)
3. Drill
4. 1/8 inch drill bit
5. Screwdriver
6. 18 gauge wire

B Construction

1. Run a length of wire, one from each terminal. Use electrical tape to hold in place.
2. In the center of the chamber drill a 1/8 inch hole. Opposite that hole, drill another hole.
3. In each hole, drive a screw.
4. Drive the screws until they meet in the center with approximately a 1/4 inch gap.
5. Solder each wire to the screws.
6. Test the ignition system, and adjust screws accordingly.

Now that the gun is completely built, it is time to load the projectile, and fuel the chamber. Care must be taken when fueling the chamber. Be positive that there are no flames left in the chamber before spraying fuel. Do NOT depress the ignition button while refueling.



VI: Loading

A Projectile Forming

Your projectiles should be pre-formed for convenience and to also keep build-up to a minimum. To make the projectiles, cut a length (about eight inches) of one inch pipe. Firmly press the pipe into a potato. Push the pieces out with a smaller diameter piece of pipe, or a broom handle. After removing the pieces from the pipe, keep them stored in water to keep them from drying out.

B Loading The Cannon

To load the cannon, take one of the pre-cut projectiles, insert it into the top of the barrel. With a broom handle, push the potato to just above the chamber. Be cautious not to push the potato in too far into the barrel.

The gun is now loaded and ready to fire. Before you can fire the gun, we must first discuss the fuel. The fuel found to be the most efficient is diethyl ether, which is bought under the pretense of starting fluid.

VII: Fueling/Firing

To fuel the gun you must first remove the cleanout plug. Then, spray the fuel into the chamber for approximately half a second, if not less. You need to experiment a little here to find the exact fuel/air mixture needed for your particular gun. After spraying the fuel, quickly replace the plug, and make sure it is on good and tight. Aim the gun, depress the ignition switch, and HOLD ON!

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Helpful Hints:

* The barrel may be turned down on a lathe in order to achieve greater accuracy, it will also cut the potato easier thus creating less a mess.

* Be sure not to spray too much fuel into the camber. This will cause improper ignition and can damage the gun permanently.

* Do not allow anyone to stand directly behind the gun while firing as the plug may blow off and create serious injuries.

* The potato cannon is not limited to potatoes alone. Pears, apples and almost any other fruit or vegetable can be used. Think about it, the possibilities are endless.

* Ether is not the only fuel that can be used in the cannon. The original potato cannon used HAIRSPRAY! This was found to cause build-up and premature ignition fouling.

* Please note that the finer the fuel mist, the better the gun will perform.



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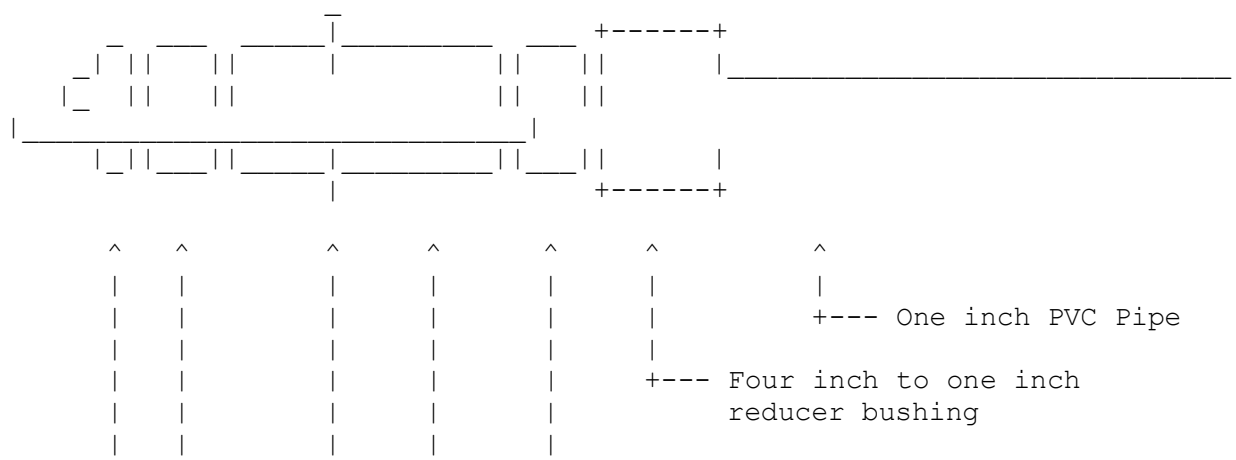
Fig 1:1 Potato Cannon



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      |   |        |     |      +--------- Four inch by four inch
coupling
      |   |        |     |
      |   |        |     +----- Four inch PVC pipe
      |   |        |
      |   |        +---- 2 1/2 Inch machine screws
      |   |
      |   +---- Four inch cleanout
      |
      +---- Four inch cleanout plug.
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You may also imagine a piezo ignitor, and two leads from it to the both screws, it was too hard to draw them in ASCII. (The drawing is not to scale, as you probably understand).

Have fun with this device, and don't aim at innocent people...

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