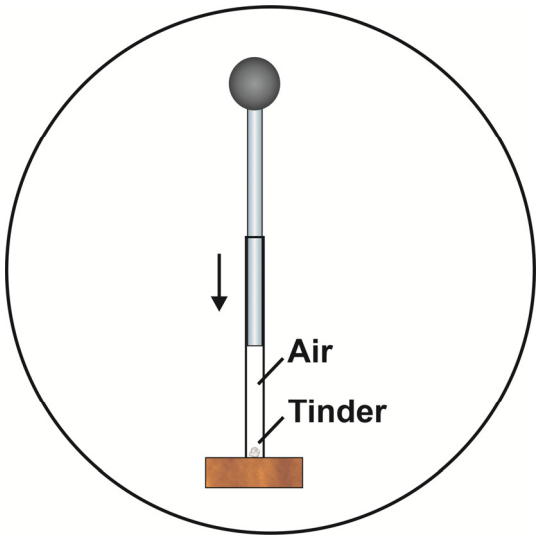
Fire Piston



Equipment:

fire piston consisting of lower piston, cylinder and upper piston
tweezer

Chemicals:

tinder e.g. cotton wool

Safety:

It is recommended to wear safety glasses.

Procedure:

A small piece of tinder e.g. cotton wool is poked with the aid of a tweezer into the hole in the lower piston (the tinder should be teased apart so that the fibers are well separated). Subsequently, the cylinder is placed on the lower piston and the upper piston is pushed a few centimeters into the cylinder. Then, the upper piston is forced vigorously down (the cylinder should not be tilted, otherwise it may break).

Observation:

The piece of tinder ignites with a bright flash.

Explanation:

When a fixed mass of gas such as air is compressed rapidly it becomes glowingly hot (adiabatic compression). (If this compression is not done quickly enough the entropy has time to flow from the hot gas into the cold cylinder walls and the gas cools down.) This effect can be used to ignite a piece of tinder. Thereby, the air in the cylinder acts simultaneously as an oxidizer.

The same principle is utilized in diesel engines to ignite the fuel-air mixture in the cylinders of the engine.

Disposal:

The singed cotton wool can be discarded as household waste.