**Source:** [KBhPHYS201IntroToElectrostaticsLN]

# 1 | **A Van De Graff Generator**

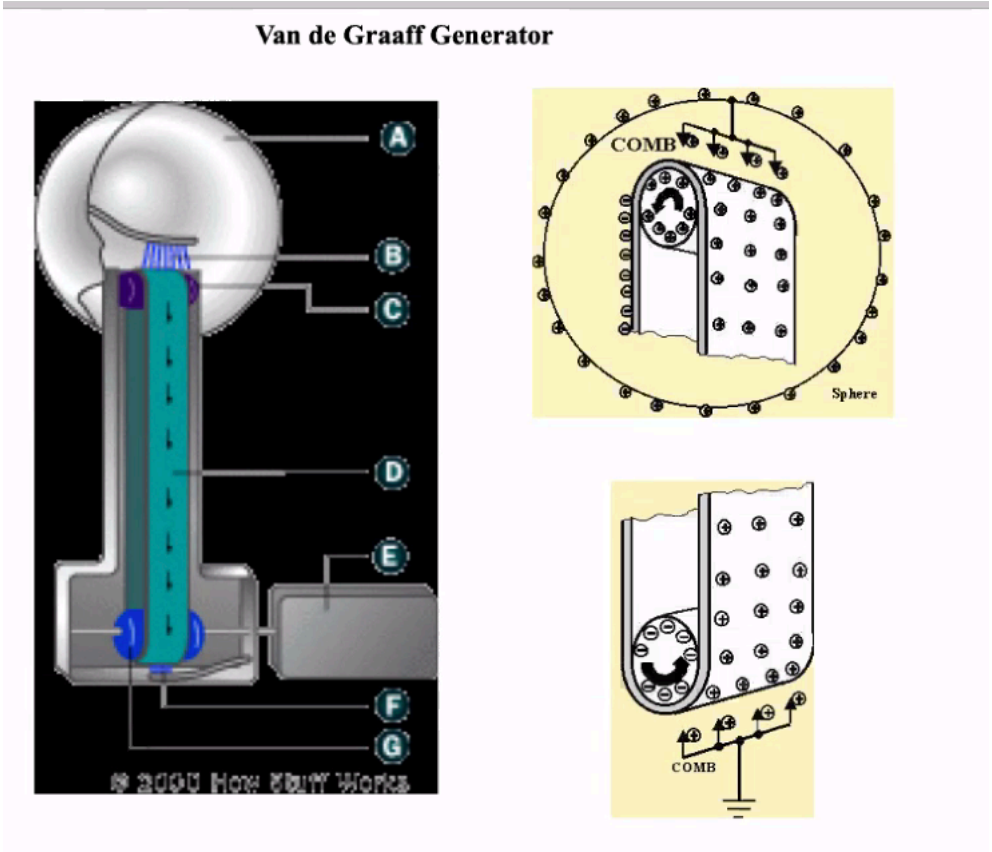


Figure 1: Screen Shot 2020-09-09 at 10.25.51 AM.png

## Basic Procedures

1. User turns crank
2. User brings handle to the globe
3. Electrostatic Bang!

## But, how does it work?

- Cranks connects to a white roller, and next to it some metal teeth
- Roller connnects to transparent belt, and on the other end, under the globe, there is a similar roller
- Metal combs next to rollers
- When cranks are turned, the bottom roller becomes negative, and the top roller becomes positive
- So, electron flow between handle (connected to bottom) and globe (connected to top)

## Why Van de Graff is so exciting

Van de graff generator so exciting because, unlike normal statics, charges are added from the inside (see, wire B from the figure)

- When you add additional changes, because conductor wants to stay 0, the additional charges can't do anything but accept it
- Sphere slightly curved to make up for gaping hole
- Normal door-handle statics would much rater simply eject the added change as their electric field is pointed at one direction against charge introduction

## Why are there sparks through the air?

- One dome that's positive, one dome is negative
- So, what happens when Spark! happens?
    - Enough charge to overcome the electric field resistance [KBhPHYS201Resistance] of air (like 3.4 million Volts/metre), and **air ionizes** — air atoms becomes so attracted that their electrons ditch their nuclei and air suddenly becomes a conductors
    - Neutral air has high resistance, but when it ionizes, the air looses its resistance (drops) and becomes nicely conductive
    - So then, current (Coulomb/s) that flow in the air suddenly spark up because of sudden loss of resistance, discharging the negative dom