Wimshurst Machine

The Wimshurst generator functions by induction. Suppose that one of the conducting pads on the rear disk has a net + charge at the instant that it is opposite a pad on the front disk which is in contact with the cross bar with brushes on the ends. A - charge is induced on the pad on the front disk and a + charge is induced on the diametrically opposite pad on the front disk in contact with the brush on the other end of the cross bar.

As the disks are rotating, these pads on the front disk which get charged up soon are aligned opposite pads on the rear disk which are in contact with the rear cross bar. They in turn induce charge on the pads on the rear disk. It is important that the front and rear cross bars be at nearly right angles for this reason.

As the disks counter rotate, pads on both disks will be charged + when they pass the horizontal bar on one side that has sharp pins attached. Pads on both disks will be charged - when they pass the horizontal bar on the other side. The sharp points produce high electric fields which result in charge collection on the points, + on one side, - on the other side.

These collection points are electrically connected to the spheres on the ends of the moveable rods that create a spark gap. Once the fields on the spheres are large enough to cause ionization of the air in the gap, a discharge takes place. The amount of charge collected to produce the necessary field intensity depends on the capacitance of the spark gap. This capacitance can be greatly increased by connecting Leyden jars across the gap, either by using the small jars built into the apparatus or by attaching the large Leyden jars with conductors.