Wimshurst Machine

Application

This generator is used for absorbing plenty of electric charge and high voltage (more than ten thousand volts) in the experiments of electrostatics and can work with other appliances to do experiments on electric charge distribution on the surface of conductors, electric filed lines, point discharge and vacuum tube discharge. Without other devices, it also can be applied for a series of experiments, such as electrostatic induction, spark discharge, point discharge, capacitance change of capacitors (referring to Leyden jar on the generator), etc.

Characteristics

Conducting layers in the conducing disc of this generator is coated with conducting material characterized by its firmness and long working life. Without the deficiency of aluminum coating which is easily peeled off, this material improves the electrical properties and can work normally in the damp or rainy circumstance.

Structure

Structure (Figure 1) 1. housing 2. Leyden jar 3. support 4. insulation handle of discharge tongs 5. electricity-collecting mast (current) 6. discharge tongs 7. conducting layer 8. neutralizing brush (induction brush) 9. electric brush mast 10. upper shaft and upper shaft screw 11. Leyden jar cap 12. conduction spring 13. band wheel 14. connection piece

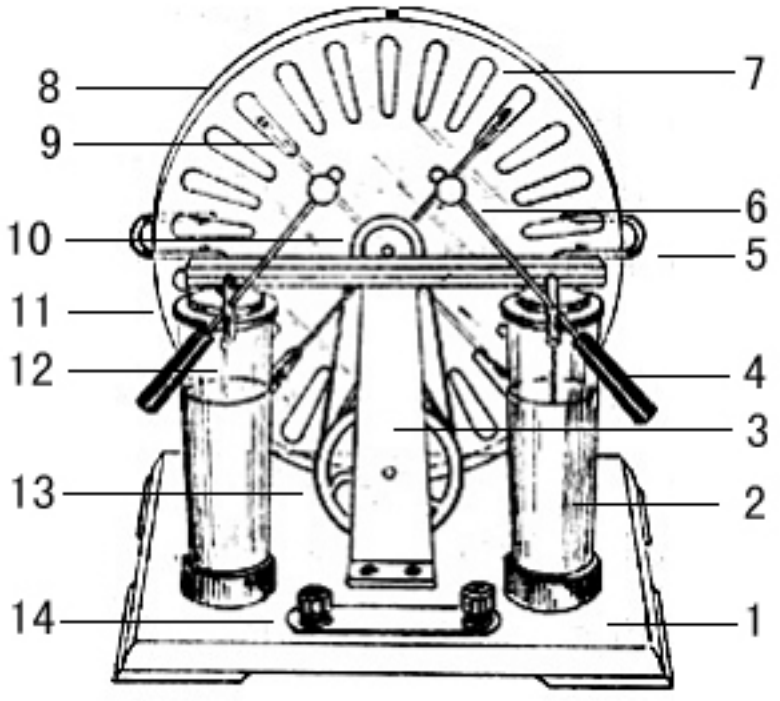

Figure (1)

Operation and Exclusion of Faults

When using the generator, make sure the surface is clean and dry, or it will be difficult for charging. Soft brushes or cloth can be used for cleaning the surface of the generator. It is usually dry, but after being in humid environment or dampened, the generator shall be exposed to sunshine or cleaned with dry dishcloth.

Due to high temperature inside in winter, when moving the generator into the room with many people in, plenty of hydrosphere generated by breath will often adhere to the surface of the generator, leading to the failure of experiments. In addition, if alcoholic lamps or gas lamps are used in previous classes, which may produce a great deal of carbon dioxide, it will make negative effect on charging. In such circumstances, open doors and windows so that dirty air can be expelled and fresh air comes in.

Sometimes, the poor contact between the neutralizing brush and conducting layers may lead to the failure of charging. So check it frequently, ensure the effective contact and replace worn-out brushes. When the relative positions for the installation of the neutralizing brush and the electricity-collecting mask is reverse, charging is impossible. the spinner handle is in front and belts are crossed behind. The brushes shall lean to the top left and

bottom right, being 45ºangel with the vertical line. The bushes in front and behind shall be crossed in right angel.

Occasionally, the generator can not be electrified even in normal operation. It is better to use another generator which can work normally. The discharging ball of the second generator shall point to the electricity-collecting mast of the first generator. Then spin both of generators simultaneously, which will electrify the generators, for the conducting layers on the electrophorus has been electrophorus. (If there is no other generators, use the ebonite rod which should be rubbed first to electrify some conducting layers on the electrophorus.)

After it is finished, make two discharging balls contact to neutralize positive and negative charge. But please note: after two discharging balls contact, do not spin handles lest all positive and negative charge in all conducting layers is neutralized. In that case, the above-mentioned method has to be applied again for electrifying the generator.

If conducting layers outside two electricity-filling containers are linked by connection pieces, discharge sparks produced will be bright, and the interval between two times of discharge will be extended. This is because the total capacitance of Leyden jars will increase. If connection pieces are pulled towards outside, the capacitance will be relatively reduced, and discharge sparks produced will be small with the interval between two times of discharge shortened. So it is easy to understand changes of capacitance.

When operating the generator, the spinning speed shall be increased gradually. But it shall not be too fast, or it will affect the contact between the neutralizing brush and conducting layers. When spinning is too fast, electrification will fail. Anther effect caused by fast spinning is that the electrophorus will get broken easily. Slow down the speed when stopping spinning. Loosen the handle and let it rotate by means of friction effect. Otherwise, the electrophorus will be loosened and disconnected with driving shafts due to the inertia of the rotating electrophorus.

When there are extra points at the electrophorus metal part (e.g. at the time of assembly or disassembly), the maximum distance of discharge spark will be affected. At normal starting-up, there is noise like “chi-chi”. If the generator is checked in a dark room, it is easy to find out these points from the slim discharge spark beam. Eliminate these points, discharge performance will be recovered.

For further understanding of the generator, observing it in a dark room is a good way. In the dark room, it is clear to see the effect of the neutralizing brush and electricity-collecting masts on which the discharge phenomenon also can be observed distinctly.

Separate discharge balls in the dark room, and spin the generator slowly where the spark beam can be seen at a ball. The experiment testifies that this ball is with positive electricity and the other ball showing purple lighting is with negative electricity.

When adjusting the position of discharging balls, it shall be from far to near, gradually

separating two balls. Keep hands grab insulation handles of discharge tongs and bodies away from being near or contact the live part. Otherwise, electric spark will jump, causing an electric shock with some strong physical reaction. But even in normal operation, this occasion may occur. So do not be afraid. Though the actual voltage is high, the current is small.

Maintenance

1. Put the electrophorus in a clean and dry place.
2. Lubricate driving shafts of the electrophorus frequently so that it will spin smartly and friction will be reduced. After the work is done, cover it with a plastic bag so as to prevent dust from entering into the device.
3. Do not damage conducting layers in the conducting disc or the Leyden jar by touching or scraping and do not make layers damp by contacting water.
4. Do not use naked fire to bake for this generator.
5. If the electrification of this generator fails, see related items stated in the exclusion of faults.

If other parts are damaged when moving, storing or using this generator, please write to us with detailed information about the name of the part and the number. We can provide replaceable parts for you and the assembly process is the same as the foregoing. Please put special attention to the belts crossing behind (the direction to users is supposed be front) and the angel of electric brushes when installation.