try again, after providing the brass tube (A) with a non-conducting or an insulating handle (B), formed by thrusting a glass rod inside the brass tube. While holding the handle, I now rub the brass, and by bringing it near the electroscope, we discover a very vigorous divergence of the leaves. The electric power was undoubtedly developed even before, but it escaped through my body to the earth; the insulating handle of glass, however, prevents this escape.

Fig. 6. Brass Tube with Glass Handle.

I take now an ordinary hard rubber comb; a few strokes across this cat's fur, and the comb causes great disturbance when brought near the electroscope. Here is a sheet of writing paper. I place it on a warm board and rub it with a simple pencil eraser; the paper clings now so tightly to the board by virtue of the electric attraction, that it can only with difficulty be removed. I hold this sheet of paper near the wall; and, though large and heavy, it clings to the wall. I have here also a sheet of ordinary brown wrapping paper; this I draw several times between my arm and the side of my body; it is now electrically excited through this friction, and flies to the wall, as you see. I hold this sheet of paper over the head of this gentleman sitting near me; and "each particular hair now stands on end." I take another sheet of paper and excite it by rubbing as before; but before taking from the board I cut it into shreds about four-fifths of its length. On removing the paper from the board, each shred repels the others—another example of electrical repulsion.

We have spoken here only of attraction and repulsion as proofs of electric excitement. If, however, these little experiments had been tried in a dark room, in every case a visible spark, accompanied by a crackling noise would have passed from the excited body.

I will ask this gentleman, who has kindly promised to assist me, to stand upon this stool, which is formed with glass legs so as to prevent electrical communication with the earth. I place about his shoulders this rubber cloak—it is a lady's cloak, however, and does not fit him as well as it might. Now I thrash him, as you see, with this cat's skin. In such experiments it is always best to remove the cat from the skin, as I have already done with this one —otherwise Pussy might object. I bring the electroscope near the gentleman's hand, and the instrument indicates a most powerful excitement. I bring my hand near the gentleman's nose, and a brilliant spark passes between his nose and my hand; those sitting near could doubtless hear the sound of the discharge; and, judging from the gentleman's somewhat queer contortions, he felt the passage. We will use the cat's skin about his shoulders once more, and ask him to then bring his knuckle near the burner from which the gas is escaping. As he does so a spark passes to the burner and lights the gas. If the room were not so warm we could easily light the gas by touching the burner with an icicle held in the hand, after having become electrically charged.

Often a person may become electrified by simply shuffling about a carpeted room, in woolen stockings without shoes, sufficiently to light gas in the same way. And it is said, blasts have been prematurely exploded in mines through the workmen rubbing against the walls as they walk, and then accidentally touching the wires leading to the powder.

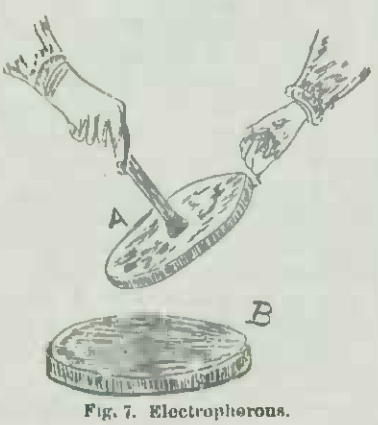

Fig. 7. Electrophorous.

We must adopt some easier way of generating electricity, however. We have here (Fig. 7), an instrument known as the electrophorous. It consists of a cake of wax or vulcanite (B) and metallic sheet (A), provided with an insulating handle of glass. By rubbing or striking the upper surface of the vulcanite with flannel or fur, and then placing the metallic plate upon it, taking care to touch the metal while in contact with the vulcanite; then lifting the plate by its glass handle, a very strong spark can be drawn from the plate, and this can be many times repeated without a repetition of the striking.

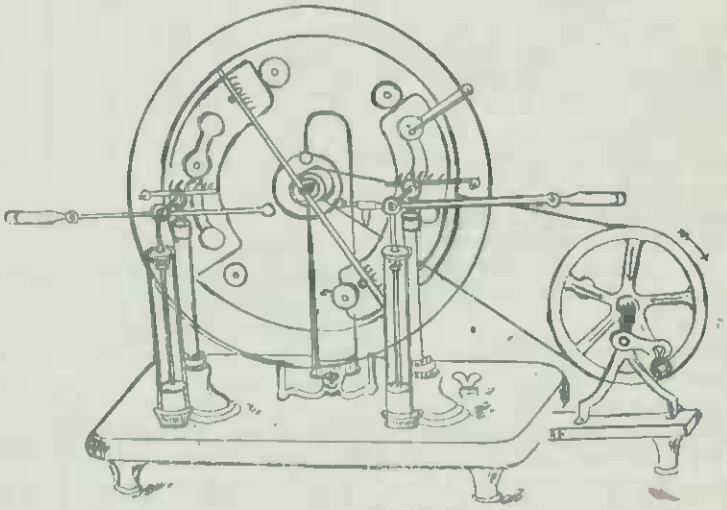
Fig. 8. Electric Machine.

The first true electric machine was constructed by the renowned Otto von Guericke, in 1672. It consisted of a globe of sulphur, revolved by means of a crank, while the hand of the experimenter, or a pad of silk was pressed against it. Later, glass globes were used instead of sulphur; then glass cylinders were employed in place of globes; and lastly plates of glass. We have here the latest and most efficient form of machine (Fig. 8), in which, as you see, there are two glass plates one being stationary and the other being made to revolve with great rapidity. It is called from its inventors, the Toepler-Holtz Machine.

As you readily see, when the movable plate is rapidly revolved, sparks several inches in length pass between the poles. Here then are brilliant luminous effects, in addition to the mechanical effects of attraction and repulsion already illustrated.

Whenever the free passage of the electric force is interrupted, a luminous manifestation is the result. By darkening the room we can perceive such much better. Now, when the