THE RAPIEFF ELECTRIC LIGHT.

This light has passed the experimental stage, and is actually employed in the printing office and composing rooms of the London *Times* newspaper.

The chief novelty of the system consists in the use of four carbons, instead of the two which, in nearly every other arrangement, form the points between which the luminous arc is produced. These carbon rods, instead of being placed parallel with one another, are so inclined that their points meet. Or to put the matter more clearly, the two upper carbons form the letter V, while the two others, forming the same letter upside down Λ. are placed so that the combination represents an X. But the lower pair are set at a right angle to the upper. In plan, therefore, the four rods would form a cross.

One great advantage in M. Rapieff's system is that a nearly burnt-out carbon may be replaced by a fresh one without any stoppage of the light. This operation, too, can be performed without the intervention of a skilled worker. In Fig. 1 the attendant—protected from the glare of the naked light by a small screen of colored glass—is in the act of replacing one of the negative carbons. The right hand lamp is shown as commonly used, with the light softened by a globe. The screw, S, in both lamps, is the means whereby the distance between the two pairs of carbons is regulated and kept constant. Indeed, we understand that the size of the arc can be so adapted to the current supplied, that a lamp can be made to represent the value of 100 gas flames, or of merely 10.

This system can be used with a magneto-electric machine of any pattern. The lights have each an independent existence, that is to say, one or two can be extinguished without affecting others in the same circuit. And the system offers the advantage of satisfactory subdivision without very great loss in the individual intensity of each light.

The carbons, as they consume away, are made slowly to approach each other, so that the arc is always of the same width, and keeps its fixed position in the space. To this effect the carbons are directed together over small pulleys at *d* (Fig. 2). The directing force is supplied by a lead weight or counterpoise, *w*, of about three pounds, which slides down the brass stems, *s s'*. The weight is supported by two silk or asbestos cords from the outer ends of the carbon sticks. In this way the descent of the weight draws the four carbons equally together as they are wasted away. A curved reflector of silvered brass or porcelain is fixed a little above the inner ends of the upper carbons. By means of the screws, *f* and *e*, the width of the arc is adjusted, and by similar screws the angle at which the lower points face the upper ones can be varied, so as to direct the arc to one side or the other. The wooden base, B, carries four terminals for connecting the wire conveying the current. The base is hollow, and contains an electro-magnetic apparatus for starting the light. At first the carbon points are in contact, but when the current is put on, it passes through a dual electro-magnet in the base, the armature of which is attracted upward and pushes a rod up the hollow stem, *s'*. This rod allows the lower carbon to drop away from the upper to the full width of the arc as previously adjusted. The positive and negative currents pass to their respective upper and lower carbons by means of the stem, *s s'*, and the curved brackets. With carbons 20 inches long and 5 millimeters in diameter, the light is maintained for seven or eight hours, and with those 6 millimeters thick it is kept up for nine or ten hours. The light is equivalent to from 100 to 120 gas flames, or say about 1,000 candles. The smallest form of the lamp made gives a light estimated at five gas flames. M. Rapieff is now constructing a form of lamp made to burn upside down, in order that it may be fixed on the ceiling of rooms. Mica plates are sometimes used to screen off the heat from the cords when they are of silk. The resistance of the arc is only two or three ohms.

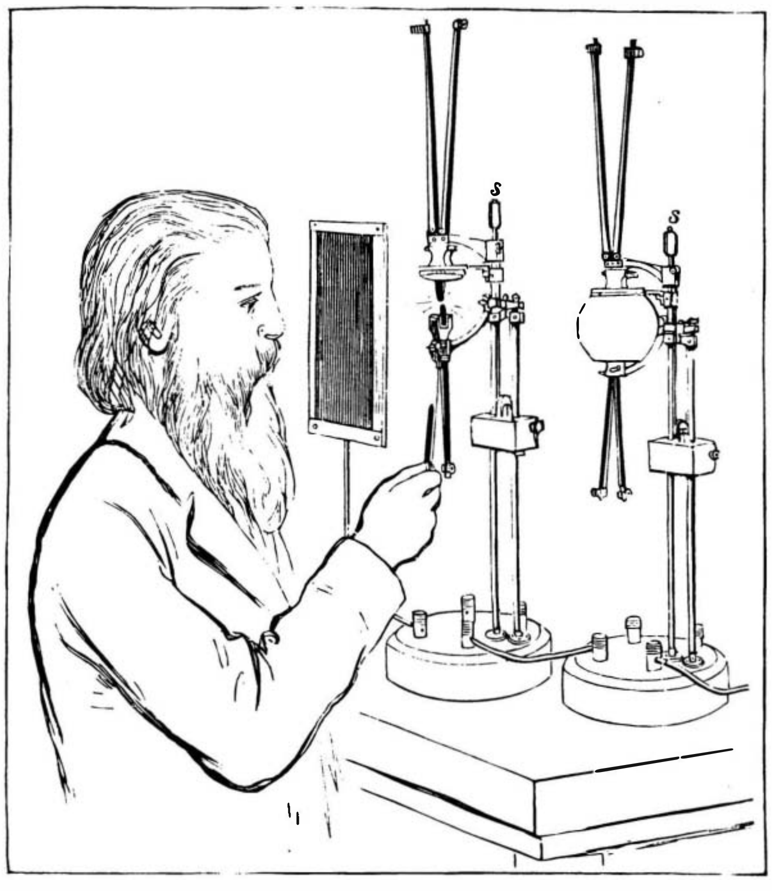

Fig. 1.—THE RAPIEFF ELECTRIC LIGHT.

Fig. 3 represents a modified form of Rapieff's lamp. In it the carbons are simply inclined to each other at an angle which can be regulated by screws, *d d'*. The width of the arc can also be regulated by the same screws. The carbons are drawn together by the descent of a counterpoise, *w*, in a similar manner to that above described. In the lamp the planes of the carbon pairs are parallel to each other. A cylinder of lime, *e*, is supported over the arc, and becoming luminous increases the illuminating power of the arc by about 40 per cent. The carbons M. Rapieff employs are made by M. Carré. The light is very pure and white, and can be considerably varied in intensity by the adjusting screws. Gramme's dynamo-machines are at present used in the *Times* office, but we believe that M. Rapieff has patented one of his own. There are six lamps in each circuit in the *Times* office, but M. Rapieff has successfully exhibited as many as ten.

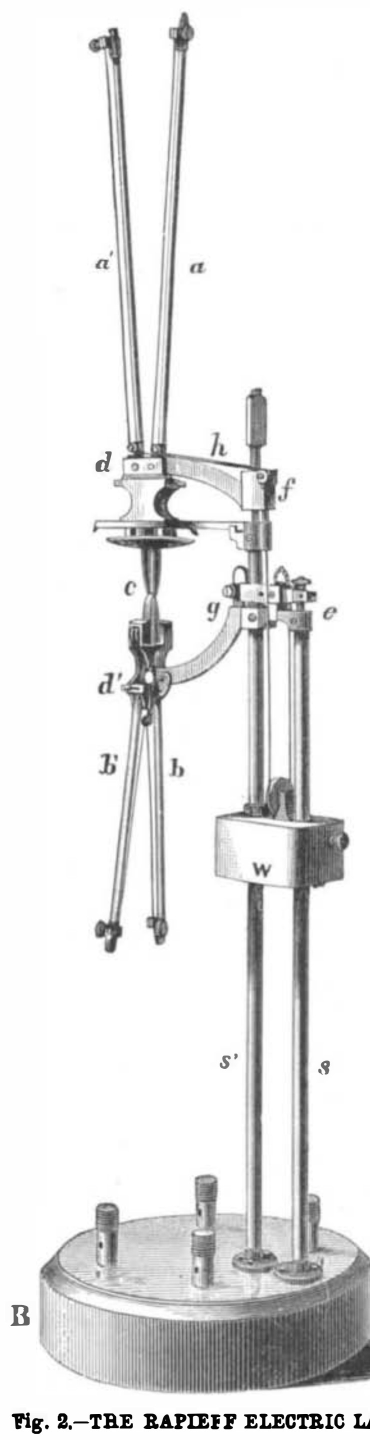

Fig. 2.—THE RAPIEFF ELECTRIC LAMP.

Action of Water and Salt Solutions on Zinc.

The results of a series of experiments made upon this subject by Snyders may be given briefly as follows:

1. Zinc decomposes salt solutions, concentrated as well as dilute, without access of air or oxygen. Hydrogen is liberated, and oxide of zinc is formed.

2. The solubility of oxide of zinc in the salt solutions hastens and aids the reaction.

3. Oxide of zinc dissolves in solutions containing but 1 per cent of salt, or even if more dilute. The solubility in different salts is different, being greatest in ammonia salts. It seems to be due to the formation of free alkali, inasmuch as it can exist in solution with a double zinc salt at certain temperatures and by certain concentration. Zinc carbonate and hydrate are not soluble in the carbonates. The solubility of zinc oxide increases as the temperature and concentration increase.

4. If the salt solution is saturated with oxide of zinc the decomposition does not go any further, but the zinc oxide formed subsequently remains undissolved. But few experiments have been made in this direction, and others will be instituted by the same person.

5. With access of oxygen free from carbonic acid the oxide dissolves more rapidly because the zinc oxidizes at the same time. The salt aids this oxidation, not directly, but by keeping the surface clean. This, too, requires to be substantiated by further experiments.

6. The solvent action is somewhat retarded by the carbonic acid of the air, owing to the formation of some basic carbonate upon the surface of the zinc.

7. The decomposing and solvent action is greatest in the case of the chlorides and with potassium sulphate, weaker with the nitrates of the alkalies and of barium, and for magnesium sulphate.

8. Zinc does not decompose solutions of alkaline carbonates or sodium phosphate in the absence of air. With access of air but little zinc is dissolved by one per cent solutions, because the zinc is protected by the zinc carbonate or phosphate formed by the reaction. In diluter solutions somewhat more zinc oxide is dissolved.

9. The action increases with increase of temperature; at the freezing point of water it is very slight.

10. Solutions of ammoniacal salts take up more zinc than the solutions of the salts of the fixed alkalies. The zinc remains bright in these solutions, and nothing separates, even if oxygen or air is permitted to enter.

11. Hard well water does not act upon zinc, even with large percentages of chlorides and sulphates. Soft water dissolves more zinc in proportion as the amount of chlorides, sulphates, and nitrates exceeds that of the carbonates and phosphates.

The poisonous nature of zinc salts, even in small doses, renders the above research of more than ordinary practical interest.

THERE is no simpler or better remedy for frost bites than the following: Extract the frost by the application of ice water till the frozen part is pliable, avoiding all artificial heat; then apply a salve made of equal parts of hog's lard and gunpowder, rubbed together until it forms a paste, and very soon the frozen parts will be well.

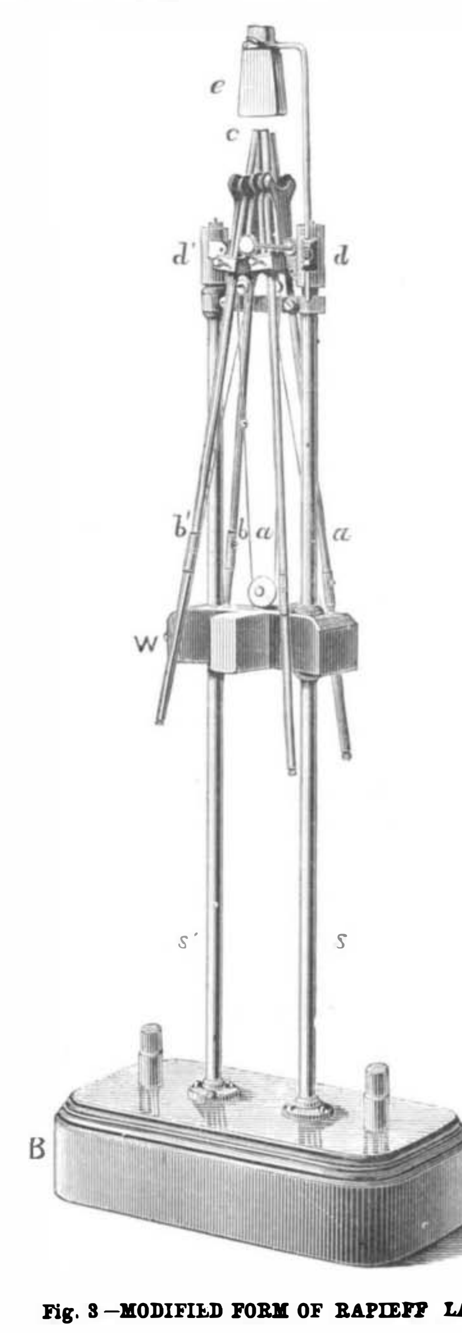

Fig. 3.—MODIFIED FORM OF RAPIEFF LAMP.