the 12th inst., an additional sum of 250*l.* was voted for their prosecution, and that they will be actively resumed as soon as Dr. Greenfield has completed his arrangements.

The interval of inactivity has been used by the committee for carrying out important improvements of the premises in Wandsworth Road, so that Dr. Greenfield will enter on his new duties with many advantages in his favour—an excellent laboratory, sufficient resources, fruitful work already in progress, and a committee including such men as Busk, Gull, Paget, Quain, Sharpey, and Simon to back him. We feel confident that the wisdom of the appointment will be justified by the result, and that the new chapter in the history of the Brown Institution which will begin with the year 1879, will be a successful one.

ON SOME IMPROVED METHODS OF PRODUCING AND REGULATING ELECTRIC LIGHT¹

IN a former communication to the Society I directed attention to the fact that when the electric light is produced from the ends of two carbon pencils placed parallel to each other, if the strength of the electric current, the thickness of the carbons, and the distance between them are rightly proportioned, the carbons will burn steadily downwards until they are wholly consumed, without any insulating material between them. To initiate the light by this method, it is necessary to complete

the electric circuit between the carbons by means of some conducting substance, which volatilises on the passage of the current, and establishes the electric arc between the points.

When a number of such lights are produced simultaneously from the same source of electricity, any interruption in the continuity of the current extinguishes all the lights in the same circuit, and each pair of carbons requires to be reprimed before the lights can again be established. This defect, as will be obvious, would cause

great inconvenience when the lights are not easily accessible, or are at considerable distances apart.

In the course of my experiments it was observed that when the electric circuit was completed at the bottom of a pair of carbons close to the holders, the arc immediately ascended to the points, where it remained so long as the current was transmitted. My first impression of this peculiar action of the arc was, that it was due to the ascending current of hot air by which it was surrounded. This, however, was found not to be the cause, as the arc travelled towards the points in whatever position the carbons were placed, whether horizontally or vertically in an inverted position. Moreover, when a pair of carbons were held in the middle by the holders, the arc travelled upwards or downwards towards the points, according as the circuit was established above or below the holders. The action was, in fact, recognised to be the same as that which determines the propagation of an electric current through two rectilinear and parallel conductors submerged in contact with the terrestrial bed, which was described by me in the *Philosophical Magazine*, August, 1868.

In all the arrangements in general use for regulating the electric light, the carbon pencils are placed in the same straight line, and end to end. When the light is required, the ends are brought into momentary contact, and are then separated a short distance to enable the arc to form between them. The peculiar behaviour of the electric arc when the carbons are placed parallel to each other, suggested to me the means of lighting the carbons automatically, notwithstanding the fact that they could only be made to approach each other by a motion laterally, and to come into contact at their adjacent sides. To accomplish this object, one of the carbon holders is articulated or hinged to a small base plate of cast iron, which is so constructed as to become an electro-magnet when coiled with a few turns of insulated wire. The carbon holder is made in the form of a right-angled lever, to the short horizontal limb of which is fixed an armature placed over the poles of the electro-magnet. When the movable and fixed carbon holders are brought into juxtaposition, and the carbons inserted in them, the upper parts of the two carbons are always in contact when no current is transmitted through them, as shown by the dotted lines in the engraving.

The contact between the carbons is maintained by means of an antagonistic spring inserted in a recess in one of the poles of the electro-magnet, and reacting on the under side of the armature. One extremity of the coil of the electro-magnet is in metallic connection with the base of the carbon holder, while the other extremity of the coil is in connection with the terminal screw at the base of the instrument from which it is insulated. The coils of the electro-magnet are thus placed in the same circuit as the carbon pencils.

When the alternating current from an electro-magnetic induction machine is transmitted through the carbons, the electro-magnet attracts the armature and separates the upper ends of the carbons, which brings them into their normal position, and the light is immediately produced. When the circuit is interrupted, the armature is released; the upper ends of the carbons come into contact, and the light is produced as before. When several pairs of carbons are placed in the same circuit, they are, by this arrangement, lighted simultaneously.

H. WILDE

INFLUENCE OF THE STRAITS OF DOVER ON THE TIDES OF THE BRITISH CHANNEL AND THE NORTH SEA¹

THE conclusions are:—

1. The rise and fall of the water-surface and the tidal streams throughout the North Sea north of the

¹ Supplement to Paper read at the Manchester Literary and Philosophical Society, November 26 (see *NATURE*, vol. xix. p. 78). Communicated by the Author.

² Abstract of a paper read at the Dublin meeting of the British Association.