### Experimental Ballooning.

We learn from our London contemporaries that ballooning will henceforth form a part of the art of war, for, by order of the War Office, a balloon equipment has been placed in the Royal Arsenal, Woolwich. Two balloons for experimental purposes, and a portable furnace for the manufacture of hydrogen gas, are in commission; and a party of men and officers of the Royal Engineers have been instructed in aerostatics, and in the preparation of network and other appliances required in actual service. The balloons and all the appurtenances have been made within the arsenal, so that ample supplies can be produced as required in working out the important aeronautical question. That balloons may be employed with great advantage in war has already been demonstrated. To look down into an enemy's camp, or to spy out his movements behind a ridge or in the rear of a wood, may tend to the defeat of his plans and the shortening of a campaign; and this may be done by means of a captive balloon. But very much more might be done if a free balloon could be made to sail in any direction; this is the problem which the Royal Engineers and the Aeronautical Society have now to work out, and it is hoped they may be successful in solving it.

### THE BLAKE TRANSMITTER.

The Blake telephonic transmitter, now so largely used in connection with the Bell telephone, is in some respects quite similar to Mr. Edison's transmitter, figured in our pages a few weeks since, and both are, in principle, like a comparatively old invention of Mr. Edison's, which he calls the inertia telephone.

This transmitter is in extensive use and is very efficient, notwithstanding its apparent clumsiness. There is, in fact, nothing delicate or fine about its construction. Those at present in use are securely inclosed in boxes which shield them from the eyes of the curious, nothing being exposed save a small portion of the diaphragm, which is seen through a ½ inch hole in the mouthpiece formed in the cover.

The transmitter is generally attached in a vertical position to a board, which also supports the switches and other accessories. To the hinged cover of the box is secured the annular cast iron frame, A, in which is placed a 3 inch circular diaphragm, B, made of common Russia iron of medium thickness, bound around the edges by a soft rubber band, stretched over it so that it covers about a quarter of an inch of its edge. The diaphragm is held in place by a small clip just touching the rubber binding upon one edge, and by a steel spring upon the other edge, which is rubber tipped and touches the diaphragm about ¾ inch from the center with a pressure of several ounces. Short arms are cast on the ring, A, one at the bottom, the other at the top, and to the upper arm is attached a spring, which is riveted to the casting, C. This casting supports two delicate springs, D E (watch springs). The spring, D, has an insulated support, and is connected by a wire with the upper hinge of the box cover, the hinge being connected with the binding post, *d*, at the top of the box.

The free end of the spring, D, rests against the diaphragm, and is provided with a convex platinum button, which is pressed by a carbon button inserted in a piece of brass weighing two or three pennyweights and fastened to the free end of the spring, E.

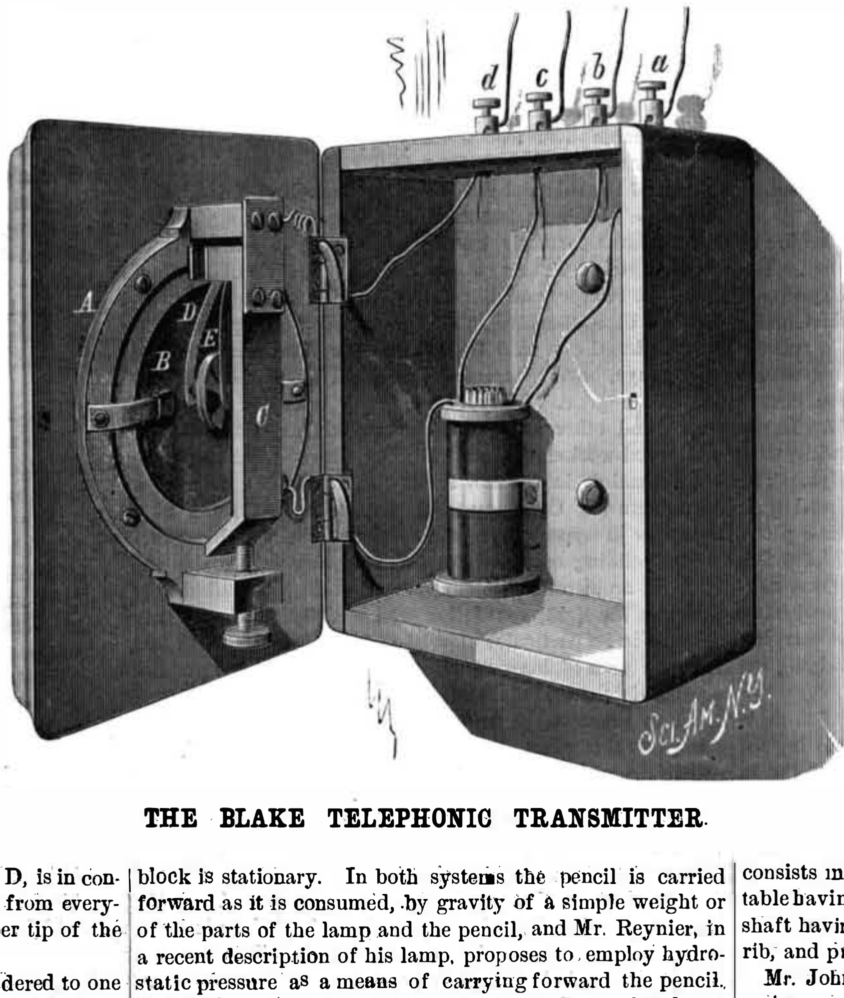
The spring, E, is in metallic contact with the casting, C, and the latter is in electrical communication with the frame, A, which is connected by a wire with the lower hinge of the box, and the hinge is connected with the bending post, *c*, by a wire that includes the primary wire of the small induction coil, seen in the corner of the box. The secondary wires of the induction coil are connected with the binding posts, *a b*.

The inclined surface of the lower end of the casting is engaged by an adjusting screw which passes through the lower arm of the frame, A. By turning this screw one way or the other the springs, D E, are made to press with more or less force upon the diaphragm, and the contact between the platinum button and the carbon is varied.

The binding posts, *c d*, are connected with a battery. The binding posts, *a b*, are connected with a telephone line, including the receiving telephones, usually of the Bell form.

The primary current passes through the springs, D E, and the primary wire of the induction coil. The vibrations of the diaphragm vary the contact between the platinum button and the carbon, and produce a variation in the current, which induces a corresponding current in the secondary wire of the induction coil and in the line including the telephones. A single cell of Leclanché or Fuller battery is sufficient to work this transmitter. It will be noticed that while the spring, D, is in contact with the diaphragm the latter is insulated from everything else by the rubber binding and the rubber tip of the spring.

The box hinges are provided with springs soldered to one half, and pressing upon the other half to insure a good electrical contact. A closed circuit bell is extensively employed in connection with this transmitter for calling attention. Magneto bells are generally used on isolated lines.

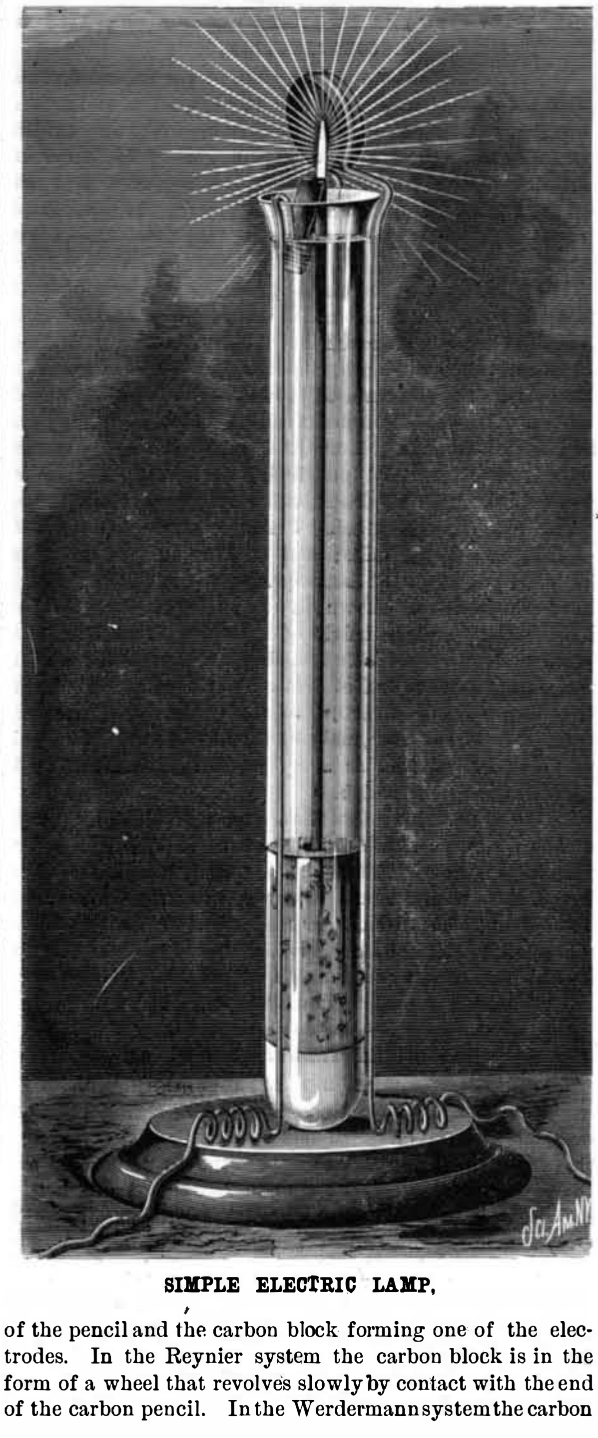



THE BLAKE TELEPHONIC TRANSMITTER.

### MODIFICATION OF THE REYNIER AND WERDERMANN ELECTRIC LAMP.

BY GEO. M. HOPKINS.

In the Reynier and Werdermann systems of electric lighting the light is produced by the incandescence of a slender pencil of carbon and by a small voltaic arc between the end



SIMPLE ELECTRIC LAMP.

of the pencil and the carbon block forming one of the electrodes. In the Reynier system the carbon block is in the form of a wheel that revolves slowly by contact with the end of the carbon pencil. In the Werdermann system the carbon block is stationary. In both systems the pencil is carried forward as it is consumed, by gravity of a simple weight or of the parts of the lamp and the pencil, and Mr. Reynier, in a recent description of his lamp, proposes to employ hydrostatic pressure as a means of carrying forward the pencil. This is not a new idea, the principle having been already applied to feeding carbons in electric lamps.

The lamp shown in the accompanying engraving embodies the principle of the Werdermann and the Reynier, and the carbon pencil is carried upward by a float which creates the required pressure between the electrodes and presents a ready means of moving the carbon with a gentle, continuous pressure.

This lamp is as simple in its construction as any having means of feeding the carbons, and it is as inexpensive as it is simple. With appropriate battery power it will give a light equal to at least two five-foot gas burners.

The test tube which contains the water and the cork float, is 9 inches high and about 1⅛ inch in diameter. From the base rise two wires, which are formed into a circular loop at the top for receiving the carbon button forming one of the electrodes. This carbon button is circular and somewhat conical, and is held in place by simply crowding it into the loop. It is arranged eccentrically in relation to the top of the test tube, to admit of turning it so as to present a new surface to the end of the carbon pencil, and it is inclined so that the upward pressure of the carbon pencil will insure a contact between the button and the pencil, and between the pencil and the small carbon block below and in front of the button. This block is inserted in the coil formed on the end of the wire which extends over the side of the test tube and downward to the base, where it is connected with one of the battery wires.

The looped wire that supports the carbon button and the wire supporting the carbon block are inserted in the base, and form a support for the test tube.

The carbon pencil is $\frac{1}{16}$ inch in diameter and 9 inches long. The cork that buoys it up has in its center a small tube for receiving the lower end of the carbon pencil; for this tube a very small quill answers well.

The carbon button and the carbon block are cut from a hard piece of battery carbon or from a piece of gas retort carbon.

The test tube is nearly filled with water, which bears up the cork float and brings the upper end of the carbon pencil into contact with the carbon button; the pressure of the pencil against the inclined surface of the button throws the pencil into contact with the carbon block, completing the electrical circuit.

Six cells of Grenet battery, each consisting of a zinc plate, 3x6 inches, placed between two carbon plates of the same size, will afford a splendid light for a short time, but this form of battery soon polarizes. For a continuous light some form of constant battery is desirable, although a greater number of elements will be required.

In the published descriptions of the Reynier lamp it is stated that four Bunsen elements will afford a clear white light, and that with a battery of thirty-six elements, grouped in two series of eighteen elements each, four lamps may be placed in a single circuit. The writer's experience has been that this lamp, as well as most of the other simple lamps, requires more battery power than the inventors claim to use.

To obtain the maximum result from one of these simple lamps it is probably safe to say that at least eight Bunsen elements will be required.

The lamp shown in the engraving seems to yield results equal to those obtained from the more expensive apparatus, and by a comparison with another lamp of more complicated and costly construction the writer was forced to believe that the results were even better. Whether this is attributable to the combustion of the gases resulting from the decomposition of steam by the intense heat of the incandescent carbon remains to be determined by future experiment.

### MECHANICAL INVENTIONS.

An improved elevator for use in manufactories, shops, planing mills, storehouses, warehouses, and other places where lumber and other articles are to be taken from higher to lower floors, has been patented by Mr. Latham W. Greenleaf, of Terre Haute, Ind. It is so constructed as to load and unload itself while in motion.

Messrs. Myron A. Culver, William A. Jones, and Myron C. Briggs, of Bairdstown, Ohio, have invented an improved machine for lapping patent hoops, which will form the laps rapidly, evenly, and without danger of splitting the hoops, which may be adjusted to operate upon hoops of different lengths.

An improvement in carpet sweepers has been patented by Mr. Frederick Cook, of New Haven, Conn. The object of this invention is to provide a carpet sweeper whose brush is made to revolve by means of adjustable cord and pulleys, and is also vertically adjustable in its box.

Mr. John Hyslop, Jr., of Abington, Mass., has patented an improved machine for tonguing and grooving the edges of boards, and at the same time jointing them, which may also be used for forming moulding. The invention consists in combining with a transversely slotted frame, the table having median rib, and spring-supported rolls, a rotary shaft having two heads, one arranged on each side of the rib, and provided with cutters.

Mr. John P. Cotaya, of New Orleans, La., has invented an improved device for attachment to the shutters of warehouses, storehouses, etc., to open the shutters automatically in case of fire, and thus allow the firemen to have access to the interior of the building.

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