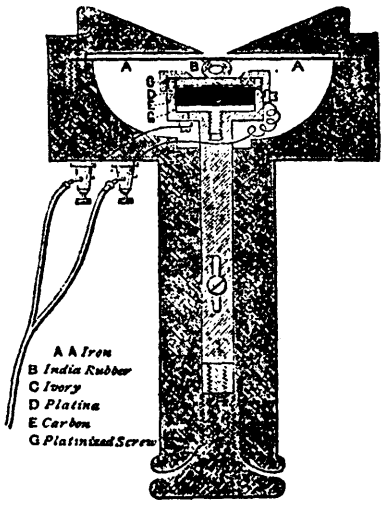

EDISON'S TELEPHONE.

PHELP'S TELEPHONE.

NOTES ON THE TELEPHONE.

BY L. L. DUERDEN.

When an iron armature approaches the poles of a permanent magnet on which insulated wire is wound, a current of electricity is thereby induced, and flows in one direction through the insulated wire; and when the armature is moved from the poles of the magnet a similar current flows through the wire, but in a reverse direction; and conversely, if the currents thus produced be passed through insulated wire wound on another permanent magnet, the armature of the second magnet will move in the same time as the first, but not necessarily in the same relative direction, as that will depend on the relative polarity of the magnets.

In the Bell telephone, the iron diaphragm which serves as an armature is caused to move directly to and from its permanent magnet, by minute concussions of air, from the speaker's throat. As these concussions are necessarily limited in their ability to move the diaphragm, it follows that if the slight movement thus produced could be used to properly control a power (in the same manner as the slight movement of the slide valve of a steam engine controls the admission of steam to its cylinder), instead of directly producing it, a much more powerful telephonic result could be obtained.

With this object in view, after several experiments, I constructed a transmitter on the principle shown in the engraving, in which A represents a metal speaking tube, having a membrane B of gold beater's skin, in the centre of which the sewing needle, C (metallically connected to the fine wire D, which is soldered, at D', to the speaking tube A), is secured by sealing wax. The end C', of the needle is hooked, so as to clip the short pieces of very fine platinum wire E. One pole of the galvanic cell S is connected with the metallic post A', to which the speaking tube A is soldered, whereby the end C' of the needle becomes the negative terminal of the battery S; and the positive pole P has two wires, F and K, connected with it; the wire F, leading through the telephone M, to one end of the platinum wire E, and the wire K leading through the telephone N to the other end of the wire E.

By this arrangement there are two courses open to the galvanic current from the end C' of the needle to the positive pole of the battery S; and when the resistance of each course is the same, the current divides itself equally between the two; but as the platinum wire E has great resistance to the current, the least movement, in either direction of its arrow, of the end C' of the needle, will make the course towards which it moves the one of the least resistance, and the same movement increases the resistance of the other course; so that the relative difference in the resistance of the courses appears to be in proportion to the square of the resistance that is thus produced by the movement of the hooked end C' of the needle.

Now the voice of the person who is speaking at the mouth of the tube A, causes the membrane B to move to and fro in either direction of its arrow, and the length and speed of these movements differ as different words are uttered; and as the needle C is rigidly secured to the membrane B by sealing wax, its end C' copies the length and speed of the movements of the membrane, and by like movements in either direction of its arrow directs a current to the wires, F or K, which corresponds in power to the varying length of these movements. The wire E should be stretched, and the hooked end C' must have an upward tendency, so as to keep it in uniform contact with the wire E.

The instrument as above described serves simply as a transmitter, and by careful adjustment at C', and speaking in an undertone, the sounds through the telephones M N were almost articulate. Singing in an ordinary tone would break contact at C'; but the results obtained were sufficient to encourage the construction of another instrument, and if better results are obtained I shall be happy to describe it.—*Scientific American.*

SAND AS FOUNDATION MATERIAL.—One of the best possible foundations is sea sand; at least so long as it is not interfered with. The man who built his house upon the sand was not quite the lunatic that many worthy people suppose. Under ordinary circumstances, his abode was just about as secure as his neighbour's upon the rock. Unfortunately, however, one stormy night an unexpected flood came, and next morning his want of forethought was made apparent. So long, therefore, as sand is uninfluenced by running water it is safe. Sink, however, a well near, and you at once undermine its security. Nothing is more treacherous than sand when allied with water. In harbour works heavy piles (driven many feet into the sand) lifted and thrown up high and dry on the adjoining beach by a single night's gale. Sand has many curious properties. Its incompressibility is well known. A paper cylinder filled with sand will sustain a surprising load. One of the London Polytechnic experiments, a few years ago, was to bury an egg in sand within a sort of enlarged cupel mold, and then to pound the die vigorously; on afterwards emptying the sand, the egg was found uninjured. The ancient Egyptian engineers, it is surmised, must have used sand extensively for some purposes for which we employ timber. Mr. Dixon supposes Cleopatra's Needle, and the various monoliths of similar character, to have been raised into a vertical position by means of hillocks of sand.

EVEN in Siberian waters, at the bottom of the lakes, rivers and seas, the temperature remains at 40°.

SIXTY-five of the victims of the Ashtabula Bridge disaster have been paid for at an average price of $500 each.

THE manufacture of toughened glass has been brought to such perfection that objects of all kinds can now be made from it.

TO KEEP moisture from clouding a mirror or the glass of an optical instrument, wipe it off with a soft cloth, slightly moistened with glycerine.

IN 1874, there were enumerated 173 processes and apparatus for preserving wood which had been patented or described since 1700; since 1874, the list has been largely extended.