

8. When an intermittent current is passed through the thick wires of a Ruhmkorff's coil, very curious audible effects are produced by the

* *Helmholtz*. *Die Lehre von dem Tonempfindungen*.

† See "Treatise on Electricity," by De la Rive, I., p. 300.

‡ *Ibid*.

§ *Gore*. *Proceedings of Royal Society*, XII., p. 217.

|| *Page*. "Vibration of Trevelyan's bars by the galvanic current." *Silliman's Journal*, 1850, IX., pp. 105-108.

currents induced in the secondary wires. A rheotome was placed in circuit with the thick wires of a Ruhmkorff's coil, and the fine wires were connected with two strips of brass (A and B), insulated from one another by means of a sheet of paper. Upon placing the ear against one of the strips of brass, a sound was perceived like that described above as proceeding from an empty helix of wire during the passage of an intermittent voltaic current. A similar sound, only much more intense, was emitted by a tin-foil condenser when connected with the fine wires of the coil.

One of the strips of brass, A (mentioned above), was held closely against the ear. A loud sound came from A whenever the slip B was touched with the other hand. It is doubtful in all these cases whether the sounds proceeded from the metals or from the imperfect conductors interposed between them. Further experiments seem to favor the latter supposition. The strips of brass A and B were held one in each hand. The induced currents occasioned a muscular tremor in the fingers. Upon placing my forefinger to my ear a loud crackling noise was audible, seemingly proceeding from the finger itself. A friend who was present placed my finger to his ear, but heard nothing. I requested him to hold the strips A and B himself. He was then distinctly conscious of a noise (which I was unable to perceive) proceeding from his finger. In these cases a portion of the induced currents passed through the head of the observer when he placed his ear against his own finger; and it is possible that the sound was occasioned by a vibration of the surfaces of the ear and finger in contact.

When two persons receive a shock from a Ruhmkorff's coil by clasping hands, each taking hold of one wire of the coil with the free hand, a sound proceeds from the clasped hands. The effect is not produced when the hands are moist. When either of the two touches the body of the other a loud sound comes from the parts in contact. When the arm of one is placed against the arm of the other, the noise produced can be heard at a distance of several feet. In all these cases a slight shock is experienced so long as the contact is preserved. The introduction of a piece of paper between the parts in contact does not materially interfere with the production of the sounds, while the unpleasant effects of the shock are avoided.

When a powerful current is passed through the body, a musical note can be perceived when the ear is closely applied to the arm of the person experimented upon. The sound seems to proceed from the muscles of the fore-arm and from the biceps muscle. The musical note is the unison of the rheotome employed to interrupt the primary

circuit. I failed to obtain audible effects in this way when the pitch of the rheotome was high. Elisha Gray* has also produced audible effects by the passage of induced electricity through the human body. A musical note is occasioned by the spark of a Ruhmkorff's coil when the primary circuit is made and broken sufficiently rapidly. When two rheotomes of different pitch are caused simultaneously to open and close the primary circuit, a double tone proceeds from the spark.