could hear the unison of the note produced by the rheotome. The intensity of the sound was much increased by placing a wrought-iron nail inside the helix. In both these cases, a crackling effect accompanied the sound. When the nail was held in the fingers so that no portion of it touched the helix, the crackling effect disappeared, and a pure musical note resulted.

When the nail was placed inside the helix, between two cylindrical pieces of iron, a loud sound resulted that could be heard all over a large room. The nail seemed to vibrate bodily, striking the cylindrical pieces of metal alternately, and the iron cylinders themselves were violently agitated.

4. Loud sounds are emitted by pieces of iron and steel when subjected to the attraction of an electro-magnet which is placed in circuit with a rheotome. Under such circumstances, the armatures of Morse-sounders and Relays produce sonorous effects. I have succeeded in rendering the sounds audible to large audiences by interposing a tense membrane between the electro-magnet and its armature. The armature in this case consisted of a piece of clock-spring glued to the membrane. This form of apparatus I have found invaluable in all my experiments. The instrument was connected with a parlor organ, the reeds of which were so arranged as to open and close the circuit during their vibration. When the organ was played the music was loudly reproduced by the telephonic receiver in a distant room. When chords were played upon the organ, the various notes composing the chords were emitted simultaneously by the armature of the receiver.

5. The simultaneous production of musical notes of different pitch by the electric current, was foreseen by me as early as 1870, and demonstrated during the year 1873. Elisha Gray,* of Chicago, and Paul La Cour,† of Copenhagen, lay claim to the same discovery. The fact that sounds of different pitch can be simultaneously produced upon any part of a telegraphic circuit is of great practical importance; for the duration of a musical note can be made to signify the dot or dash of the Morse alphabet, and thus a number of telegraphic messages may be sent simultaneously over the same wire without confusion by making signals of a definite pitch for each message.

6. If the armature of an electro-magnet has a definite rate of oscillation of its own, it is thrown bodily into vibration when the interrup-

* *Elisha Gray.* Eng. Pat. Spec., No. 974. See "Engineer," March 26, 1875.
† *Paul la Cour.* Telegraphic Journal, Nov. 1, 1875.