

Helmholtz Sound Synthesiser.

Max Kohl. Germany, 1905



Max Kohl's 'Helmholtz Sound Synthesiser' 1905

Max Kohl AG founded on 14 March 1876 was a well known company that designed and built scientific mechanical and electrical instruments and was based on Andorfer Str, Chemnitz, Germany. The company created a huge range of equipment sold throughout the world to laboratories and universities including a sound instrument based on a design by the German physicist and psychologist Hermann von Helmholtz. The Max Kohl AG factory in Chemnitz was destroyed by allied bombing during WW2 and most of the remaining equipment was transported intact after the war to the Soviet Union

DIE LEHRE VON DEN TONEMPFINDUNGEN, ALS PHYSIOLOGISCHE GRUNDLAGE FÜR DIE THEORIE DER MUSIK.

VON
H. HELMHOLTZ,
Professor der Physiologie an der Universität zu Heidelberg.

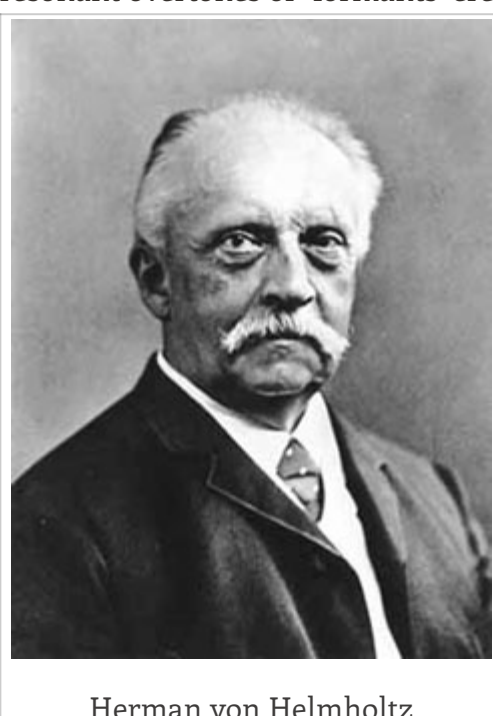
MIT IN DEN TEXT EINGEDRUCKTEN HOLZSTICHEN.

Dritte umgearbeitete Ausgabe.

BRAUNSCHWEIG,
DRUCK UND VERLAG VON FRIEDRICH VIEWEG UND SOHN.
1870.

Hermann von Helmholtz 'On the Sensations of Tone as a Physiological Basis for the Theory of Music' 1870

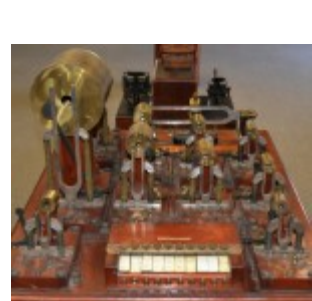
The 'Sound Synthesiser' was not intended as a musical instrument but a scientific tool to demonstrate and analyse the effect of overtones in complex sound as described in Helmholtz's revolutionary book '[On the Sensations of Tone as a Physiological Basis for the Theory of Music](#)' (Hermann von Helmholtz 1870) which had a huge impact on musicologists and instrument designers throughout the twentieth century. Using **resonators**, Helmholtz demonstrated the components of complex sounds are a combination of overtones of a fundamental note (e.g. a "fundamental" pitch G 440Hz contains a harmonic series of whole number multiples of this 440Hz frequency or overtones - 880Hz G , 1320Hz, 1760Hz, etc. at variable volumes). The Sound Synthesiser used a number of tuning forks - which produced almost pure tones - vibrated by electromagnets which in turn were amplified by a Helmholtz Resonator to generate overtones. The range of overtones could be 'filtered' by a mechanical shutter. The instrument helped in the understanding of the nature of speech and vowel sounds; vowel sounds being varied combinations of resonant overtones or 'formants' created by the muscles of the vocal tract.



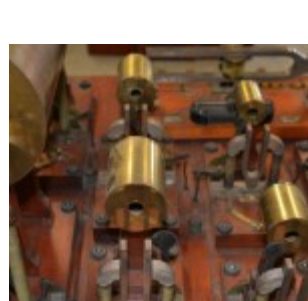
Herman von Helmholtz

Many variations of Helmholtz's resonators were built; some were brass spheres used with hand-held tuning forks, others used electromagnets to excite the tuning forks. Max Kohl's 1905 version had ten forks and their corresponding resonators attached to a 39½ x 29 inch mahogany base. The system is driven by an intermittent current provided by a large horizontal master tuning fork and was operated by pressing on the keys on a small ivory keyboard which sent the current to the corresponding electrically driven tuning forks. The keyboard is marked; ut [Do, or C] to 4 octaves, mi [E] to 3 octaves, and sol [G] to 3 octaves. The synthesiser was capable of combining timbres of 10 harmonics to form vowel sounds.

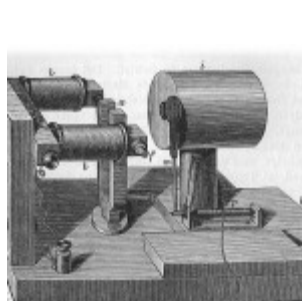
Images of Max Kohl's Sound Synthesiser



Max Kohl's Helmholtz Sound Synthesiser



Max Kohl's Helmholtz Sound Synthesiser



Individual Electromagnetic resonators



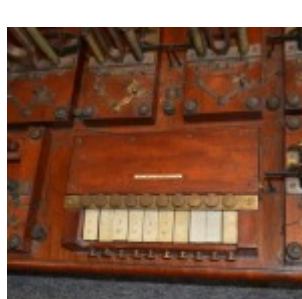
Max Kohl's Helmholtz Sound Synthesiser



A set of Helmholtz Resonators



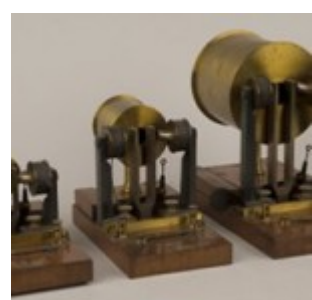
Max Kohl's Helmholtz Sound Synthesiser



Max Kohl's Helmholtz Sound Synthesiser



Individual Electromagnetic resonators with a keyboard



Individual Electromagnetic resonators



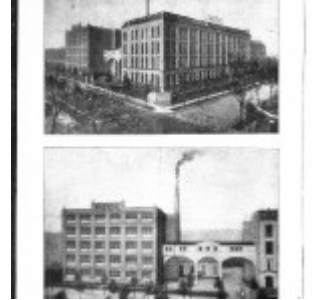
Max Kohl catalogue



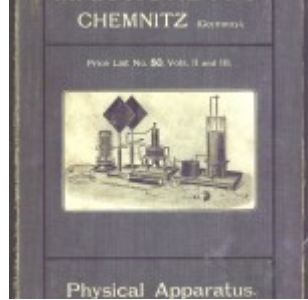
Max Kohl catalogue



Max Kohl catalogue



Max Kohl Factory in Chemnitz



Max Kohl catalogue



A single Helmholtz Resonators

Sources

<http://www.bonhams.com/auctions/22247/lot/245/>

<http://www.hps.cam.ac.uk/whipple/explore/acoustics/rudolphkoenig/koenigsanalyzer/>

<http://www.sil.si.edu/digitalcollections/trade-literature/scientific-instruments/files/51637/index.htm>

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