

Cambridge University Press

978-1-108-06738-6 - Sound: A Course of Eight Lectures Delivered at the Royal Institution of Great Britain

John Tyndall

Index

[More information](#)

INDEX.

ACA

- A**CACIA wood, velocity of sound transmitted through, 41
- Air, process of the propagation of sound through the, 3
- propagation of sound through air of varying density, 9
 - amplitude of the vibration of the sound-wave, 11
 - effect of a non-homogeneous atmosphere, 19
 - elasticity and density of air, 23
 - influence of temperature on the velocity of sound, 24
 - thermal changes produced by the sonorous wave, 28
 - ratio of specific heats at constant pressure and at constant volume deduced from velocities of sound, 31
 - mechanical equivalent of heat deduced from this ratio, 33
 - inference that atmospheric air possesses no sensible power to radiate heat, 34
 - velocity of sound in air, 37
 - difference between the velocity of sound in air and iron, 40
 - musical sounds produced by puffs of air, 55
 - other modes of throwing the air into a state of periodic motion, 57
 - resonance of the air, 173, 213
 - vibrations of columns of air, 179, 213
 - state of the air in sounding pipes, 185, 214
 - illustration of the rapidity with which sound is propagated through air, 239
 - action of sound on jets of air, 243

BUR

- Air—*continued.*
- law of vibratory motions in air, 255
- Albans, St., echo in the Abbey Church of, 20
- Alcohol, velocity of sound transmitted through common and absolute, 38
- Alder wood, velocity of sound transmitted through, 41
- Amplitude of the vibration of a sound-wave, 9
- Ash wood, velocity of sound transmitted through, 41
- Aspen wood, velocity of sound transmitted through, 41
- Auditory nerve, office of the, 2
- manner in which sonorous motion is communicated to the, 323
- B**ARS, heated, musical sounds produced by, 53
- examination of vibrating bars by polarised light, 168
- Beats, theory of, 263
- action of, on flame, 264
 - optical illustration of, 266
 - various illustrations of, 274
 - dissonance due to beats, 298–301
- Beech wood, velocity of sound transmitted through, 41
- Bell, experiments on a, placed *in vacuo*, 6
- Bells, analysis of vibrations of, 150, 158
- Bourse, at Paris, echoes of the gallery of the, 17
- Burners, fish-tail and bat's-wings, experiments with, 232

Cambridge University Press

978-1-108-06738-6 - Sound: A Course of Eight Lectures Delivered at the Royal Institution of Great Britain

John Tyndall

Index

[More information](#)

328

INDEX.

CAL

- CALCIUM**, velocity of sound transmitted through a solution of chloride of, 38
- Carbonic acid, velocity of sound in, 37
- Carbonic oxide, velocity of sound in, 37
- Chladni, his tonometer, 131
- his experiments on the modes of vibration possible to rods free at both ends, 135
- his analysis of the vibrations of a tuning-fork, 137
- his device for rendering the vibrations visible, 139
- Chords, musical, 306
- Clang, definition of, 117
- Claque-bois, formation of the, 137, 157
- Clarionet, tones of the, 195
- Clouds, sounds reflected from the, 18
- Coal-gas, resonance of, 175
- Copper, velocity of sound transmitted through, 39
- Corti's fibres, in the mechanism of the ear, 324

- DEAFNESS**, causes of artificial, 74, 85
- Diatonic scale, 307
- Difference tones, 281
- Discs, analysis of vibrations of, 147, 158
- Dissonance, cause of, 298-301
- graphic representations of, 305
- Doppler, his theory of the coloured stars, 78
- Dunloe, Gap of, echo of, 17

- EAR**, limits of the range of hearing of the, 71, 84
- causes of artificial deafness, 74, 85
- mechanism of the ear, 323
- Echoes, 17
- instances of, 17, 20
- Elm wood, velocity of sound transmitted through, 41
- Eolian harp, formation of the, 123
- Erith, effects of the explosion of 1864 on the village and church of, 23

HAR

- Ether, velocity of sound transmitted through sulphuric, 38
- Eustachian tube, the, 74
- mode of equalising the air on each side of the tympanic membrane, 74, 85

- FALSETTO** voice, causes of the, 197
- Faraday, Mr., his experiment on sonorous ripples, 155
- Fiddle, formation of the, 89
- sound-board of the, 89
- the iron fiddle, 132, 156
- the straw-fiddle, 137, 157
- Fir wood, velocity of sound transmitted through, 41
- Flames, sounding, 217, 252
- rhythmic character of friction, 217, 252
- influence of the tube surrounding the flame, 219, 252
- singing flames, 221, 252
- — analysis of, 223
- harmonic notes of flames, 234
- effect of unisonant notes on singing flames, 229
- action of sound on naked flames, 230, 253
- experiments with fish-tail and bat's-wing burners, 232, 253
- experiments on tall flames, 236
- shortening and lengthening of flames, 237
- influence of pitch, 239
- extraordinary delicacy of flames as acoustic reagents, 239
- the vowel flame, 241
- action of beats on flame, 264
- Flute, tones of the, 195
- Friction, rhythmic character of, 217

- GOLD**, velocity of sound transmitted through, 39
- Gyroscope, musical sounds produced by the, 52

- HARMONIC** tones of strings, 115, 116
- Harmony, 286
- notions of the Pythagoreans, 286

Cambridge University Press

978-1-108-06738-6 - Sound: A Course of Eight Lectures Delivered at the Royal Institution of Great Britain

John Tyndall

Index

[More information](#)

INDEX.

329

HAR

- Harmony--*continued*.
 -- Euler's theory, 287, 296
 -- conditions of harmony, 289
 -- influence of overtones on harmony, 301
 -- graphic representations of consonance and dissonance, 305
 Harmonica, the glass, 137
 Hawksbee, his experiment on sounding bodies placed *in vacuo*, 6
 Hearing, mechanism of, 323
 Heat, thermal changes in the air produced by the sonorous wave, 28
 -- ratio of specific heats at constant pressure and at constant volume deduced from velocities of sound, 31
 -- mechanical equivalent of heat deduced from this ratio, 33
 -- inference that atmospheric air possesses no sensible power to radiate heat, 34
 -- musical sounds produced by heated bars, 53
 -- conversion of sonorous motion into heat, 177
 Helmholtz, his theory of resultant tones, 281-283
 -- -- -- -- consonance, 292, 298
 Herschel, Sir John, his article on 'Sound,' quoted, 20
 Hooke, Dr. Robert, his anticipation of the stethoscope, 42
 -- his production of musical sounds by the teeth of a rotating wheel, 51
 Hydrogen, action of, upon the voice, 9
 -- velocity of sound in, 25, 37
 INFLECTION of sound, 22
 -- case of the Erith explosion, 23
 Interference and coincidence of sonorous waves, 259, 284
 -- extinction of sound by sound, 261, 284
 -- theory of beats, 263, 284
 Intervals, optical illustration of, 313
 Iron, velocity of sound transmitted through, and through iron wire, 39
 -- difference between the velocity of iron and air, 40

JOULES equivalent, 35
 Jungfrau, echoes of the, 17

MUS

- KALEIDOPHONE, Wheatstone's formation of, 132, 156
 Kundt, M., his experiments, 202
 LAPLACE, his correction of Newton's formula for the velocity of sound, 28
 Lead, velocity of sound transmitted through, 39
 Leconte, Professor, his observation upon sensitive naked flames, 230
 Lenses, refraction of sound by, 20
 Light, analogy between sound and, 13, 20
 -- causes of Newton's rejection of the undulatory theory of, 22
 Liquids, velocity of sound in, 37
 -- transmission of musical sounds through, 79
 -- action of sound on liquid veins, 247
 -- delicacy of liquid veins, 250
 Lissajous, M., his method of giving optical expression to the vibrations of a tuning-fork, 60
 Lupo, Lago del, echoes on the banks of the, 20
 MAPLE wood, velocity of sound transmitted through, 41
 Mayer, his formula of the equivalent of heat, 34
 Melde, M., his experiments with vibrating strings, 105
 -- and with sonorous ripples, 154
 Metals, velocity of sound transmitted through, 39
 -- determination of velocity in, 170
 Molecular structure, influence of, on the velocity of sound, 40
 Monochord, sonometer, the, 86
 Motion, conveyed to the brain by the nerves, 1
 -- sonorous motion. *See* SOUND
 Mouth, resonance of the, 197
 Music, physical difference between noise and, 48, 83
 -- a musical tone produced by periodic, noise by unperiodic, impulses, 49, 83
 -- production of musical sounds by taps, 51, 83
 -- -- -- -- by puffs of air, 55, 83

Cambridge University Press

978-1-108-06738-6 - Sound: A Course of Eight Lectures Delivered at the Royal Institution of Great Britain

John Tyndall

Index

[More information](#)

330

INDEX.

MUS

- Music, pitch and intensity of musical sounds, 57, 83
 — description of the syren, 63
 — definition of an octave, 71
 — description of the double syren, 76
 — transmission of musical sounds through liquids and stones, 79
 — musical chords, 306
 — the diatonic scale, 307
 — *See also* HARMONY
 Musical box, formation of the, 132, 156

- N**ERVES of the human body, origin and seat of the, 1
 — motion conveyed by the, to the brain, 1
 — rapidity of impressions conveyed by the, 2 *note*
 Newton, Sir Isaac, facts which led to his rejection of the undulatory theory of light, 22
 — his calculation of the velocity of sound, 27
 Nitrogen, protoxide of, velocity of sound in, 37
 Nodes, 97, 98
 — the nodes not points of absolute rest, 99
 — nodes of a tuning-fork, 137–139
 — rendered visible, 139–141
 — a node the organ of vibration, 209
 Noise, physical difference between music and, 48

- O**AK wood, velocity of sound transmitted through, 41
 Ochsenthal, echoes of the, 17
 Octave, definition of an, 71
 Olefiant gas, velocity of sound in, 37
 Organ-pipes, 178, 213
 — vibrations of stopped pipes, 180, 213
 — — the Pandæan pipes, 182
 — — — open pipes, 182, 214
 — state of the air in sounding pipes, 185, 214
 — reeds and reed-pipes, 192
 Otolithes of the ear, 324
 Overtones, definition of, 117

RIP

- Overtones, relation of the point plucked to the, 119
 — overtones corresponding to the vibrations of a rod fixed at both ends, 128
 — — of a tuning-fork, 137–139
 — — rendered visible, 139–141
 — — of rods vibrating longitudinally, 166
 — — of the syren, 293
 — influence of overtones on harmony, 301
 Oxygen, velocity of sound in, 37

- P**ANDÆAN pipes, the, 182
 Piano wires, clang of, 121
 — curves described by vibrating, 123
 Pine wood, velocity of sound transmitted through, 41
 Pipes. *See* ORGAN-PIPES
 Pitch of musical sounds, 57
 — illustration of the dependence of pitch on rapidity of vibration, 67
 — relation of velocity to pitch, 171
 — velocity deduced from pitch, 190
 — influences of pitch on flames, 239
 Platinum, velocity of sound transmitted through, 39
 Poplar wood, velocity of sound transmitted through, 41
 Pythagoreans, notions of the, regarding musical consonance, 288

- R**EEDS and reed-pipes, 192
 — the clarionet and flute, 195
 Reflection of sound, 13
 Refraction of sound, 20
 Resonance, 172
 — of the air, 173
 — of coal-gas, 175
 — of the mouth, 199
 Resultant tones, discovery of, 276
 — conditions of their production, 276
 — experimental illustrations, 278
 — theories of Young and Helmholtz, 281–283
 Reuss, thunder-like sound produced by the falls of the, 211
 Ripples, sonorous, in water, 153
 — and in lighter volatile liquids, 154, 158

Cambridge University Press

978-1-108-06738-6 - Sound: A Course of Eight Lectures Delivered at the Royal Institution of Great Britain

John Tyndall

Index

[More information](#)

INDEX.

331

RIP

- Ripples, Faraday and Melde's experiments, 144, 155, 158
 Robison, Professor, his production of musical sounds by puffs of air, 55
 Rod, vibrations of a, fixed at both ends: its subdivisions and corresponding overtones, 128, 157
 — vibrations of a rod fixed at one end, 129, 157
 — of rods free at both ends, 135, 157

- S**ALT, velocity of sound transmitted through a solution of common, 38
 Schultze's bristles in the mechanism of hearing, 324
 Sea water, velocity of sound in, 38
 Sensation transmitted by the human nerves to the brain, 1
 Silver, velocity of sound transmitted through, 39
 Smoke-jets, action of musical sounds on, 244
 Snow, transmission of sound through falling, 19
 Soda, velocity of sound transmitted through a solution of sulphate of, 38
 — through a solution of carbonate of, 38
 — and through a solution of nitrate of, 38
 Solids, velocity of sound transmitted through, 37, 39
 — musical sounds transmitted through, 80
 — determination of velocity in, 170
 Sonometer, or monochord, the, 86
 Sorge, his discovery of resultant tones, 276
 Sound, production and propagation of, 2, 44
 — experiments on sounding bodies placed *in vacuo*, 6, 44
 — action of hydrogen upon the voice, 9
 — propagation of sound through air of varying density, 9
 — amplitude of the vibration of a sound-wave, 11, 44
 — the action of sound compared with that of light and radiant heat, 13

SOU

- Sound—*continued*.
 — reflection of, 13, 44
 — echoes, 17, 20, 44
 — sounds reflected from the clouds, 18
 — transmission of sound through falling snow, 19
 — refraction of sound, 20, 44
 — inflection of sound, 22, 44
 — influence of temperature on velocity of sound, 24, 45
 — influence of density and elasticity on velocity, 25, 45
 — determination of velocity, 26, 45
 — Newton's calculation, 27, 46
 — Laplace's correction of Newton's formula, 28, 46
 — thermal changes produced by the sonorous wave, 28, 46
 — velocity of sound in different gases, 37, 47
 — — — in liquids and solids, 37–40, 47
 — influence of molecular structure on the velocity of sound, 40, 47
 — velocity of sound transmitted through wood, 41, 47
 — physical distinction between noise and music, 48
 — musical sounds periodic, noise imperiodic, impulses, 49
 — — — produced by taps, 51
 — — — by puffs of air, 55
 — pitch and intensity of musical sounds, 57
 — vibrations of a tuning-fork, 58
 — graphic representations of the vibrations on a piece of smoked glass, 59
 — M. Lissajous' method of giving optical expression to the vibrations of a tuning-fork, 60
 — description of the syren, and definition of the wave-length, 63
 — determination of the rapidity of vibration, 68
 — and of the length of the corresponding sonorous wave, 69
 — various definitions of vibration and of sound wave, 69
 — limits of range of hearing of the ear: highest and deepest tones, 71
 — double syren, 76
 — transmission of musical sounds through liquids and solids, 78–82

Cambridge University Press

978-1-108-06738-6 - Sound: A Course of Eight Lectures Delivered at the Royal Institution of Great Britain

John Tyndall

Index

[More information](#)

332

INDEX.

SOU

Sound—*continued.*
 — the sonometer, or monochord, 86
 — vibrations of strings, 86
 — influence of sound-boards, 89
 — laws of vibrating strings, 90
 — direct and reflected pulses, 93
 — stationary and progressive waves, 95
 — nodes and ventral segments, 96, 97
 — application of the results to the vibration of musical strings, 102
 — M. Melde's experiments, 105
 — longitudinal and transverse impulses, 107
 — laws of vibration thus demonstrated, 111, 125
 — harmonic tones of strings, 115, 116, 126
 — definitions of timbre, or quality, of overtones and clang, 117, 127
 — relation of the point of string plucked to overtones, 119
 — vibrations of a rod fixed at both ends: its subdivisions and corresponding overtones, 128
 — — of a rod fixed at one end, 129
 — Chladni's tonometer, 131
 — Wheatstone's Kaleidophone, 152, 156
 — vibrations of rods free at both ends, 135, 157
 — nodes and overtones of a tuning-fork, 137–139, 157
 — — — rendered visible, 139–141, 157
 — vibrations of squared plates, 144, 157
 — of discs and bells, 147, 150, 158
 — sonorous ripples in water, 153, 158
 — Faraday's and Melde's experiments on sonorous ripples, 154, 155, 158
 — longitudinal vibrations of a wire, 159
 — relative velocities of sound in brass and iron, 162
 — examination of vibrating bars by polarised light, 168
 — determination of velocity in solids, 170
 — relation of velocity to pitch, 171
 — resonance, 172, 211, 214
 — — of the air, 173, 214

SOU

Sound—*continued.*
 — resonance of coal-gas, 175, 214
 — conversion of sonorous motion into heat, 177
 — organ-pipes, 178, 214
 — — stopped pipes, 180, 214
 — — open pipes, 182, 214
 — reeds and reed-pipes, 192, 215
 — — the clarinet and flute, 195
 — description of the organ of voice, 195, 215
 — — the roughness in colds and the squeaking falsetto, 197
 — — the vowel-sounds, 197, 215
 — — synthesis of vowel-sounds, 200
 — Kundt's experiments on sound-figures within tubes, 202, 216
 — new methods of determining velocity of sound, 204–210, 216
 — sounding of flames, 217, 252
 — — analysis of, 223
 — — harmonic notes of flames, 243
 — — effect of unisonant notes on singing flames, 229, 253
 — — — sound on naked flames, 230, 253
 — — — — pitch on flames, 239, 253
 — — delicacy of flames as acoustic reagents, 239
 — — the vowel flame, 241
 — action of musical sounds on unignited jets of gas, 243
 — — — — on jets of water, 245
 — law of vibratory motions in water and air, 255, 284
 — superposition of vibrations, 258
 — interference and coincidence of sonorous waves, 259, 284
 — extinction of sound by sound, 261, 284
 — theory of beats, 263, 284
 — action of beats in flame, 264, 285
 — optical illustration of beats, 266, 285
 — various illustrations of beats, 274
 — resultant tones, 276, 285
 — — conditions of their production, 276
 — — — experimental illustrations, 278
 — — — theories of Young and Helmholtz, 281–283
 — — difference tones and summation tones, 281, 282

Cambridge University Press

978-1-108-06738-6 - Sound: A Course of Eight Lectures Delivered at the Royal Institution of Great Britain

John Tyndall

Index

[More information](#)

INDEX.

333

SOU

- Sound—*continued.*
 — combination of musical sounds, 286
 — the smaller the two numbers which express the ratio of their rates of vibration, the more perfect is the harmony of two sounds, 288
 — notions of the Pythagoreans regarding musical consonance, 288
 — Euler's theory of consonance, 289, 296
 — physical analysis of the question, 289
 — — the double syren, 289–291
 — theory of Helmholtz, 292, 298
 — causes of dissonance, 298–301
 — influence of overtones on harmony, 301
 — graphic representations of consonance and dissonance, 305
 — musical chords, 306
 — the diatonic scale, 307
 — optical illustration of intervals, 313
 — sympathetic vibrations, 321
 — mode in which sonorous motion is communicated to the auditory nerve, 323
 Sound-boards, influence of, 89
 Sound-figures within tubes, M. Kundt's experiments with, 202–207
 Stars, Doppler's theory of the coloured, 78
 Steam-jet, thunder-like sound produced by a, in Iceland, 211
 Steel, velocity of sound transmitted through, and through steel-wire, 39
 Stethoscope, Dr. Hooke's anticipations of the, 42
 Stones, transmission of musical sounds through, 79, 85
 Straw-fiddle, formation of the, 137, 157
 Strings, vibration of. 86
 — laws of vibrating strings, 90
 — combination of direct and reflected pulses, 93
 — stationary and progressive waves, 95
 — nodes and ventral segments, 96, 97
 — application of results to the vibration of musical strings, 102
 — experiments of M. Melde, 105

VEL

- Strings—*continued.*
 — longitudinal and transverse impulses, 107
 — laws of vibration thus demonstrated, 111, 125
 — harmonic tones of strings, 115, 116, 126
 — timbre or quality, and overtone and clang, 119, 127
 — Dr. Young's experiments on the curves described by vibrating piano wires, 123
 — longitudinal vibrations of a wire, 159
 — — — — — with one end fixed, 163
 — — — — — with both ends free, 164
 Summation tones, 282
 Sycamore wood, velocity of sound transmitted through, 41
 Syren, description of the, 63
 — sounds, description of the, 63
 — its determination of the rate of vibration, 68
 — the double syren, 76, 289

TARTINI'S tones, 276. *See* RESULTANT TONES

- Timbre, or quality of sound, definition of, 117
 Tonometer, Chladni's, 131
 Tuning-fork, vibrations of a, 58
 — graphic representations of the vibrations on a piece of smoked glass, 59
 — M. Lissajous' method of giving optical expression to the vibrations, 60
 — strings set in motion by tuning-forks, 102
 — vibrations of the tuning-fork as analysed by Chladni, 137
 — nodes and overtones of a tuning-fork, 139, 157
 — interference of waves of the, 272
 Turpentine, velocity of sound transmitted through spirits of, 38

- V**ELLOCITY of sound, influence of temperature on, 24
 — influence of density and elasticity on, 25

Cambridge University Press

978-1-108-06738-6 - Sound: A Course of Eight Lectures Delivered at the Royal Institution of Great Britain

John Tyndall

Index

[More information](#)

334

INDEX.

VEL

- Velocity—*continued*.
 — determination of, 26
 — Newton's calculation, 27
 — velocity of sound in different gases, 37
 — and transmitted through various liquids and solids, 37-40
 — relative velocities of sound in brass and iron, 162
 — relation of velocity to pitch, 171
 — velocity deduced from pitch, 190
 Ventral segments, 97
 Vibrations of a tuning-fork, 58
 — representations of the vibrations on a piece of smoked glass, 59
 — method of giving optical expression to the vibrations of a tuning-fork, 60
 — illustration of the dependence of pitch on rapidity of vibration, 67
 — the rate of vibration determined by the syren, 68
 — determination of the length of the sound wave, 69, 84
 — various definitions of vibrations, 69, 84
 — vibration of strings, 86
 — laws of vibrating strings, 90
 — direct and reflected pulses illustrated, 93
 — application of the result to the vibration of musical strings, 102
 — M. Melde's experiments on the vibration of strings, 105
 — longitudinal and transverse impulses, 107
 — vibration of a red-hot wire, 110
 — laws of vibration thus demonstrated, 111, 125
 — new mode of determining the law of vibration, 113
 — harmonic tones of strings, 115, 116, 126
 — vibrations of a rod fixed at both ends; its subdivisions and corresponding overtones, 128
 — vibrations of a rod fixed at one end, 129
 — Chladni's tonometer, 131
 — Wheatstone's Kaleidophone, 132
 — vibrations of rods free at both ends, 135
 — nodes and overtones rendered visible, 139-141

WAT

- Vibrations of square plates, 144
 — of discs and bells, 147
 — longitudinal vibrations of a wire, 159, 212
 — — — — — with one end fixed, 163
 — — — — — with both ends free, 164
 — divisions and overtones of rods vibrating longitudinally, 166
 — examination of vibrating bars by polarised light, 168
 — vibrations of stopped pipes, 180
 — — of open pipes, 182
 — a node the organ of vibration, 209
 — law of vibratory motions in water and air, 255
 — superposition of vibrations, 258
 — theory of beats, 263
 — sympathetic vibrations, 321
 — M. Lissajous' method of studying musical vibrations, 307
 Violin, formation of the, 89
 — sound-board of the, 89
 — the iron fiddle, 132, 156
 Voice, human, action of hydrogen upon the, 9
 — sonorous waves of the, 71
 — description of the organ of voice, 195
 — causes of the roughness of the voice in colds, 196
 — causes of the squeaking falsetto voice, 197
 — Müller's imitation of the action of the vocal chords, 197
 — formation of the vowel-sounds, 197
 — synthesis of vowel-sounds, 200
 Vowel-flame, the, 241
 Vowel-sounds, formation of the, 197
 — synthesis of, 200
- W**ATER-WAVES, stationary, phenomena of, 100
 Water, velocity of sound in, 37, 38
 — transmission of musical sounds through, 78
 — effects of musical sounds on jets of water, 245
 — delicacy of liquid veins, 247
 — law of vibratory motions in water, 255

Cambridge University Press

978-1-108-06738-6 - Sound: A Course of Eight Lectures Delivered at the Royal
Institution of Great Britain

John Tyndall

Index

[More information](#)

INDEX.

335

WAV

- Wave-length, definition of, 63
 — determination of the length of
 the sonorous wave, 69
 — definition of sonorous wave, 69
 Wave-motion, illustration, 93-97
 — law of, 255
 Waves of the sea, causes of the roar
 of the breaking, 55
 Weber, Messrs., their researches on
 wave-motion, 97
 Wetterhorn, echoes of the, 17
 Wheatstone, Mr., his Kaleidophone,
 132
 Wires. *See* STRINGS
 Wood, velocity of sound transmitted
 through, 41

YOU

- Wood, musical sounds transmitted
 through, 80
 — the claque-bois, 137
 — determination of velocity in wood,
 170
 Woodstock Park, echoes in, 20
- Y**OUNG, Dr. Thomas, his proof of
 the relation of the point of a
 string plucked to the overtones,
 118
 — on the curves described by
 vibrating piano wires, 123
 — his theory of resultant tones, 281

LONDON

PRINTED BY SPOTTISWOODE AND CO.

NEW-STREET SQUARE