

Index

- Adams, Douglas: *The Hitchhiker's Guide to the Galaxy*, 306
- Adams, John, 169
- Africa, 28, 168
- agricultural civilization, origins of
 animal domestication, 47–49
 earliest empires, 54–60
 food storage and preservation, 45
 permanent settlements, 49–53
 plant domestication, 45–47
 pre-agrarian settlements, 43–45
 sacred structures, 53–54
 theories of, 42
 timeline, 42
 warfare in, 53
- agricultural revolution
 European, 108–110
 Islamic, 102–105
- Albert, Prince, 160, 164
- Alcuin of York, 112
- Alexander the Great, 86, 87
- Allen, Paul, 277
- Altair 8800 (computer), 275
- alternating current (AC), 190–191
- American Academy of Arts and Sciences, 169
- American Philosophical Society, 169
- American Revolution, 167, 234
- Ampère, André-Marie, 188
- amplifiers (electronic), 262, 268
- Analytical Engine (calculator), 259
- Anasazi, 295
- androids, 274
- aniline dye, 161–162
- animal domestication
 Chinese animal power technology, 66–67
 earliest developments in, 47–49
 Neolithic roots of, 38
 and textile industry, 134
- Annie McKim* (clipper ship), 168
- Anthropocene, 284
- Antikythera mechanical calculator, 254
- Apollo Program, 297
- Apple Computers, 275–276, 278
- Appold, John G., 219
- Arab Spring (political movement), 280
- ARAPANET, 278
- arch construction system, 95
- archeological eras
 Bronze Age, 29
 Mesolithic, 30
 Neolithic, 30
 Paleolithic, 29
- archeological technology
 art and music, 35–37
 fire, 31–33
 Neolithic life, 37–39
 stone tool making, 27–31
 timeline, 27
 Upper Paleolithic Revolution, 34–35
 Venus figurines, 33
- Archie (search engine), 279
- Archimedes
 Claw of, 144
On Floating Bodies, 88
 as role model, 4–5
 story of, 87–88
- architecture
 in cities and suburb growth, 220–222
 Crystal Palace, 160
 and home sizes, 218
 Modernist, 222
 Roman, 93–96
 skyscrapers, 219–220, 228
- Arelate, 97–98
- argon isotope dating technique, 29
- Arkwright, Richard, 139–141
- arms race. *See also* Cold War
 and aviation, 202
 chemical warfare in, 199–200
 and dreadnoughts, 196–198
 and industrialized war, 195–196
 and machine guns, 199
 and submarines, 198
 and tanks, 201
- Armstrong, Edwin H., 264
- Arrhenius, Svante, 285
- art
 earliest developments in, 35–37, 40
 as forerunner to printing, 73
- Arthur, W. Brian, 304
- artifacts, from archeological eras, 29–31
- artificial intelligence, 303–305
- ASDIC sonar system, 300
- Asia
 maritime capabilities, 80
 mechanical calculation tools in, 254
 miracle rice in, 207
- assembly line, 193, 223
- Aswan High Dam, 281–282, 292–293
- Atlantic Ocean region technology.
See also United States of America
 engineering, 184–186
 timeline, 166
- Atlantikwall, 241
- Atlantis* (space shuttle), 298
- atlatl, 38
- atomic energy. *See* nuclear power
- Audion, 263
- Australopithecines, 29, 32
- automobile
 and Henry Ford, 193–194
 and petroleum, 194–195
 tunnel creation for, 236
- autonomous robots, 274
- autonomous technology, 305
- autopoietic system, 304
- aviation
 in digital age, 271–272
 First World War, 201, 237
 and Lindbergh, 236, 237
 Second World War, 243–245
- Avro Lancaster (plane), 244, 272
- Babbage, Charles
 Economy of Manufactures and Machinery, 257
 effect on others, 259
 life of, 256
- Bachelor in Paradise*, 224

314  INDEX

- Baird, John Logie, 265
Bait al-Hikma (House of Wisdom), 104
Baltimore and Ohio (B&O) Rail Road Company, 154, 173
banking
 Bank of England, 129, 132
 Medici Bank, 132
Banu Musa brothers, 104
Bardeen, John, 268
batteries, 287–288
Battle of Hastings, 111
Beijing, 222
Bell, Alexander Graham, 235, 261, 263
Benedictine order, 114–115
Bent Pyramid, 60
Bentham, Jeremy, 130
Bessemer, Henry, 308
 ‘The Manufacture of Iron without Fuel’, 156
Bessemer process, 156–158
Bhopal pesticide disaster, 293–294
Bi Sheng, 73
Biddle, James, 175
Billings, John Shaw, 260
Binet, Alfred, 234
Binet-Simon test, 234
Birdseye, Clarence Frank, 216
Black Death. *See* bubonic plague
black ships, 175–177
Black Tuesday, 238
Blake, William, 129
blast furnace, 156
Bláthy, Ottó, 190
Blitzkrieg warfare, 240–241
Blombos Cave, 33
Bob & Carol & Ted & Alice, 224
Boch, Karl, 188
Boeing 707 and 747, 271, 272, 290
Boeing B-17 Flying Fortress, 244
Boeing B-29 Superfortress, 244
bomber (plane), 244
boomerang, 37
Borlaug, Norman, 207
Bose, Jagadish Chandra, 263
Bouchon, Basile, 142
Boulton, Matthew, 151
bow and arrow, 39
Braidwood, Robert, 42
brain development
 and tool usage, 28, 30
 in the Upper Paleolithic, 34–35
Brattain, Walter, 268
Bridges, Robert, 129
Brin, Sergey, 279
Britain
 and American Revolution, 167
 and Atlantic sugar trade, 167–168
 banking and patents, 131–133
 BBC television broadcasting, 265
 civil service examinations in, 78
 corporation, 158
 energy and chemistry, 160–162
 engineering education in, 185
 factory system in, 147–149
 garden city movement in, 218
 Great Exhibition of the Works of Industry of all Nations (1851), 159–160
 most powerful empire after US Civil War, 182
 nuclear weapons, 249
 and origin of computing, 256
 relationships after First World War, 231
 Second World War technologies
 Spanish invasion of, 122–123
 supremacy in the Industrial Revolution, 130–131
 textile industry in, 134–143
 unions in, 232–233
Brown, George, 173
bubonic plague
 effects in Europe, 115–116
 and fall of Islamic empire, 105
buckminsterfullerene, 301
bureaucracy
 Chinese, 72–78
 European, 109–110
 Greek, 86–87
 Roman, 97–98
Burke, James, 116
Butler, Samuel: *Erewhon*, 303
Butterick, Ebenezer and Ellen, 217
Byrd, Richard E., 236
Cagliari, Adam, 308
Cai Lun, 72
Calahan, Edward A., 238
calculators, 254–256
calotype, 180
Canada
 Head-Smashed-In Buffalo Jump, 38
 nuclear weapons in, 249
 oil discovery in, 195
 satellite broadcasts in, 298
 time standardization in, 182
 urbanization in, 221
canals, 171
cannon boring machine, 151
cannons, 76, 179
Čapek, Josef, 274
Čapek, Karel, 274
carding, 134, 139
Carnot, Sadi: *Reflections on the Motive Power of Fire*, 162
carracks, 120
Cartwright, Edmund, 141
cast iron, 68–69
Çatalhöyük, 44–45, 49
catapult, 99
cathedral schools, 112
cathode rays, 262
cave painting, 35–36, 37
Caxton, William, 118
Centro Internacional de Mejoramiento de Maíz y Trigo (International Maize and Wheat Improvement Center), 207
Chain Home system, 246
Chakrabarty, Ananda, 299–300
Challenger (space shuttle), 298
charcoal, 209
Charlemagne, 111–113
Chauvet Cave, 35–36
Cheops, 57
Chernobyl nuclear accident, 284
Chinese technology
 animal power, 66–67
 domestic, 208
 gunpowder, 75
 hydroelectricity, 282
 importance of agriculture to, 65–66
 invisible, 76–78
 list of inventions, 64
 metallurgical, 68–70
 paper and printing, 72–75
 resistance to, 17
 and river systems, 55
 rocket, 247
 timeline, 63
 trade and exploration, 78–80
 waterwheels, 150–152
chlorine gas, 200
Chomsky, Noam: *Manufacturing Consent: The Political Economy of Mass Media*, 11
Cistercian order, 114–115
Citizens Band radio, 269
civil service examinations, 76–78
Clark, Sir Kenneth: *Civilization*, 306
Clarke, Arthur C., 298
 The Fountains of Paradise, 301
climate change. *See also* environment and agricultural development, 45

- and the Anthropocene, 284
- and fall of the Roman Empire, 100
- history of, 294–296
- in the Upper Paleolithic Revolution, 34–35
- clipper ship, 168–169
- coal, 211, 284
- coal gas, 161
- coal-tar, 161
- COBOL (Common Business-Oriented Language), 277
- code talkers, 243
- coding (information), 242–243
- coke (coal), 156, 161
- Cold War. *See also* arms race
 - affecting Green Revolution, 207
 - ENIAC in, 266
 - space exploration, 296–299
- Cole, Henry, 160
- Coliseum, 95
- Colossus (early computer), 243
- Columbia (space shuttle), 298
- Columbus, Christopher, 119–120, 127, 167
- column and beam construction, 93–95
- comitatus*, 110
- communications technology
 - and empire formation, 23
 - “medium is the message”, 22–23
 - radio, 235–236, 263–264, 269–270
 - Roman road network as, 91–92
 - satellite, 298–299
 - telegraph, 178–179, 189–190, 237–238
 - telephone, 260–261, 263
- competition
 - Dollar Auction Game, 21
 - lack of in China, 80
 - as societal condition for technological change, 16
- complexity of human society, 8–9
- computers
 - origins of, 259–260
 - in reshaping modern world, 253–254
 - software for, 275–277
 - tube technology in, 265–268
- Conard, Nicholas, 36
- concrete, 95–96
- container ship, 271
- Convair 880, 271
- converter (Bessemer), 156
- Cooke, William, 189
- corporation, 158
- cotton
 - and Richard Arkwright, 140
 - in textiles, 135
 - in United States, 173–174
- cotton gin, 173–174
- Cowan, Ruth Schwartz: *More Work for Mother*, 228
- Cromford Mill, 140
- Crookes, William, 262
- crop rotation
 - Chinese, 65–66
 - European, 109
- crucible method (steel), 156
- Crusades, 113, 167
- Crutzen, Paul, 285
- Crystal Palace, 160, 220
- CSS (cascading style sheets), 279
- Cugnot, Nicolas-Joseph, 153
- Curl, Robert, 301
- cutters (stone), 30

- Daguerre, Louis-Jacques-Mandé, 180
- daguerreotypes, 180
- Damascus steel, 104–105, 156
- Darby, Abraham I, 156
- Darwin, Charles: *On the Origin of Species by Means of Natural Selection*, 303
- dating techniques, 29
- De Forest, Lee, 262
- de Havilland Comet, 271
- Deepwater Horizon disaster, 271
- democracy
 - and the Industrial Revolution, 130
 - technological determinism and, 10–11
- demographics
 - European proto-industrial revolution, 126
 - India losing population, 294
 - and industrialization, 232, 251
 - population growth during the Industrial Revolution, 129
 - and US Census technology, 260
- Demorest, Ellen Louise Curtis, 217
- Déri, Miksa, 190
- Devol, George, 274
- Diderot, Denis: *Encyclopédie*, 4
- Difference Engine, 257
- digital age technology
 - batteries, 287–288
 - calculator, 254–256
 - computers
 - internet, 278–281
 - origins of, 259–260
 - personal, 274–275
 - software, 275–277
 - tube technology, 265–268
 - device connection, 288–289
 - electronics
 - origins of, 261–262
 - solid-state, 268–269
 - energy exploitation, 281–282
 - nuclear power, 282–284
 - radio, 263–264
 - robots, 273–274
 - telephone
 - invention of, 260–261
 - mobile, 269–270
 - networks, 263
 - television, 264–265
 - timeline, 253
 - transportation, 270–273
- Dilke, Charles, 159
- direct current (DC), 190–191
- dirigible, 237
- Discovery* (space shuttle), 298
- Djoser (pharaoh), 57
- dog domestication, 47–49
- Dolní Věstonice, 40
- Dollar Auction Game, 21
- domestic technology. *See also* women
 - cooking in fireplaces and ovens, 208–211
 - cooking with electricity, 212
 - food/Green Revolution, 206–208
 - home architecture/suburbs, 218–223
 - ideology around, 224
 - microwave oven, 212–213
 - Neolithic era, 37–39
 - refrigeration, 213–216
 - sewing machine, 216–218
 - timeline, 205
- Dominican Republic, 168
- Dornberger, Walter, 247
- Douglas DC-8, 271
- dreadnoughts, 196–198
- Drexler, Eric: *Engines of Creation*, 301
- Dutch East India Company, 158
- dye industry, 161–162

- Easter Island, 20
- Eccles, William, 265
- Eckert, John Presper, 266
- École Polytechnique, 185
- École Royale des Ponts et Chaussées (Royal College of Bridges and Roads), 185
- Edgerton, David: *The Shock of the Old*, 8
- Edison, Thomas
 - Hertz waves, 263
 - life of, 190–191
 - as role model, 4–5, 235
 - and stock ticker, 238
 - and trial street lighting, 212
 - and War of the Currents, 190–191

316  INDEX

- education. *See also* invisible technologies
for Chinese civil service exams, 76–78
engineering, 184–186
European cathedral schools, 112
Islamic, 104
mass, 233–235
- EDVAC (Electronic Discrete Variable Automatic Computer), 267
- Egypt
crop rotation in, 109
hydroelectric power in, 281–282
importing technology, 292–293
Library of Alexandria, 87
- Eight-Hour Day movement, 232
- Einstein, Albert, 247–248
- Ekhholm, Nils Gustaf, 285
- electricity
commercial, 190–193
in domestic technology, 216–218
in food preparation, 212–216
as form of network, 24
history of, 188–189
as major turning point in world history, 253
- electromagnetism, 263
- electron, 261–262
- electronics
from cathode ray technology, 262–263
device connection, 288–289
origins of, 261–262
solid-state, 268–269
tube technology, 265–268
wave technology, 264
- elevator, 219–220
- Ellul, Jacques, 306
The Technological Society, 11, 145
- empires
British, 182
earliest development from settlements, 54–60
Greek, 86
Islamic, 100–105
Roman, 90–100
- Enclosure Acts (1750–1860), 143–144
- energy
coal, 161, 211, 284
electrical, 188–189, 253
exploitation in digital age, 281–282
nuclear, 282–284
petroleum, 194–195
waterwheels, 114–115, 150–152
wood, 20
- Engelbart, Douglas, 278
- Engels, Friedrich, 130
- England. *See* Britain
- ENIAC (Electronic Numerical Integrator and Calculator), 266–267
- Enigma machine coding, 242–243, 251
- environment. *See also* climate change
Anthropocene influence, 284
Bhopal pesticide disaster, 293–294
Green Revolution and biodiversity, 207
oil tanker hazards, 271
waste disposal, 273
- Eratosthenes, 87
- Erie Canal, 171
- Etruria, 148
- Euclid: *The Elements*, 87
- Euphrates river, 55
- European technology
after US Civil War, 182
agrarian
crop rotation, 109
timeline, 108
and Atlantic sugar trade, 167–168
bubonic plague affects, 115–116
Cistercian order, 114–115
Crusades, 113–114
feudalism, 110
imported, 292–293
- Industrial Revolution
banking and patents, 131–133
energy, 161
British supremacy in, 130–131
factory system, 147–149
Luddites/neo-Luddites, 143–144
manufacturing with labor
division and steam power, 131
steam-powered engines, 150–154
steel, 154–158
textile production, 134–143, 146
timeline, 129
Islamic influence in, 114
maritime, 80, 119–123
movable type printing, 116–119
proto-industrial revolution
influences on, 123–124
population changes in, 126
slavery, 124–125
and rise of Charlemagne, 111–113
stirrup, 110–111
- exploration voyages
Chinese, 79–80
European, 119–123
Greek, 87
space, 296–299
- Exxon Valdez disaster, 271
- Factory Act (1847), 232
- factory system
growth of, 147–149
Henry Ford's automobile, 193–194
and just-in-time manufacturing, 272–273
robots in, 274
- Fair Labor Standards Act, 232
- fake news, 281
- Falcon, Jean, 142
- Faraday, Michael, 189
- fardier à vapeur* (steam cart), 153
- Farnsworth, Philo, 265
- fashion (home), 217
- Fat Man (bomb), 249
- felting, 137
- Fermi, Enrico, 248, 282
- Ferranti, Sebastian de, 190
- Fertile Crescent
beginning of agriculture in, 40
as birthplace of western civilization, 84
mechanical calculation tools in, 254
plow development in, 67
- fertilizer nitrates, 187–188
- Fessenden, Reginald, 198, 264
- feudalism
European, 110
hierarchy as form of network, 23
- Feynman, Richard, 301
- fire
clay pottery, 51
earliest use of, 31–33
and magic and religion, 33
- fire-lance, 75
- fireplace, 208–211
- First World War
areas of combat in, 238
aviation in, 202
chemical warfare in, 199–200
creating cultural disdain for history, 235
and creation of military research institutions, 242
dreadnoughts in, 196–198
German technology and, 186–188
and industrialization, 195–196
machine guns in, 199
submarines in, 198
tanks in, 201
and technology in twentieth century, 231–232
- Five Pillars of Islam, 101–102
- flax (grain), 134
- flip-flop circuit, 265
- Flowers, Tommy, 243, 268

- flying shuttle, 138
 flywheel, 103
 food
 Green Revolution and biodiversity of, 206–208
 Islamic agrarian revolution, 102–105
 Roman production of, 109–110
 and technology in China, 65–66
 and technology in Germany, 187–188
 food preparation
 electricity in, 212–216
 importance of cooking in, 32
 technology history of, 208–211
 food surplus
 earliest storage and preservation, 45
 and empire building, 54–60
 and permanent settlements, 49–50
 Ford, Henry, 193–194, 235
 Fourier, Joseph, 285
 France
 Maginot Line, 239
 relationships after First World War, 231
 slide rule, 256
 Franklin, Benjamin
 American Philosophical Society, 169
 and electricity, 188
 and firebox baffles, 209
 Franklin, Ursula
 philosophy of technology, 12–13
 The Real World of Technology, 12, 309
 Freya system, 246
 Frisch, Otto Robert, 248
 Fukushima Daliichi nuclear power plant, 284
 Fuller, Buckminster, 301
 Fuller, Frances, 160
 Fuller, J. F. C.: *The Foundations of the Science of War*, 239
 fulling, 136–137
 Fust, Johann, 117
 fusta, 120

 Gagarin, Yuri, 297
 galleon, 120
 galley, 120
 Ganges river, 55
 garden city movement, 218
 gas absorption refrigerator, 214
 gas stove, 211
 Gates, Bill, 277

Gattaca, 7
 Geim, Andre, 301
 Geissler, Heinrich, 262
 gender
 ideology around domestic tasks, 224
 industrialization and, 225
 and marginalization, 14–15
 General Electric, 190–191, 215
 General Foods Corporation, 216
 genetics challenges (human), 299–300
 Germany
 early television broadcasts in, 265
 engineering education in, 185
 preparation for First World War, 186–188
 relationships after First World War, 231, 236
 Second World War technologies, 239–241, 242–245, 246–247, 251
 and Spanish Civil War, 238
 Gesner, Abraham, 195
 Glendinning, Chellis, 145
 Global Positioning System (GPS), 304
 Göbekli Tepe, 43–44
 Goddard, Robert, 235, 247
 Goodyear, Charles, 183
 Google, 279
 Gorrie, John, 214
 government
 banking, 132
 engineering projects, 74–75
 investment in innovation by, 17–18
 online privacy laws, 280
 and railways, 174–175
 time standardization importance to, 183
Graf Zeppelin, 237
 grains, 45–47, 134, 207
 graphene, 301
 graphical user interface (GUI), 278
 Gray, Elisha, 261
 Great Depression
 causes of, 237–238, 251
 system vulnerability in, 296
 Great Exhibition of the Works of Industry of all Nations (1851), 159–160, 211
 Great Leap Forward. *See* Upper Paleolithic Revolution
 Great Pyramid of Giza, 57–60
 Great Rift Valley (Africa), 28
 Great War. *See* First World War

 Greece
 and Antikythera mechanical calculator, 254
 electricity, 188
 empire of, 86
 technology of, 86–87
 Greek Orthodox Church, 111
 greenhouse gas effect, 285
 Greenwich Mean Time, 182
 Gribbeauval, Jean-Baptiste Vaquette de, 180
 Gross, Alfred J., 269
 gunpowder, 75–76
 guns
 earliest, 76
 machine, 199
 Gutenberg, Johan
 life of, 116–117
 mass printing and democratic ideology, 10–11
 as role model, 4–5

 Haber, Fritz, 188
 Hagoaka, Hantaro, 262
 Hahn, Otto, 248
hai jin (Sea Ban laws), 80
 Haiti, 168
 Hajj, 101–102
 Hancock, Thomas, 183
 hand axe, 31
 Handley Page Halifax (plane), 244
 Hardin, Garrett, 22, 310
 harness (horse), 66–67
 harpoon, 38
 Harrison, John, 4
 Harvard mouse, 300
 Hawass, Zahi, 58
 Hawley, Jesse, 171
 Hawthorne, Nathaniel, 211, 229
 Hayden, Brian, 42
 Head-Smashed-in-Buffalo-Jump, 38
 Heilbronner, Robert L., 10
 Heineman, Arthur S., 236
 Heinkel He 177, 244
 Henry, Joseph, 189, 263
 Henshilwood, Christopher, 33
 Hero of Alexandria, 4, 274
 Hertz, Heinrich Rudolf, 263
 Hertz waves, 263
 Higgs, Thomas, 139
 Hilly Flanks hypothesis, 42
Hindenburg, 237
 Hings, Donald, 269
HMS Dreadnought, 197
 Hoffmann, August Wilhelm von, 161
 Holland, Clifford, 236

318  INDEX

- Hollerith, Herman, 260
Home Insurance Building, 220
Homo erectus, 32
Homo habilis, 27
Homo sapiens, 27, 34–35
Hoover Dam, 281
Hopper, Grace, 15, 275–276
Houdin, Jean-Pierre, 59
Howard, Ebenezer, 219–220
Howe, Elias, 216
HTML (hypertext markup language), 279
Hudson's Bay Company, 158
Huelsmeyer, Christian, 245
Hull, Albert W., 213
Hull, Charles, 301
Human Genome Project, 299
Hunt, Walter, 216
hunter-gatherer societies, 37–39
hydroelectricity, 281–282
- IBM Corporation, 260, 274, 275–276
Ibn al-Baitar: *Kitan al-Jami fi al-Adwiya al-Mufrada*, 103
ICBMs (Inter-Continental Ballistic Missiles), 297
ice machine, 214
Ice Man, 37
impeller pump, 219
imported technology, 292–293
IMSAI 8080 (computer), 275
Index of Proscribed Books, 118
India
 Bhobal pesticide disaster, 293–294
 mechanical calculation tools in, 254
 miracle rice in, 207
 river systems in, 55
 sugar production in, 167
indulgences, printing of, 117
Indus river, 55
Industrial Revolution
 banking and patents, 131–133
 British early supremacy in
 earliest use of term, 163
 energy, 161
 engineering education and, 185–186
 factory system, 147–149
 and gender roles, 225
 Luddites/neo-Luddites, 143–144
 manufacturing with labor
 division and steam power, 131
 refrigeration technology in, 214
 and social fascination with novelty, 16
 steam-powered engines, 150–154
 steel, 154–158
 textile production, 134–143, 146
 timeline, 129
information bubbles, 280
ink, 117
Innis, Harold, 92
integrated circuit technology, 275
Intel, 275
intelligence tests, 234
internet, 278–281
Internet of Things, 302–303
inventors
 bank financing of, 132
 characteristics of, 89–90
 Greek, 86–88
 as role models, 4–5
invisible technologies. *See also*
 education
 British banking and patents, 131–133
 Chinese, 76–78
 corporation, 158
 definition of, 3
 European feudalism, 110
 Neil Postman on, 13–14
iron, 68–69
Iron Lion of Cangzhou, 69
irrigation systems, 103
Isaacson, Walter, 310
Islamic world
 agrarian revolution, 102–105
 Golden Age of, 100–105
 gunpowder in, 75–76
 resistance to innovation after the Golden Age, 17
 rise of, 100–102
 sugar trade in, 167
 technological decline in, 296
Jabir ibn Hayyan, 103–104
Jacobs, Jane: *The Death and Life of Great American Cities*, 224
Jacquard, Joseph Marie, 142–143
Jacquard cards (calculation), 259, 260
Jaques, Kevin, 310
Jani'at al-Qarawiyyin, 104
Japan
 black ship trade from United States, 175–177
 car culture in, 221
 Fukushima Daiichi nuclear power plant, 284
 importing technology, 292–293
 Pearl Harbor attack, 249
 relationships after First World War, 231
 samurai swords in, 69–70
 Shimabara Rebellion, 80
JavaScript, 279
al-Jazari, 274
The Jazz Singer (movie), 236
Jefferson, Thomas, 130, 169
jet aircraft, 245, 271–272
Jewett, Llewellynn, 310
Jordan, Frank Wilfred, 266
jumps (hunting), 38
Junkers Ju 88A (plane), 244
just-in-time manufacturing, 272–273
Kaczynski, Theodore (Unabomber), 146
Kaiser Wilhelm Institutes, 187
Kay, John, 138
Kennedy, John F., 297, 310
Kenyon, Kathleen Mary, 50
kerosene, 195
Khufu (pharaoh), 57
Kier, Samuel Martin, 195
Kilby, Jack St. Clair, 275
knapping stone tools, 30
knights (mounted), 110–111
Kodamo, Hideo, 301
Korea, 78
Korn, Arthur, 265
Kroto, Harold, 301
Kursk (Battle of), 241
Kurzweil, Ray, 305
- labor
 artificial intelligence modern threat to, 303–305
 industrial, 123–124, 130
 in mass production, 131, 143–144
 and the proto-industrial revolution, 123–124
 and social reform movements, 232
 sweat shops, 218
 and technology, 18–19
 unionization of, 232–233
 winners and losers, 233
Lahner, Mark, 59
Langevin, Paul, 198
language
 disappearance of due to technology, 19
 as invisible technology, 13–14
 in the Upper Paleolithic Revolution, 34–35
Lavoisier, Antoine, 161
Le Corbusier (Charles-Édouard Jeanneret-Gris), 222

- Leonardo da Vinci, 150, 274
letters patent, 132
Levin, Ira: *The Stepford Wives*, 224
Levitt, William, 222–223
Levittown, 222–223
Li Jun, 4–5
Library of Alexandria, 87
Licklider, J. C. R., 278
Lindbergh, Charles, 235, 237
linen, 134
Ling Ch'u, emperor, 75
Lingqu, 75
Little Boy (bomb), 249
Lloyd, William Forster, 22
Lloyd's of London, 169
locomotive (steam), 152–154
looms, 137–138, 141
losers and winners (technological), 233
Lovelace, Ada, 259
Luddites, 143–144, 233
Łukasiewicz, Ignacy, 195
Leyden jar, 188
- Machu Picchu, 54
magazine
 fashion, 217
 technology, 237
magic and fire, 33
Magic Canal, 75
Maginot Line, 239
Malthus, Thomas
 effects of industry on people, 130
 Essay on the Principles of Population, 129
Manhattan Project, 248, 282
Manutius, Aldus, 118
Marco Polo
 Il Milione (Travels of Marco Polo), 78–79
Marconi, Guglielmo, 262, 264
marginal cost, 302
maritime technology
 Atlantic ships
 clipper, 168–169
 schooner, 168
 dreadnoughts, 196–198
 European, 80, 120–121
 twentieth-century innovations in, 270–271
Marx, Karl
 effects of industry on people, 130
 The Poverty of Philosophy, 10
mass hunting, 38
mass media
 Chinese woodblock printing, 73
 fashion magazines, 217
 home as valuable market for, 225
 medium is the message, 22–23
 social media, 280
 twentieth-century, 235–236
mass production
 battlefield equipment in US Civil War, 178
 factory system, 147–149
 of homes, 222–223
 interchangeable parts, and labor division, 131, 179–180
 and steam engine power, 131
 in steel and Bessemer process, 156–158
 in textile industry, 218
 and three-dimensional printing, 301
Mather, Ralph: *An Impartial Representation of the Case of the Poor Cotton Spinners in Lancashire*, 140–141, 164
The Matrix (movie), 305
Mauchly, John W., 266
Maxim, Hiram Stevens, 203
Maxwell, James C., 263
Mayans, 295
McLuhan, Marshall
 Empire and Communications, 23
 mass media, 22–23
Medici Bank, 132
Mediterranean world technology
 geography of, 86
 Greek, 86–88
 Islamic, 100–105
 Roman, 90–100
 timeline, 84
megacities, 222
Meitner, Lise, 248
memory
 in history, 8
 and stone tool making, 31
Mesolithic era, 30
meta-data, 280
metallurgy
 Chinese, 68–70
 Islamic, 104–105
Meucci, Antonio, 260
Mexico, 206–207
Microsoft Corporation, 278
microwave ovens, 212–213
Middle East
 domestic technology in, 208
 river systems in, 55
 sugar, 167
Middleton Railway, 153
Mill, John Stuart, 130
miracle rice, 207
missiles
 ICBMs, 297
 and space race, 298
mobile telephone, 269–270, 280
Modernist movement, 222
money, 74
Montessori, Maria, 234
Moore, Gordon, 275, 290
Moore's law, 305
Morse, Samuel, 190
Morse code, 190
movable type printing, 73, 116–119
Moyce, Robert Norton, 275
Muhammad, the Prophet of Islam, 100–102
Munters, Carl, 214
Murdoch, William, 153, 161
Murray, Matthew, 153
music technology, 36–37
- nanotechnology, 300–301
Napier, John, 255–256
NASA (National Air and Space Administration), 297–298
naval technology. *See* maritime technology
Neanderthals, 34–35
Neolithic era
 culture in, 37–39
 pottery in, 51
 sacred places, 53–54
 tool making in, 30
neo-Luddites, 143–144
new brain theory, 34–35
New Lanark mill, 146
New World. *See* North America
New York World's Fair, 219
Newcomen, Thomas, 150
Niagara Falls, 190–191
Niépce, Joseph Nicéphore, 180
Nile river, 55–57, 61
Nipkow, Paul Gottlieb, 265
nitrates (fertilizer), 187–188
North America. *See also* Canada; United States of America
 European voyages to, 119–123
 slavery in, 124–125
North American Aviation P-51 Mustang (plane), 244
novelty and technological change, 16
Novoselov, Konstantin, 301
nuclear family, 224, 229
nuclear power, 282–284
nuclear weapons, 247–249
- Oberth, Hermann, 247
Oersted, Hans Christian, 189

320  INDEX

- Ohm, Georg Simon, 189
oil tankers, 270–271
Oppenheimer, Robert, 248
organic chemistry, 161
Otis, Elisha, 219–220
Otto, Louis-Guillaume, 163
Ötzi (ice man), 37
ovens, 209, 212–213
Owen, Robert, 146
- Page, Larry, 279
Paine, Thomas, 169
Paleolithic era
 technology traps during, 20
 tool making in, 29
 Upper Paleolithic Revolution,
 34–35
Pantheon, 96
paper
 Chinese, 72
 Islamic, 103
 money, 74
Paris Climate Accord (2016), 284
Parker, Geoffrey, 122
Parkes, Mrs. William (Frances), 211
Pascal, Blaise, 256
patents
 British, 132–133
 and genetics research, 300
Paterson, William, 132
pattern (dressmaking), 217
Paul, Lewis, 139
Paxton, Joseph, 160
Perkin, William Henry, 161–162
Perry, Matthew, 175
Persky, Constantin Dmitrievich, 265
personal computers, 274–275
petroleum
 and genetics research, 300
 history of, 194–195
 oil tankers, 270–271
 as technology trap, 21
photography, 180
Pierce, John R., 268, 290
pit ovens, 209
plant domestication, 45–47
Pleistocene, 34–35
Pontcysyllte Aqueduct, 149
Poor Laws, 146
Popov, Alexander, 263
Postman, Neil
 philosophy of technology, 13–14
 *Technopoly: The Surrender of
 Culture to Technology*, 13–14
pottery
 earliest developments in, 40
 and permanent settlements, 50–52
 Pre-Pottery Neolithic A, B and C,
 50, 61
 presentism, 8–9
 printing
 Aldine Press, 118
 Chinese movable type, 73
 effect on European life, 118–119
 Gutenberg, 117
 three-dimensional, 301–302
 privacy (online), 280
 progressivism
 and glorification of technology, 5
 and human history, 6
 and Western society, 6
Prussia, 234
Ptolemy
 Almagest, 119
 Geographia, 119
Puffing Billy (steam locomotive), 153
Puskás, Tivadar, 261
Putin, Vladimir, 281
putting-out system, 123, 136
pyramid technology, 57–60
Pythagoras of Samos, 86
- Qin Shi Huang, emperor, 75
Queen's Ware (pottery), 148
quinine, 161
- radar, 245–246, 270
Radcliffe, William, 141
radio
 Citizens Band, 269
 invention of, 236, 263–264
 in ocean vessels, 270
 transistor, 269
railways
 British, 152–154
 and garden city movement, 218
 and telegraphy, 190
 in United States, 171–173, 174–175,
 178
raisin-pudding model, 262
ranch houses, 222–223
Rawley, James, 311
Raytheon, 213
Real Monasterio de Nuestra Señora de
 Rueda (Royal Monastery of
 Our Lady of the Wheel), 115
refrigeration (domestic), 213–216
Reis, Johann Philipp, 261
religion
 in early agricultural settlements,
 53–54
 European Middle Ages, 111, 112
 and fire, 33
 indulgences printing, 117
 in Islamic world, 100–102
 Roman Catholic Church, 111,
 114–115, 118
retting, 134
Ricardo, David, 130
rice, 207
Rifkin, Jeremy: *The Zero Marginal
 Cost Society*, 302
rivers
 and beginning of agricultural
 empires, 54–57
 Chinese civil engineering projects
 on, 74–75
 and hydroelectricity, 281–282
Robinson, Kim Stanley: *Red Mars*,
 301
robots, 273–274
Rockefeller Foundation, 206–207
rockets, 247
Roebuck, John, 151
Roentgen, Wilhelm Konrad, 262
Roman Catholic Church
 Cistercian order, 114–115
 feudal power of, 111
 Index of Proscribed Books, 118
Roman Empire
 architecture, 93–96
 army, 98–99
 extensive knowledge of, 90–91
 fall of, 99–100, 295
 farming in, 109–110
 management of, 97–98
 mechanical calculation tools in,
 254
 refrigeration in, 214
 road network in, 91–92
Ronalds, Francis: *Descriptions of
 an Electrical Telegraph and
 of Some Other Electrical
 Apparatus*, 203
 telegraph, 189
Rousseau, Jean-Jacques, 234
Royal Society of London, 162
rudder, 120–121
Rumford, Count, 209
Rumford fireplace, 209
Russia
 Chernobyl nuclear accident, 284
 importing technology, 292–293
 nuclear weapons, 249
 relationships after First World
 War, 231
Rutherford, Ernest, 262
Rybczynski, Witold
 *One Good Turn: A Natural History
 of the Screwdriver and the
 Screw*, 4

- Saddlebags cast iron stove, 211
 Saint, Thomas, 216
salah, 101
Salamanca (steam locomotive), 153
 Sale, Kirkpatrick, 145, 306
 salting food, 45
 Samarskaya Dam, 281
 satellites, 298–299
 Saur, Carl, 42, 61
sawm, 101
 Scheutz, Pehr George, 259
 Schilling, Pavel Lvovitch, 189
 Schmidt, Klaus, 43–44, 61
 schooners, 168
 scrapers (stone), 30, 31
 Sea Ban laws, 80
 search engines, 279
 Second World War
 areas of combat in, 238
 aviation, 243–245
 field weapons, 241–243
 German preparations for, 239–241
 Germany's early weapon superiority during, 242
 and growth of suburbs, 220–222
 nuclear weapons, 247–249
 preparations for, 238–241
 radar, 245–246
 rockets, 246–247
 weapons of, 241–243
 Seven Voyages of Zheng He, 79–80
 sewing machines, 216–218
shahadah, 101
 Sharp, James, 211
 Shelley, Mary: *Frankenstein: Or the Modern Prometheus*, 7, 303
 Shen Kuo: *Writings Beside the Meng Creek*, 73
 Shimabara Rebellion, 80
 Shockley, William, 268
 Shubik, Martin, 21, 312
 shuttle (weaving)
 boat/bobbin, 138
 flying, 138
 silk, 135
 Sima Qian: *Historical Record*, 4
 Simon, Théodore, 234
 Singer, Isaac Merritt, 216–217
 Singularity (machine consciousness), 304–305
 slavery
 and cotton production, 174
 in North America, 124–125
 slide rule, 256
 Smalley, Richard, 301
 Smitch, Adam, 130
 social effects of technology
 bubonic plague effects, 115–116
 bureaucratic control over, 74–75
 communications, 22–24
 concept of time and place, 182–183
 conditions for change, 16–18
 Dollar Auction Game, 21
 electricity, 212
 feudalism, 110
 fireplaces, 209–210
 gender roles, 14–15, 205–206, 224
 Greek, 87
 Industrial Revolution, 162
 Islamic, 103–104
 Luddites, 7, 143–144
 modern challenges, 292–307
 online privacy, 280
 open fires, 208–209
 ovens, 209
 printing, 118–119
 railways and information flow, 174–175
 record keeping, 72–75
 robots, 274
 slavery, 124–125
 stoves, 211
 and technological determinism, 9–11
 tragedy of the commons, 22
 transition from hunter-gathering to permanent settlements, 52–53
 winners and losers, 19
 social media, 280
 software, 275–277
 solid-state electronics, 268–269
 sonar, 198, 311
 Sony Corporation, 269
 space exploration, 296–299
 space shuttle, 298
 Spanish Civil War, 238
 spear making, 30, 31, 37–39, 99
 spear throwing stick, 38
 Speedie Weenie project, 213
 Spenser, Percy, 213
 spinning jenny, 139
 spinning machine, roller, 139
 Sputnik, 297
SS Great Eastern (steamship), 196
 St. Lawrence Seaway, 171
 St. Mary and the Martyrs (church), 96
 Star Wars defense system, 18
 Station X, 243
 Statute of Monopolies (1623), 132, 164
 steam engines
 history of, 150–152
 locomotive, 152–154
 for mass production, 131
 steel production
 Chinese, 69
 European, 154–158
 Islamic, 104–105
 Japanese, 69–70
 Steiner, Rudolf, 234
 Stephenson, George, 153
 stereolithography, 301
 stirrup (horse), 110–111
 stock market (US), 237–238, 251
 Stockton and Darlington Railway, 153
 stone tools
 prehistoric, 31
 revealing culture, 30–31
 Stoney, George Johnstone, 262
 stoves, 211
Strangers When We Meet (movie), 224
 strategic bombers (planes), 244
 Strutt, Jedediah, 140
 Stuka (plane), 244
 submarines, 198, 283
 suburbs
 growth of, 220–222
 as technology trap, 223–225
 Sud Aviation Caravelle (jet), 271
 Suez Crisis, 270
 sweat shops, 218
 swords, 99
 Szilard, Leo, 247–248

 Taizong, emperor, 76
 Talbot, William Henry Fox, 180
 talbotype, 180
 Tanaka, Hisashige, 274
 tanks, 201
 tapa cloth, 72
 TCP/IP (Transmission Control Protocol/Internet Protocol), 278
 Technische Universität Bergakademie Freiberg (Freiberg University of Mining and Technology), 185
 technological blindness, 12–13
 technological determinism, 9–11
 technology
 as the “house we live in,” 12–13
 definition of, 2–3
 and human existence, 1–2
 and organic chemistry, 161
 resulting from increased brain development, 25
 transformative nature of, 14
 winners and losers in, 233

322  INDEX

- technology challenges
 artificial intelligence, 303–305
 Bhopal pesticide disaster, 293–294
 humans as DNA technology,
 299–300
 imported technology, 292–293
 Internet of Things, 302–303
 nanotechnology, 300–301
 space exploration, 296–299
 three-dimensional printing,
 301–302
 timeline, 292
 technology transfer, 294
 technology traps
 Blitzkrieg warfare, 240
 and fall of Roman Empire, 99–100
 greenhouse gas effect, 284
 in Paleolithic era, 19–21
 suburbs as, 223–225
 technopoly, 13
 telegraph
 history of, 189–190
 in stock market, 237–238
 in US Civil War, 178–179
 telemicroscope, 245
 telephones
 exchanges, 261
 long-distance, 263
 origins of, 260–261
 television, 264–265
 Tell es-Sultan, 50
 Telstar I (satellite), 298
 Tereshkova, Valentina, 297
Terminator (movie), 7, 305
 Tesla, Nikola, 190, 263
 Texas Instruments, 275
 textile industry
 and Industrial Revolution, 129,
 134–139
 influence of the sewing machine
 on, 218
 looms, 137–138
 Luddites, 143–144
 putting-out system, 123
 reform in, 146
 shuttle and carding innovations, 138
 weaving automation, 142–143
 weaving machines, 141
 Thales of Miletus, 86
 Theodorus of Samos, 86
 Thimonnier, Barthélemy, 216
 Thomas, Philip E., 173
 Thonborough, John, 156
 three-dimensional printing, 301–302
 Three Gorges Dam, 282
 Three Mile Island accident, 284
 Tigris river, 55
 Tihanyi, Kálmán, 265
 time standardization, 182–183
 Toffler, Alvin: *Future Shock*, 17
 Toledo, 113
 tool making
 archeological eras, 29–31
 and definition of technology, 2
 and technology development, 8,
 27–28
 in the Upper Paleolithic
 Revolution, 34
 total war, 179
 town gas, 161
 trade
 Atlantic, 168–169
 black ships, 175–177
 chartered companies, 158
 Chinese, 78–80
 European, 122
 slave, 124–125
 sugar, 167–168
 tragedy of the commons, 22
 transformative technology, 14
 transistor, 268, 290
 Treaty of London, 123
 Trevithick, Richard, 153
 Trinity test (nuclear), 248
 triodes, 262
 Truck Act (1831), 144
 Trump, Donald, 280
 Tseng Kung-Liang, 75
 Tsiolkovsky, Konstantin, 301
 tube technology
 in computers, 265–268
 origins of, 264
 Tudor, Frederic, 213
 tunnels, 236
 Tupolev Tu-104 (jet), 271
 Turing, Alan, 243, 266
 Turing machine, 266
 twentieth-century technology
 aviation, 236–238
 and labor unionization, 232–233
 optimism for the future in,
 235–236
 and public education, 233–235
 Second World War
 aviation, 243–245
 nuclear weapons, 247–249
 preparations for, 238–241
 radar, 245–246
 rockets, 246–247
 weapons of, 241–243
 United Nations Food and Agriculture
 Organization, 207
 United States of America
 black ships, 175–177
 canal building, 171
 cast iron stoves, 211
 Civil War technologies, 177–180
 and computer origins, 260
 Constitution, 170
 cotton industry, 173–174
 economic background of, 167
 founders' philosophy, 169–170
 growth of suburbs in, 220–222
 Industrial Revolution technologies,
 170–173
 internet protocols, 278
 nuclear weapons, 247–249
 patent system, 133
 railways, 154, 171–173
 rubber development, 183
 slavery in, 124–125
 sugar industry in, 167–168
 unions in, 232–233
 UNIVAC, 276, 310
 Universal Time, 182
 Upper Paleolithic Revolution, 34–35
 Ur, 84
 urbanization
 European proto-industrial, 126
 and growth of suburbs, 220–222
 V-2 rocket, 247
 Vail, Alfred, 190
 Vaucanson, Jacques de, 142
 Venus figurines, 33, 40
 Verein für Raumschiffahrt (VfR), 247
 vertical integration (factory system),
 193–194
 Vietnam, 67
 Vinge, Vernor, 304
 Vitruvius
 concrete components, 95
The Ten Books on Architecture, 88
Volkschule (people's school), 234
 Volta, Alessandro, 188
 voltaic pile, 188
 von Braun, Werner, 247
 von Liebig, Justus, 227
 von Neumann, John, 266, 267–268,
 305
 von Platen, Baltzar, 214
 von Siemens, Werner, 220
 walkie-talkies, 290
 Walter, William Grey, 274
 War of 1812, 167
 War of the Currents, 190

- War of the Pacific, 187
- warfare technologies
- American Civil War, 177–180
 - aviation, 202, 243–245
 - battlefield weapons, 69–70, 75, 110–111, 199, 201, 241–243, 246–247
 - chemical warfare, 199–200
 - Claw of Archimedes, 89
 - Crusades, 113
 - earliest evidence for, 53
 - and engineering education, 186
 - First World War industrialization, 195–202
 - nuclear weapons, 247–249
 - radar, 245–246
 - Roman army, 98–99
 - submarines, 198
- Washington, George, 169
- water pumps, 219
- waterwheels
- Chinese, 150–152
 - and the Cisterian order, 114–115
 - cost of, 152
- Watson, Thomas A., 261
- Watson-Watt, Robert, 246, 251
- Watt, James, 150–152
- weaves (textile), 136
- Wedgwood, Josiah, 147–149
- Welland Canal, 171
- West Point Academy, 185
- Westinghouse Electric Company, 190–191
- wheat, 207
- Wheatstone, Charles, 189
- White, Lynn, 110–111
- Whitney, Eli, 173–174
- Wikileaks (website), 280
- William III, 132
- Wilson, Robert Forest, 309
- winners and losers (technological), 233
- women. *See also* domestic technology
- historical marginalization of, 14–15
 - and industrialization, 225
- wood (use of), 20
- wootz steel, 105
- World Trade Center, 228
- World Wars. *See* First World War; Second World War
- Wu Zetian, Empress, 69
- Wyatt, John, 139
- Wylam Colliery Railway, 153
- Xerox PARC, 278
- x-rays, 262
- Yangtze River, 55
- Yellow River, 55
- zakat*, 101
- Zeh, Jan, 194
- Zerzan, John, 145
- Zheng He, 17, 79–80
- Zipernowsky, Károly, 190
- Zworykin, Vladimir, 265