

SUBJECT INDEX

- abacus (*abacco*),
 schools, 176, 181, 257, 259
 tradition, 156
Alberti's *velum*, 234
Anet, castle of, 204–6
Anleitung Schießpulver zu bereiten, 87
Anonymus of the Hussite Wars, 21, 96
Antwerk, 96
appareilleurs, *see* stonemason, *appareilleurs*
Archimedean screw, 46
archimetro, 158–9
architectural drawings and plans, 31–4, 145–69, 196–208, 209–244, 245–259, 272–3
 as part of contracts, 33, 222
 practical role of before 1500, 221–5
 recording (*Baufaufnahme*), 217, 227, 248
 see also fortification, drawings and plans
architectural treatises, *see* treatises, architecture
argani, 130
armillary sphere, 187
artillery, 90–1, 99, 119, 143, 148–9, 152, 154, 158, 161–9
 see also ballistics, gun, and gunpowder weapons
artillery manuals, *see* manuals, artillery
artisans, *see* blacksmith, carpenter, clock-maker, goldsmith, gunner, gun-maker, instrument maker, stonemason, surveyor
arts,
 fine, 6, 13, 141, 173,
 liberal, 158, 176, 275
 mechanical, 118–20, 140
assault ladder, *see* siege engines, assault ladder
assault wagon and battle wagon, 61–3, 68, 101–2
 covered, 68
 crank-powered, 61, 63
 wind-powered, 62–3
astrolabe, 156, 186–7
attack boat, *see* ships, war ships
authorship, 24, 120–1, 131, 139–41, 151
automata, 36
axle, 34, 109, 122, 125–6, 130, 137–8
axonometric projection, *see* projection, axonometric
Azarchiel's plate (*saphaea azarchielis*), 187
balance, 43, 46–7, 167, 287
 bent-arm, 287
 with unequal arms, 43
ballistics, 167–8
 see also artillery, gun, and gunpowder weapons
battering instruments, *see* siege engines, battering instruments
battle wagon, *see* assault wagon
baivel, *see* square, *biveau*
bellows, 103
biveau, *see* square, *biveau*
blacksmith, 88, 106, 108
blueprint, 7, 34, 51, 109, 111, 209, 224
boat, *see* ships
Bogenaustragung, 225
books and booklets,
 gun-makers, 14, 87–90, 92–3, 96–8, 108
 machine, *see* machine books
 of model and model book, 36, 148, 156
 practitioners, 85–98, 233, 241–2
 see also manuals, manuscripts, notebooks, pictorial catalogues, and treatises
cams, 32, 34, 57
canal building, 132, 135
capstan, 130
cartographers and cartography, 155, 158, 173, 180, 187, 208, 217
 see also surveyors
carpenter, 26, 33–4, 148, 150, 200, 213, 261, 263, 267
casting, 98, 135
 large-scale, 135
cavalier projection, *see* projection, cavalier
celestial sphere, 186, 188–9
central projection, *see* perspective
chain gear, 132
Clermont–Ferrand, cathedral of, 200, 224, 238
clock and clockwork, 132, 283–4, 288, 297–304
 arbor, 299, 301, 303
 balance-spring regulator, 288, 301, 303
 escapement, 132, 299–303

- pendulum clock, 288
 “perfect marine balance,” 288, 304
 spiral balance, spring balance, and coiled-spring balance, 298–9, 304–5
 clock-maker, 280, 289, 298, 300, 304–5
 combined views, combined plans, double projection, double views, triple projection, and three-view drawing, 196, 198, 209–44, 272
 as means of plan construction, 211–2, 226–7, 233
 and perspective, 233–4
 compass, 58, 71, 108–9, 143, 148, 158, 163–4, 177–8, 187, 208, 219, 223, 226, 242, 245, 251, 261–2, 264
 conical projection, *see* perspective
 conic sections, 198, 235, 270–1, 274
costruzione legittima, 233–4
 copy-books, 158, 160
see also notebooks
 craft secrecy, *see* secrecy
 craftsmen, *see* blacksmith, carpenter, clock-maker, goldsmith, gunner, gun-maker, instrument maker, stonemason, surveyor
 crane, 46, 122, 128, 287
see also hoisting devices
 crank, 46, 61, 63, 117–8, 122, 125, 132, 134–8
 crown gear, 126, 130
 crown wheel, 130, 303
 cutaway, *see* view, cutaway
 cylindrical projection, *see* projection, cylindrical
 dagger, 182
degradato, *see* plans, foreshortened
 Delian problem, 235
 design process, 7–8, 56–60, 73–84, 143–69, 223, 238–42
 diagonal method and template method, 261, 263
 diagrams, 5, 45, 58, 125, 202, 209, 225, 233–4, 241–2, 244, 251, 254–5, 257, 279–80, 283–4, 288–97
 geometrical, 43, 46, 48, 288–97
see also schematics
 Didime, Apollo temple, 197, 200
 dimensions, 40, 51, 53–84, 120–31, 144–46, 166, 223–25, 285
 final, 56, 59, 63, 72–3, 83, 92
see also measures and scale
 distance point, 177–9, 182–3, 193–5, 198, 268, 270
distanziometro, 182
 drawings,
 grammar, *see* pictorial language, grammar
 iconic, *see* icon
 investigation by, 43–48, 76–83, 132–40
 as means of communication, 3–5, 19, 24, 28, 40, 66, 89–91, 94, 98, 104, 108–9, 111, 280, 298
 measured, 145–6, 148, 155, 223, 285
 medium of, 4–5, 17, 19–20, 29
 perspective, *see* perspective
 plane, *see* picture plane
 style, *see* pictorial style
 three-view, *see* combined views
 working (*Werkris*), 197, 200–1, 223–4, 273
 workshop, 13–5, 94
see also architectural drawings, diagrams, engineering drawings, fortification, drawings, *Goldschmiederisse*, images, machine drawings, *Ritzzeichnungen*, schematics, and sketch
 drawing devices and instruments, 7, 177, 180–2, 187, 189, 201, 208, 217, 223, 234, 245, 257, 261–7, 269, 275
 for isometric perspective, 189
 for perspective drawings and perspective machine, 180–2, 208, 217, 234, 268
see also Alberti’s *velum*, compass, Dürer’s window, ellipsograph, grid, measuring instruments, ruler, and square
 dropper, 73, 75–6, 78
 stone, 73, 76
 fire, 73
 dry mills (*pistrini*), 122, 128, 130
 Dürer’s window (*portello*), 180–2, 187, 195
 dynamics, 169, 283, 288, 303
see also force, friction, law of free fall, oscillator, pendulum, positional gravity, and spring

- elevation and profile, 145–6, 193–200, 210–29, 233–44, 258–65
 construction of, 206, 217–9, 244
 of helices, 226–9, 248–51
see also section
- ellipsograph, 188
- engineer and engineering,
 authors, 119, 285
 fortification, 20, 143–69
 libraries, 40
 “maxim of engineering experience,” 297
 military, 118, 121, 143–69, 175, 182
 technical vocabulary of, 126, 135
 treatises, *see* treatises, engineering
- engineering drawings, 1–9, 13–5, 17–48, 54–5, 115, 143–4, 175, 209, 279
see also architectural drawings, fortification, drawings, and machine drawings
- engravings, 20, 26, 232
exempla, see models
- experiments and experimentation, 7, 18, 36, 117, 135, 139–40, 168, 208, 268, 271, 294, 298
 experimental apparatus, 84, 135
 on paper and by means of drawing, 135, 140
 thought experiments, 18, 36, 223
- exploded view, *see* view, exploded
- Fireworkbook of 1420*, 89
- Florence,
Santa Maria del Fiore, 150–1, 197, 217, 221
Accademia del Disegno, 3, 151–2
- flour-mill, 38, 40, 47, 126
- force, 8, 43, 48, 103–4, 109, 141, 163, 279, 283, 287, 290, 295–8, 301, 303–5
- fortification, fortress, and fort, 20, 66, 116, 119, 121, 125, 127, 139, 143–69, 182, 265
 drawings and plans, 20, 116, 127, 145–8, 153–5, 163–7, 182–3
 engineer, *see* engineer, fortification
 models, 143–69
 textbooks and treatises on, *see* treatises, fortification
see also siege engines
- Freiburg, *Münster* of, 238–9, 242
- friction, 46, 109, 118, 138, 141
- fulling-mill, 32–3, 39–40, 284
- furnace, 103
- gear, gear wheel, and gearing, 24, 34, 38, 40, 46–8, 63, 82, 98, 103, 106, 109–10, 118, 120, 122, 125, 130, 139–40, 283
 ratios, 24, 38, 40, 47, 109, 130, 140
see also chain gear, crown gear, lantern gear, rack, gear rack, and worm-gear
- geometrical proofs, 43, 268–9, 279
- geometrical construction, 158, 160, 173, 219, 273
- geometry,
 constructive, 241–2, 245, 258
 demonstrative, 245
 descriptive, 175, 208, 226, 248, 254, 267, 271–2
 Euclidean, 182, 245
 painters, 176, 181
 practical and practitioners, 174–6, 181, 184, 207, 242, 244, 258
 projective, 191, 226, 242, 267–71, 275
 stereotomic, 205
 stonemasons, 200
- gnomone*, 182
- goldsmith, 176, 198, 200, 213, 238, 244, 261, 267
- Goldschmiederrisse*, 283
- graphical languages, *see* pictorial languages
- graphic techniques, *see* architectural drawings, recording, *Bogenaustragung*, cartography, combined views, *costruzione legittima*, diagonal method, diagrams, drawing devices, elevation, construction of, engravings, geometrical constructions, mapping, perspective, plans, projection, *Ritzzeichnungen*, schematics, sketch, stereotomy, view, view-point, and woodcuts
see also pictorial style
- grid, 178, 180, 223
- grinding-mill, 32–3, 39–40, 125
- grist-mill, 59, 284
- ground plan (*perpetto*), 23, 32–3, 146, 209–44, 245–75

- foreshortened, 259–64
 superposed, 238–43
see also section, horizontal
- gun, 68, 96–8, 105–6, 108, 119–20
 barrels, 97–8
 carriages, 96, 119
 foundry, 96
 tube, 91–2, 94, 96–7, 99
 turret gun, 97
- gunner, 20, 91, 108, 167–8
 manuals, *see* manuals, gunners
 quadrant, *see* quadrant, gunners
- gun-maker, 51, 59, 87–99, 105–6, 108
 books, *see* books, gun-makers
- gunpowder weapons, 72, 87, 89–90, 145, 148–9
see also artillery, ballistics, and gun
- helix, 226–9, 246, 248, 250–1, 256–7
- hoisting devices and lifting devices, 21, 24, 29, 41, 97–9, 101, 121–8, 130, 132, 150, 209, 285
see also argani, crane, *viti*, and water lifting devices
- ichnographia*, 197, 213
- icon and iconic, 59–60, 62–3, 66, 68, 70–1, 75, 83, 201
see also pictorial style, iconic
- images,
 as explanatory tools, 116, 138–40
 and text, 21, 115–6, 120, 132
- inclined plane, 288, 293, 295
- infinity, point of, 188, 270–1, 274
- Ingenieurkunst- und Wunderbuch*, 105–7
- instrument makers, 184, 208, 305
see also drawing devices and measuring instruments
- isometric perspective, *see* perspective, isometric
- isometric projection, *see* projection, isometric
- kinematics and kinematic, 7, 119–20, 139, 287–8
see also motion and velocity
- knowledge, 112–169
 communication and conveying of, 3, 17, 19, 86, 89–92, 94, 106, 115
 learned and theoretical, 3–4, 6, 21, 119, 150, 158, 201, 226, 234, 245, 258, 279, 303
 mechanical and technical, 3, 17, 86, 94, 115, 119, 127, 141, 146, 208, 281
 oral tradition of, 3
 practitioners, practical, and tacit, 3, 7, 48, 53–4, 78, 115, 119, 140–1, 154, 167, 200, 207, 226–7, 234–5, 244, 303–4
- Kriegsbuch*, 105
- Kunstbücher*, 258–9
- ladder, 76, 78, 86, 106, 119
 step-ladder, 86
see also siege engines, assault ladder
- lantern and lantern gear, 26, 63, 125–6, 130
- lathe, 92, 101–2
- law of free fall, 295, 297
- law of the lever, 287–8
- Lettera a Leone X*, 196–7, 212, 219
- lever, 43, 46, 78, 122, 287–8
see also law of the lever
- lodge-books, *see* notebooks
- longitude, determination at sea, 288, 297–8, 304
- machine and machinery,
 abstract, 283–4
 crushing, 103, 125
 perpetual motion machines, 117–8, 297
 siege, *see* siege engines
 simple, *see* simple machines
 textile, 19, 305
 transmission, 26, 103, 109
see also artillery, automata, clock, crane, hoisting devices, mills, and pumps
- machine books and machine literature, 17, 20–8, 40, 48, 86, 108, 118, 120, 285, 305
 in manuscript, 13–4, 17, 20–9, 53–84, 85–111, 115, 119, 120–31, 176, 209, 222
 in print, 13–4, 17, 20–3, 26, 40, 86, 108, 119, 222
see also books, *Theatres of Machines*, and treatises

- machine drawings, 2–9, 13–4, 17–48, 51–2, 53–84, 85–111, 117–141, 145, 161, 281
 artists of, 26, 53, 56, 70–2, 82
see also engineering drawings
- machine models, *see* models, machine
- machine parts, components, and machinery
 elements, *see* axle, cams, capstan, crank, gear, piston, rack, shaft, screw, spindle, wheel, and windlass
see also simple machines
- manuals,
 artillery, 168
 gunners, 20
 military engineering, 119, 146, 160
see also books, manuscripts, and pictorial catalogues
- manuscripts,
 craftsmen, 85–111
 representational, 14, 17, 23, 60–72, 120–131
see also books, manuals, machine books, in manuscript, and pictorial catalogues
- mapping, 148, 156, 217, 284
- measures and measurements, 24, 28, 31, 34, 38, 40, 47, 51, 56, 72–5, 92, 106, 108, 121, 125, 143–69, 178, 182–3, 196–200, 219, 222–3, 238, 241–4, 259, 267, 270, 275, 285, 293, 296
see also dimension and scale
- measuring instruments, 152, 156–8, 181–2
see also *archimetro*, dagger, *distanziometro*, *gnomone*, *polimetro*, *proteo militare*, quadrant, *squadra*, *verghe astronomiche*, and drawing devices
- mechanics, 43–4, 48, 63, 78, 82, 117–8, 131, 140, 147, 168, 279–80, 281–306
 classical, 141, 279
 mechanical problems, 43, 78, 140
 mechanical power, 118, 141, 306
 pre-classical, 43, 48, 279
see also dynamics, kinematics, and statics
- Medieval Housebook*, 99, 101–3
- military,
 devices, *see* weapons
 engineering, *see* engineer, military
 equipment, *see* weapons
 projection, *see* projection, cavalier
 military engineering manuals, *see* manuals,
 military engineering
- mills,
 horse-driven, 40, 47, 106
 millstone, 106, 109, 126, 130
see also dry mill, flour-mill, fulling-mill, grinding-mill, grist-mills, paper-mill, sawmill, smithing mill, stamp-mill, water mill, and windmill
- Milan, cathedral of, 20, 221, 238
- mines and mining, 26, 40, 101, 103, 109, 119, 287
- models (*exempla*), 7, 128, 130, 143–69, 196, 200–1, 209, 217, 221, 261, 265–6, 273, 279, 289
 clock, 298–304
 flat and on paper, 7, 217, 279
 fortification, *see* fortification, models
 machine, 17, 20, 26, 28, 36, 46–7, 122, 125, 128, 130, 139, 287
 mathematical and geometric, 180, 305–6
 presentation, 20, 28, 146
 scaled, scaled-down, and scale model, 17, 20, 28, 36, 144, 201, 301
 textbook models, 148, 156, 160, 163
 three-dimensional, 17, 26, 279
 wooden, 146, 150, 200, 222
- model books and books of model, *see* books, model
- modular devices and system, 60–1, 64–7, 106–7
- motion, 26, 37, 117–8, 126, 130–40, 168–9
 mechanical, 118, 132, 140, 281–306
 natural, 140
 perpetual, 117–8, 297
- mould, 36
see also template
- mount, 91, 96, 149
- mulini*, *see* water mills
- Neugothik*, 223
- notebooks, lodge-books, and sketch-books, 13–4, 17, 26, 40, 46, 53–6, 60, 73–8, 82, 85, 88, 90–1, 115–21, 131–9, 148, 178, 201, 227, 241
see also copy-books

- oblique projection, *see* projection, oblique
optics and optical theory, 173, 176–7, 195, 233, 251, 254–9, 268
Euclidean, 235, 251, 254–8, 268, 275
practical, 173, 217, 257, 259
see also visual angle, visual cone, and visual pyramid
orthographia, 197, 213, 219
orthographic and orthogonal projection, *see* plans
Orvieto, *duomo* of, 213, 217
oscillator, 298, 300–1, 303–4
simple harmonic, 304
see also pendulum
- panel, *see* template
paper-mill, 31–2
“paper tool,” 82
patron and patronage, 55, 60, 66, 71–2, 75, 82–3, 90, 101, 105, 118–21, 127, 131–2, 141, 150–8, 169, 267, 275, 281, 285, 298
client / patronage relationship, 141
pendulum, 46, 288–95, 297, 300, 302–5
compound, 293–4, 297
conical, 288
cycloidal, 288, 303, 305
tautochronicity of, 298, 303
tricord, 288, 304
perfetto, *see* ground plan
perpetual motion, *see* motion, perpetual
perspective, central and conical projection, 175–200, 233–4, 258–75
central, 248
isometric, 184, 186, 189
linear, 55, 82–3, 173, 176, 184, 197, 215, 217, 233, 235
mathematical approach to, 182, 184–6, 267–75
military, *see* projection, cavalier
practical, 235, 237, 258–67
soldierly, *see* projection, cavalier
spherical, 184
see also distance point, infinity, point of, picture plane, tiers point, vanishing point, and viewpoint
perspective machine, *see* drawing devices, for perspective
- pictorial catalogues, 29, 51, 86–7, 90, 96–7, 105, 108
see also books, manuals, and manuscripts
pictorial languages and graphical languages, 4–6, 43, 51–2, 86, 88, 94, 104–5, 108, 115, 175, 279
grammar, 5, 48, 85–111, 143
pictorial style and drawing style, 5–8, 51–2, 53–84, 85–111, 173–4, 279, 297
flat, 58, 60–1, 63, 66–8, 70–1, 73, 82–3, 211
iconic, 59, 63, 68, 70, 83
perspective, *see* perspective
see also architectural drawings, diagrams, geometrical constructions, mapping, plans, projection, schematics, sketch, stereotomy
picture plane and drawing plane, 55, 179–80, 183, 198, 210–4, 217, 219, 233, 259, 263, 267, 270
pin wheel, 103
piston, 23, 26, 34, 36
piston rods, 26
pistrini, *see* dry mills
planisphere, 186–7, 269
Ptolemaic, 187, 269
universal, 186–7
see also Azarchiel’s palte
plans, orthographic and orthogonal projection, 196–208, 209–44
foreshortened (*degradato*), 259–61
full-size and full-scale, 200, 203, 207, 223–5, 242
as part of contracts, 33, 222
printed, 153, 230
reduced, 159, 197, 223–4
scaled and to scale, 7, 33, 109, 197–200, 210–1, 219, 223, 237, 242, 244, 285
sets of, 222, 237–8, 242
with marked-on dimensions and measures, 109–10, 144, 146, 148, 155, 159, 161, 223, 225
see also architectural drawings, blueprint, combined views, elevation, fortification, drawings, ground plan, and section

- polimetro*, 156
 poliorcetic treatises, *see* treatises, poliorcetic
 positional gravity, 167
 practitioners booklets, *see* books, practitioners
 privileges for inventions, 24, 28, 301
 profile, *see* elevation
 projection, 175–208, 209–44, 245–75
 axonometric, 184, 211
 double, *see* combined views
 cavalier, military, and soldierly 173, 183–91, 211
 central and conical, *see* perspective
 cylindrical, 274
 double, *see* combined views
 isometric, 184, 186, 189, 211
 oblique, 173, 211, 235
 orthographic and orthogonal, *see* plans
 shadow, 173, 175, 190–6, 208
 spherical, 184
 stereographic, 173, 187
 triple, *see* combined views
 see also perspective
Proportionierungssysteme, 223
proteo militare, 182
 Pseudo-Aristotle's *Problemata mechanicae*, 43, 297
 pulley, 43, 76, 78, 98, 134
 pumps and pumping plant, 23, 26–7, 34–6, 42, 86, 103, 130

 quadrant, 108, 156, 257–8
 gunners quadrant, 108

 rack, 26, 99, 303
 gear rack, 99
 ram, *see* siege engines, ram
Reims palimpsest, 213
Ritzzeichnungen, 213, 224–5, 242
 Rome, *San Pietro* (new *San Pietro*), 222, 232
 ruler, 108–9, 201, 219, 226, 245
 see also square

 St. Gall, abbey of, 223
 saw, 20, 57, 59
 stone-saw, 20
 sawmill, 32–3, 56–60, 66, 96, 119, 284

scaenographia, 195, 197, 213
 scale and scales, 33, 98, 109, 200, 237, 270, 285, 287
 see also dimension, measures, and plans, scaled
 schematics and schema, 26, 51, 59, 68, 82, 83, 178, 209, 242
 logical, 59, 68, 82
 see also diagrams
 science of weights, *see* statics
 screw, 43, 46, 91, 106, 130, 132
 endless, 132
 see also Archimedean screw
 secrecy, craft secrecy, and secrets, 90, 106, 149, 151, 200, 298
 section, 23–4, 31–2, 40, 109–10, 197–8, 204, 218, 238, 254
 architectural in Italy before 1500, 213, 217–8
 horizontal, 109, 238, 242, 251
 see also elevation
 shadow projection, *see* projection, shadow
 shaft, 32, 58, 103–4, 106, 109–10, 122, 126
 crank shaft, 106
 ships and boats, 36, 60–1, 73, 76–81, 83, 288, 297
 paddle-boat, 60–1
 war ships and attack boats, 36, 76–81, 83
 siege engines and siege machines, 21, 119, 128
 assault ladder and ladders with claws, 76, 78, 106, 119
 assault ramp, 66
 assault tower, 63–6
 battering instruments, 106–7
 Greek manuals on, *see* treatises, poliorcetic
 ram, 76, 119
 trebuchet, 71–2
 see also assault wagon and fortification
 simple machines, 43–6
 see also balance, inclined plane, lever, pulley, and screw
 sketch, 29, 38–9, 73–82, 89–109, 131–39, 156, 223, 289, 298–301, 304
 sketch-books, *see* notebooks
Sketch-book of the Volpaia family, 40

- smelting hut, 103
smithing-mill, 284
soldierly perspective, *see* projection, cavalier
spherical projection, *see* projection, spherical
spindle, 91, 96, 98
sportello, *see* Dürer's window
spring, 66, 98, 132, 288, 297–305
squadra, 156
square, 201, 208, 241, 260, 262–3, 275
 biveau (*baivel*), 208
 foreshortened, 177, 260, 262–3
 stonemasons, 201, 241, 260, 275
 see also ruler
stamp-mill, 30–3, 38, 40
statics and science of weights (*scientia de ponderibus*), 43, 118–20, 131, 139–40, 169, 287
 Jordanian tradition, 43, 140, 287
 see also balance, inclined plane, law of the lever, lever, positional gravity, simple machines, and weight
stereographic projection, *see* projection, stereographic
stereometry, 173, 200–1, 241
stereotomy, 201–2, 205, 207, 271–3
stonemasons, 148–50, 169, 175, 198–208, 238–44, 248, 257, 260–1, 267, 273, 275
 appareilleurs and stone-dressers, 203, 272–3
 design technique of, 200–8, 238–42, 257
 stonecutters, 150, 201, 238, 245, 272–3
Strasbourg, cathedral of, 213
survey and surveying, 25, 155–60, 182, 184, 233
 triangulation, 156
surveyor, 181, 217
 see also cartographers
“tacit knowledge,” *see* knowledge, practitioners
tautochronicity, *see* pendulum, tautochronicity
technical literature, 86, 285, 305
 see also books, machine books, manuals, pictorial catalogues, and treatises
telescope, 190–1, 282
template and panel, 7, 36, 203–9, 225, 242, 260–3, 267
 see also mould
template method, *see* diagonal method
Theatres of Machines, 1, 6, 9, 14, 21, 209
three-quarters view, *see* view, three-quarters
tiers point, 178, 270
top view, *see* view, top
tread-wheel, 46, 106
treatises and textbooks,
 architecture, 118, 121, 139, 167, 201, 219, 272
 engineering, 46, 75, 115, 118, 154, 158
 fortification, 139, 146, 161, 168, 184, 198, 230
 illustrated, 13, 26, 43, 46, 118–9, 268, 281
 poliorcetic, 119
 see also machine books
triangulation, *see* survey, triangulation
trompe and *trompa*, 203–8
 de Montpellier, 203, 205, 207–8
 quarré, 203
vanishing point, 177–9, 182–3, 190, 195, 198, 261, 270–1
vault, 180, 201, 203–7, 225, 273
 barrel, 203
 conical, 203
 cylindrical, 273
 hemispheric, 201, 207
 oblique, 201, 206
veil, *see* Alberti's *velum*
velocity, 43, 48, 283, 290, 293–6
verghe astronomiche, 156
view,
 combined, *see* combined views
 cutaway, 6, 52
 double, *see* combined views
 exploded, 6, 52, 101
 front, 92, 232
 isometric, *see* projection, isometric
 oblique, *see* projection, oblique
 partial and partial representation, 21, 98, 101
 three-quarters, 57, 61
 top, 40, 109, 299

- total and general, 21, 23, 97–8, 103–4, 109, 225
- triple and three-views, *see* combined views
- viewpoint and point of view,
 - elevated, 22, 92, 96–7
 - laterally relocated, 98
 - multiple, 57, 88, 91–4, 97, 104
 - single, 55, 73, 75, 97
- vis de Saint-Gilles*, 203
- visual angle, 251, 259
- visual cone, 180, 233, 271
- visual pyramid, 177–9, 181, 194, 259, 267
- viti*, 130
- Von des Chores Maß und Gerechtigkeit*, 222

- wagon, *see* assault wagon
- warfare devices, *see* weapons
- war machines, *see* siege engines and weapons
- war ship, *see* ships, war ships
- water lifting devices, 21, 24, 29, 209
 - see also* Archimedean screw and pumps
- water mills (*mulini*), 26, 117, 122, 126, 130–1, 284
- water-wheel, 26, 33, 45–6, 57–9, 103, 106, 125–6, 130–1, 139
 - horizontal, 45, 122, 130
 - overshot, 122, 125–6, 129–31
 - undershot, 103, 122, 126
- weapons, military devices and equipment, war machines, and warfare devices, 21, 60–1, 72, 87–8, 92, 101, 105, 119, 121–2, 127–8, 149, 176
 - see also* artillery, dropper, gunpowder weapons, siege engines, and ships, war ships
- weight, 43, 72, 76, 97, 103, 122, 131–2, 134, 167–9, 283, 288, 293–5, 297, 301–3
 - counterbalance weight, 103, 132
- wheel,
 - toothed, 34, 36, 42, 126, 132
 - see also* crown wheel, gear, pin wheel, tread-wheel, and water-wheel
- Wiener Werkmeisterbuch*, 222
- windlass, 130, 287
- windmill, 63, 122, 133, 284
- window, *see* Dürer's window
- Werkriss*, *see* drawing, working
- woodcuts, 20, 26, 41, 86, 179, 181, 183, 185, 188, 190–1, 194, 199, 202–4, 266–7
- worm-gear, 99, 101