

SECTION E — FIXED CONSTRUCTIONS

E02 HYDRAULIC ENGINEERING; FOUNDATIONS; SOIL-SHIFTING

E02B HYDRAULIC ENGINEERING (ship-lifting E02C; dredging E02F)

Subclass index

METHODS AND EQUIPMENT IN GENERAL.....	1/00, 3/00
ARTIFICIAL WATER CANALS.....	5/00
BARRAGES OR WEIRS.....	7/00, 8/00
WATER-POWER PLANTS.....	9/00
DRAINAGE; IRRIGATION; CLEANING OF SURFACE OF OPEN WATER.....	11/00, 13/00, 15/00
ARTIFICIAL ISLANDS MOUNTED ON PILES OR LIKE SUPPORTS.....	17/00

1/00	Equipment or apparatus for, or methods of, general hydraulic engineering	5/06	• • Operating equipment in connection with canals (ship-lifting devices E02C)
1/02	• Hydraulic models	5/08	• Details, e.g. gates, screens
3/00	Engineering work in connection with control or use of streams, rivers, coasts, or other marine sites (barrages or weirs E02B 7/00); Sealings or joints for engineering work in general	7/00	Barrages or weirs; Layout, construction, methods of, or devices for, making same (for protecting banks, coasts, or harbours E02B 3/04; sealings or joints E02B 3/16; handling building or like materials for hydraulic engineering E02D 15/00; foundations in general E02D 27/00)
3/02	• Stream regulation, e.g. breaking up subaqueous rock, cleaning the beds of waterways, directing the water flow (dredging or scraping devices E02F)	7/02	• Fixed barrages
3/04	• Structures or apparatus for, or methods of, protecting banks, coasts, or harbours (sealings or joints E02B 3/16)	7/04	• • Dams across valleys
3/06	• • Moles; Piers; Quays; Quay walls; Groynes; Breakwaters	7/06	• • • Earth-fill dams; Rock-fill dams
3/08	• • • Structures of loose stones with or without piles (piles E02D 5/00)	7/08	• • • Wall dams
3/10	• • Dams; Dykes; Sluice ways or other structures for dykes, dams, or the like (making embankments or dams in general E02D 17/18)	7/10	• • • • Gravity dams, i.e. those in which the weight of the structure prevents overturning
3/12	• • Revetment of banks, dams, watercourses, or the like (of slopes in general E02D 17/20)	7/12	• • • • Arch dams
3/14	• • • Preformed blocks; Arrangements thereof	7/14	• • • • Buttress dams
3/16	• Sealings or joints (joints for foundation structures E02D 29/16; sealing joints not restricted to hydraulic engineering work E04B 1/68)	7/16	• Fixed weirs; Superstructures or flash-boards therefor
3/18	• Reclamation of land from water (drainage of soil E02B 11/00)	7/18	• • Siphon weirs
3/20	• Equipment for shipping on coasts, in harbours or on other fixed marine structures, e.g. bollards (tying-up, anchoring B63B 21/00, e.g. bollards for shipping B63B 21/06; buoys B63B 22/00) [5]	7/20	• Movable barrages; Lock gates
3/24	• • Mooring posts [5]	7/22	• • Stop log dams; Emergency gates
3/26	• • Fenders (fenders integral with waterborne vessels or specially adapted therefor B63B 59/02) [5]	7/24	• • Needle weirs
3/28	• • Fender piles [5]	7/26	• • Vertical-lift gates
5/00	Artificial water canals (for water-power plants E02B 9/02; irrigation of soil E02B 13/00)	7/28	• • • with sliding gates
5/02	• Making or lining canals	7/30	• • • with guide wheels or rollers for the gates
5/04	• Navigable canals	7/32	• • • Cylindrical or tubular gates
		7/34	• • • Flash-boards for vertical-lift gates
		7/36	• • • Elevating mechanisms for vertical-lift gates
		7/38	• • Rolling gates
		7/40	• • Swinging or turning gates
		7/42	• • • Gates of segmental or sector-like shape with horizontal axis
		7/44	• • • Hinged-leaf gates
		7/46	• • • Gates turning round a horizontal axis arranged midway of the flap
		7/48	• • • Roof or double shutter gates
		7/50	• • Floating gates
		7/52	• • Equipment preventing vibration of gates
		7/54	• • Sealings for gates

E02B

- 8/00 Details of barrages or weirs** (cleaning or keeping clear the surface of open water E02B 15/00)
- 8/02 • Sediment base gates; Sand sluices; Structures for arresting waterborne material
- 8/04 • Valves, slides, or the like; Submerged sluice gates
- 8/06 • Spillways; Devices for dissipation of energy, e.g. for reducing eddies
- 8/08 • Fish passes; Passages for rafts or boats
- 9/00 Water-power plants; Layout, construction or equipment, methods of, or apparatus for, making same** (hydraulic motors F03B)
- 9/02 • Water-ways
- 9/04 • • Free-flow canals or flumes; Intakes (gratings or screens therefor E02B 5/08)
- 9/06 • • Pressure galleries or pressure conduits; Galleries specially adapted to house pressure conduits; Means specially adapted for use therewith, e.g. housings, valves, gates (driving inclined galleries E21D 9/02; valves in general F16K; conduits in general F16L) [6]
- 9/08 • Tide or wave power plants (water-pressure machines, tide or wave motors F03B)
- 11/00 Drainage of soil, e.g. for agricultural purposes**
- 11/02 • Drainage-device-laying apparatus, e.g. drainage ploughs
- 13/00 Irrigation ditches, i.e. gravity flow, open channel water distribution systems** (other distribution systems for watering or spraying gardens, fields, sports grounds, or the like A01G 25/00) [2]
- 13/02 • Closures for irrigation conduits

- 15/00 Cleaning or keeping clear the surface of open water; Apparatus therefor** (construction of ships or other waterborne vessels B63B, e.g. vessels specially adapted for collecting pollution from open water B63B 35/32; in swimming or splash baths or pools E04H 4/16) [5]
- 15/02 • from ice [5]
- 15/04 • Devices for cleaning or keeping clear the surface of open water from oil or like floating materials by separating or removing these materials (other treatment of water, waste water or sewage C02F; materials for treating liquid pollutants, e.g. oil, gasoline, fat, C09K 3/32)
- 15/06 • • Barriers therefor (E02B 15/08 takes precedence) [5]
- 15/08 • • Devices for reducing the polluted area without removing the material [5]
- 15/10 • • Devices for removing the material from the surface [5]
- 17/00 Artificial islands mounted on piles or like supports, e.g. platforms on raisable legs; Construction methods therefor** (fenders E02B 3/26; anchoring floating platforms B63B 21/00; floating platforms, e.g. anchored, B63B 35/44; independent underwater structures E02D 29/00) [5]
- 17/02 • placed by lowering the supporting construction to the bottom, e.g. with subsequent fixing thereto
- 17/04 • Equipment specially adapted for raising, lowering, or immobilising the working platform relative to the supporting construction (platform lifts in general B66F 7/00)
- 17/06 • • for immobilising, e.g. using wedges or clamping rings
- 17/08 • • for raising or lowering

E02C SHIP-LIFTING DEVICES OR MECHANISMS

- 1/00 Locks; Shaft locks, i.e. locks of which one front side is formed by a solid wall with an opening in the lower part through which the ships pass** (lock gates E02B 7/20)
- 1/02 • with auxiliary basins
- 1/04 • with floating troughs
- 1/06 • Devices for filling or emptying locks (in lock gates E02B 7/20)
- 1/08 • Arrangements for dissipating the energy of the water (carried by lock gates E02B 8/06)

- 1/10 • Equipment for use in connection with the navigation of ships in locks; Mooring equipment (tying-up, anchoring waterborne vessels B63B 21/00; equipment for shipping on coasts, in harbours or on other fixed marine structures E02B 3/20)
- 3/00 Inclined-plane ship-lifting mechanisms**
- 5/00 Mechanisms for lifting ships vertically** (salvaging sunken vessels B63C 7/00)
- 5/02 • with floating chambers

E02D FOUNDATIONS; EXCAVATIONS; EMBANKMENTS (specially adapted for hydraulic engineering E02B); UNDERGROUND OR UNDERWATER STRUCTURES [6]

Note(s)

1. This subclass covers underground structures made by foundation engineering, i.e. involving disturbance of the ground surface.
2. This subclass does not cover underground spaces, made by underground mining methods only, i.e. not involving disturbance of the ground surface, which are covered by subclass E21D.

Subclass index

INVESTIGATING, IMPROVING OR PRESERVING FOUNDATION SOIL OR ROCK.....	1/00, 3/00
STRUCTURAL ELEMENTS AND TECHNIQUES THEREFOR	
Structural elements.....	5/00
Placing; removing; placing and removing; accessories.....	7/00, 9/00, 11/00, 13/00
HANDLING MATERIALS.....	15/00
EXCAVATIONS, MAKING EMBANKMENTS.....	17/00

KEEPING DRY FOUNDATION SITES.....	19/00
CAISSONS.....	23/00, 25/00
FOUNDATIONS AS SUBSTRUCTURES; UNDERGROUND OR UNDERWATER STRUCTURES, RETAINING WALLS.....	27/00, 29/00
PROTECTING, TESTING, STRAIGHTENING, LIFTING, REPAIRING.....	31/00-37/00

1/00	Investigation of foundation soil <u>in situ</u> (investigation involving boring or specially adapted to earth drilling E21B 25/00, E21B 49/00; investigating or analysing materials by determining their chemical or physical properties, in general G01N, e.g. sampling G01N 1/00)	3/12	• Consolidating by placing solidifying or pore-filling substances in the soil (making piles E02D 5/46; soil-conditioning or soil-stabilising materials C09K 17/00)
1/02	• before construction work	5/00	Bulkheads, piles, or other structural elements specially adapted to foundation engineering (engineering elements in general F16)
1/04	• • Sampling of soil	5/02	• Sheet piles or sheet pile bulkheads
1/06	• • Sampling of ground water	5/03	• • Prefabricated parts
1/08	• after finishing the foundation structure	5/04	• • • made of steel
3/00	Improving or preserving soil or rock, e.g. preserving permafrost soil (securing of slopes or inclines E02D 17/20; damming or interrupting passage of underground water E02D 19/12; improving soil for agricultural purposes A01; soil stabilisation for road building or like purposes E01C 21/00, E01C 23/10; setting rock anchoring bolts E21D)	5/06	• • • • Fitted piles or other elements specially adapted for closing gaps between two sheet piles or between two walls of sheet piles
3/02	• Improving by compacting (E02D 3/11 takes precedence; compacting soil locally before or while forming foundations E02D 27/26, E02D 27/28) [3]	5/08	• • • • Locking forms; Edge joints; Pile crossings; Branch pieces
3/026	• • by rolling with rollers usable only for or specially adapted for soil compaction, e.g. sheepsfoot rollers (rollers for soil working in agriculture A01B 29/00; rollers for road paving, such rollers usable also for compacting soil E01C 19/23) [3]	5/10	• • • • made of concrete or reinforced concrete
3/032	• • • Trench rollers [3]	5/12	• • • • Locking forms; Edge joints; Pile crossings; Branch pieces
3/039	• • • Slope rollers [3]	5/14	• • Sealing joints between adjacent piles (sealing joints not restricted to foundation piles E04B 1/68)
3/046	• • by tamping or vibrating, e.g. with auxiliary watering of the soil (E02D 3/026, E02D 3/08 take precedence; tamping or vibrating apparatus for working ballast on railways E01B 27/00, for consolidating paving materials E01C 19/30, for consolidating concrete in general E04G 21/06) [3]	5/16	• • Auxiliary devices rigidly or detachably arranged on sheet piles for facilitating assembly
3/054	• • • involving penetration of the soil, e.g. vibroflotation [3]	5/18	• Bulkheads or similar walls made solely of concrete <u>in situ</u>
3/061	• • • Tampers with directly acting explosion chambers (pile drivers with explosion chambers E02D 7/12) [3]	5/20	• Bulkheads or similar walls made of prefabricated parts and concrete, including reinforced concrete, <u>in situ</u>
3/068	• • • Vibrating apparatus operating with systems involving reciprocating masses (E02D 3/054, E02D 3/061 take precedence) [3]	5/22	• Piles (sheet piles E02D 5/02)
3/074	• • • Vibrating apparatus operating with systems involving rotary unbalanced masses (E02D 3/054 takes precedence) [3]	5/24	• • Prefabricated piles
3/08	• • by inserting stones or lost bodies, e.g. compaction piles (sand drains for soil compaction E02D 3/10; stressing soil while forming foundations E02D 27/28)	5/26	• • • made of timber with or without reinforcement; Means affording protection against spoiling of the wood (cases E02D 5/60; impregnating agents B27K 3/16); Self-cleaning of piles placed in water
3/10	• • by watering, draining, de-aerating or blasting, e.g. by installing sand or wick drains (E02D 3/11 takes precedence; soil-penetrating vibrators with auxiliary watering E02D 3/054; drainage of soil in general E02B 11/00) [3]	5/28	• • • made of steel
3/11	• by thermal, electrical or electro-chemical means (freezing soil for interrupting passage of underground water E02D 19/14) [3]	5/30	• • • made of concrete or reinforced concrete or made of steel and concrete
3/115	• • by freezing [3]	5/32	• • • with arrangements for setting in position by fluid jets
		5/34	• • Concrete or concrete-like piles cast in position
		5/36	• • • making without use of mould-pipes or other moulds
		5/38	• • • making by use of mould-pipes or other moulds
		5/40	• • • • in open water
		5/42	• • • • by making use of pressure liquid or pressure gas for compacting the concrete
		5/44	• • • • with enlarged footing or enlargements at the bottom of the pile
		5/46	• • • making <u>in situ</u> by forcing bonding agents into gravel fillings or the soil (consolidating soil in general E02D 3/12)
		5/48	• • Piles varying in construction along their length
		5/50	• • Piles comprising both precast concrete portions and concrete portions cast <u>in situ</u>
		5/52	• • Piles composed of separable parts, e.g. telescopic tubes
		5/54	• • Piles with prefabricated supports or anchoring parts; Anchoring piles

E02D

- 5/56 • • Screw piles
- 5/58 • • Prestressed concrete piles
- 5/60 • • Piles with protecting cases
- 5/62 • • Compacting the soil at the footing or in a casing by forcing cement or like material through tubes
- 5/64 • • Repairing piles
- 5/66 • Mould-pipes or other moulds
- 5/68 • • for making bulkheads
- 5/70 • • for making sheet piles
- 5/72 • Pile shoes
- 5/74 • Means for anchoring structural elements or bulkheads (anchoring piles E02D 5/54)
- 5/76 • • Anchorings for bulkheads or sections thereof
- 5/80 • • Ground anchors

7/00 Methods or apparatus for placing sheet pile bulkheads, piles, mould-pipes, or other moulds (for both placing and removing E02D 11/00)

- 7/02 • Placing by driving
- 7/04 • • Hand pile-drivers
- 7/06 • • Power-driven drivers
- 7/08 • • • Drop drivers with free-falling hammer
- 7/10 • • • with pressure-operated hammer
- 7/12 • • • Drivers with explosion chambers
- 7/14 • • • Components for drivers
- 7/16 • • • • Scaffolds for drivers
- 7/18 • Placing by vibrating
- 7/20 • Placing by pressure or pulling power
- 7/22 • Placing by screwing down
- 7/24 • Placing by using fluid jets
- 7/26 • Placing by using several means simultaneously
- 7/28 • Placing of hollow piles or mould-pipes by means arranged inside the piles or pipes
- 7/30 • • by driving cores

9/00 Removing sheet pile bulkheads, piles, mould-pipes, or other moulds (for both placing and removing E02D 11/00)

- 9/02 • by withdrawing
- 9/04 • by cutting-off under water

11/00 Methods or apparatus for both placing and removing sheet pile bulkheads, piles, or mould-pipes (features relating to placing only E02D 7/00, to removing only E02D 9/00)

13/00 Accessories for placing or removing piles or bulkheads

- 13/02 • specially adapted for placing or removing bulkheads
- 13/04 • Guide devices; Guide frames
- 13/06 • for observation while placing
- 13/08 • Removing obstacles
- 13/10 • Follow-blocks of pile-drivers or like devices

15/00 Handling building or like materials for hydraulic engineering or foundations (conveying or working-up concrete or similar masses in general E04G 21/02)

- 15/02 • Handling of bulk concrete specially for foundation purposes
- 15/04 • • Placing concrete in mould-pipes, pile tubes, boreholes, or narrow shafts
- 15/06 • • Placing concrete under water
- 15/08 • Sinking workpieces into water or soil
- 15/10 • Placing gravel or like material under water

17/00 Excavations; Bordering of excavations; Making embankments (soil shifting apparatus E02F; earth drilling E21)

- 17/02 • Foundation pits
- 17/04 • • Bordering or stiffening the sides of foundation pits
- 17/06 • Foundation ditches or narrow shafts
- 17/08 • • Bordering or stiffening the sides of ditches or narrow shafts for foundations
- 17/10 • • Covering trenches for foundations
- 17/12 • • Back-filling of foundation trenches or ditches
- 17/13 • Foundation slots; Implements for making these slots
- 17/16 • Loosening of soil or rock, under water (for correcting streams E02B 3/02; by dredgers or excavators E02F)
- 17/18 • Making embankments (E02D 17/20 takes precedence)
- 17/20 • Securing of slopes or inclines

19/00 Keeping dry foundation sites or other areas in the ground (sheet piles or bulkheads E02D 5/02)

- 19/02 • Restraining of open water
- 19/04 • • by coffer-dams
- 19/06 • Restraining of underground water
- 19/08 • • by employing open ditches arranged below the level of the water
- 19/10 • • by lowering level of ground water
- 19/12 • • by damming or interrupting the passage of underground water
- 19/14 • • • by freezing the soil (in connection with sinking shafts E21D 1/12)
- 19/16 • • • by placing or applying sealing substances (consolidating by placing solidifying or pore-filling substances in the soil E02D 3/12)
- 19/18 • • • by making use of sealing aprons (sealings or joints for engineering work E02B 3/16)
- 19/20 • • • by displacing the water, e.g. by compressed air
- 19/22 • Lining sumps in trenches

23/00 Caissons; Construction or placing of caissons (tunnels submerged into or built in open water E02D 29/063) [6]

- 23/02 • Caissons able to be floated on water and to be lowered into water in situ
- 23/04 • Pneumatic caissons
- 23/06 • • Bringing persons or material into, or out of, compressed air caissons
- 23/08 • Lowering or sinking caissons
- 23/10 • • Caissons filled with compressed air
- 23/12 • • Inclined lowering
- 23/14 • • Decreasing the skin friction while lowering
- 23/16 • Jointing caissons to the foundation soil, specially to uneven foundation soil

25/00 Joining caissons or like sunk units to each other under water

27/00 Foundations as substructures

- 27/01 • Flat foundations
- 27/02 • • Flat foundations without substantial excavation (E02D 27/04, E02D 27/08 take precedence)
- 27/04 • • in water or on quicksand
- 27/06 • • • Floating caisson foundations
- 27/08 • • Reinforcements for flat foundations
- 27/10 • Deep foundations
- 27/12 • • Pile foundations
- 27/14 • • • Pile framings
- 27/16 • • • Foundations formed of separate piles
- 27/18 • • Foundations formed by making use of caissons

- 27/20 • • Caisson foundations combined with pile foundations
- 27/22 • • Caisson foundations made by starting from fixed or floating artificial islands by using protective bulkheads
- 27/24 • Foundations constructed by making use of diving-bells (equipment for dwelling or working under water B63C 11/00)
- 27/26 • Compacting soil locally before forming foundations; Construction of foundation structures by forcing binding substances into gravel fillings (consolidating foundation soil in general E02D 3/02-E02D 3/12)
- 27/28 • Stressing the soil or the foundation structure while forming foundations
- 27/30 • Foundations made with permanent use of sheet pile bulkheads, walls of planks, or sheet piling boxes
- 27/32 • Foundations for special purposes
- 27/34 • • Foundations for sinking or earthquake territories (building constructions with protection arrangements against earthquakes E04H 9/02)
- 27/35 • • Foundations formed in frozen ground, e.g. in permafrost soil [3]
- 27/36 • • Foundations formed in moors or bogs
- 27/38 • • Foundations for large tanks, e.g. oil tanks
- 27/40 • • Foundations for dams across valleys or for dam constructions
- 27/42 • • Foundations for poles, masts, or chimneys
- 27/44 • • Foundations for machines, engines, or ordnance (special layout of foundations with respect to machinery to be supported F16M 9/00)
- 27/46 • • Foundations for supply conduits or other canals
- 27/48 • • Foundations inserted underneath existing buildings or constructions
- 27/50 • • Anchored foundations
- 27/52 • • Submerged foundations
- 29/00 Underground or underwater structures** (underground tanks B65D 88/76; hydraulic engineering, e.g. sealings or joints, E02B; underground garages E04H 6/00; underground air-raid shelters E04H 9/12; burial vaults E04H 13/00); **Retaining walls [6]**
- 29/02 • Retaining or protecting walls (piers or quay walls E02B 3/06)
- 29/045 • Underground structures, e.g. tunnels or galleries, built in the open air or by methods involving disturbance of the ground surface all along the location line; Methods of making them [6]
- 29/05 • • at least part of the cross-section being constructed in an open excavation or from the ground surface, e.g. assembled in a trench [6]
- 29/055 • • • further excavation of the cross-section proceeding underneath an already installed part of the structure, e.g. the roof of a tunnel [6]
- 29/063 • Tunnels submerged into, or built in, open water (construction or placing of caissons in general E02D 23/00; joining caissons to each other under water, in general E02D 25/00) [6]
- 29/067 • • Floating tunnels; Submerged bridge-like tunnels, i.e. tunnels supported by piers or the like above the water-bed (pontoons or floating bridges E01D 15/14) [6]
- 29/07 • • Tunnels or shuttering therefor preconstructed as a whole or continuously made, and moved into place on the water-bed, e.g. into a preformed trench [6]
- 29/073 • • Tunnels or shuttering therefor assembled from sections individually sunk onto, or laid on, the water-bed, e.g. in a preformed trench (caisson-type sections lowered onto the water-bed E02D 29/077) [6]
- 29/077 • • Tunnels at least partially built beneath the water-bed characterised by being made by methods involving disturbance thereof all along the location line, e.g. by cut-and-cover or caisson methods [6]
- 29/09 • Constructions or methods of constructing, in water, not otherwise provided for [6]
- 29/12 • Manhole shafts; Other inspection or access chambers; Accessories therefor (for underground tanks B65D 90/10; for sewerage E03F 5/02) [6]
- 29/14 • • Covers for manholes or the like; Frames for covers [6]
- 29/16 • Arrangement or construction of joints in foundation structures (sealing joints not restricted to foundation structures E04B 1/68)
- 31/00 Protective arrangements for foundations or foundation structures; Ground foundation measures for protecting the soil or the subsoil water, e.g. preventing or counteracting oil pollution** (spillage retaining means for tanks B65D 90/24)
- 31/02 • against ground humidity or ground water
- 31/04 • • Watertight packings for use under hydraulic pressure
- 31/06 • against corrosion by soil or water
- 31/08 • against transmission of vibrations or movements in the foundation soil
- 31/10 • against soil pressure or hydraulic pressure
- 31/12 • • against upward hydraulic pressure
- 31/14 • • against frost heaves in soil [3]
- 33/00 Testing foundations or foundation structures** (testing methods or apparatus, see the relevant subclasses of class G01; testing structures or apparatus as regards function, in general, G01M; investigating or analysing materials by determining their chemical or physical properties, in general G01N)
- 35/00 Straightening, lifting, or lowering of foundation structures or of constructions erected on foundations**
- 37/00 Repair of damaged foundations or foundation structures**
- E02F DREDGING; SOIL-SHIFTING** (winning peat E21C 49/00)

Note(s)

This subclass **covers**:

- primarily equipment for excavating or loosening earth or for moving loose earth;
- equipment for working similarly on other materials and similar equipment for loading or unloading materials.

Subclass index

GENERAL WORKING METHODS.....	1/00
HAND-OPERATED MACHINES OR APPARATUS FOR GENERAL USE.....	3/02
MECHANICALLY-DRIVEN MACHINES OR APPARATUS FOR GENERAL USE OR THEIR SPECIAL DETAILS.....	3/04
MACHINES FOR SPECIAL PURPOSES OR THEIR SPECIAL DETAILS.....	5/00
EQUIPMENT FOR CONVEYING OR SEPARATING EXCAVATED MATERIAL.....	7/00
GENERAL DETAILS.....	9/00

1/00	General working methods with dredgers or soil-shifting machines (methods for making embankments E02D 17/18; methods for mining E21C)	3/43	• • • • Control of dipper or bucket position; Control of sequence of drive operations [4]
3/00	Dredgers; Soil-shifting machines (for special purposes E02F 5/00; other machines or apparatus for mining E21C; tunnelling E21D)	3/46	• • with reciprocating digging or scraping elements moved by cables or hoisting ropes [4]
3/02	• hand-operated	3/47	• • • with grab buckets (grab equipment for cranes B66C) [4]
3/04	• mechanically-driven	3/48	• • • Drag-lines
3/06	• • with digging screws	3/50	• • • with buckets or other digging elements moved along a rigid guideway
3/08	• • with digging elements on an endless chain (conveyers B65G)	3/52	• • • Cableway excavators (cable cranes B66C)
3/10	• • • with tools that only loosen the material	3/54	• • • Cable scrapers
3/12	• • • Component parts	3/56	• • • with hand-controlled scraper or other digging elements
3/14	• • • Buckets; Chains; Guides for buckets or chains; Drives for chains	3/58	• • • Component parts
3/16	• • • Safety or control devices (safety devices in general F16P; controlling in general G05)	3/60	• • • Buckets, scrapers, or other digging elements
3/18	• • with digging wheels turning round an axis	3/627	• • Devices to connect beams or arms to a tractor or similar self-propelled machine [4]
3/20	• • • with tools that only loosen the material	3/633	• • • Drives therefor [4]
3/22	• • • Component parts	3/64	• • Bucket cars, i.e. having scraper bowls [4]
3/24	• • • Digging wheels; Digging elements of wheels; Drives for wheels	3/65	• • • Component parts, e.g. drives, control devices [4]
3/26	• • • Safety or control devices (safety devices in general F16P; controlling in general G05)	3/76	• • Graders, bulldozers, or the like with scraper plates or ploughshare-like elements (soil working A01B); Levelling devices [4]
3/28	• • with digging tools mounted on a dipper- or bucket-arm, e.g. dippers, buckets [4]	3/78	• • • with rotating digging elements
3/30	• • • with a dipper-arm pivoted on a cantilever beam	3/80	• • • Component parts
3/32	• • • working downwardly and towards the machine, e.g. with backhoes	3/815	• • • Blades; Levelling tools [4]
3/34	• • • with bucket-arms directly pivoted on the frames of tractors or self-propelled machines [4]	3/84	• • • Drives or control devices therefor
3/342	• • • Buckets emptying overhead (E02F 3/348-E02F 3/358 take precedence) [4]	3/85	• • • Applications of hydraulic or pneumatic systems
3/345	• • • Buckets emptying side-ways (E02F 3/348-E02F 3/358 take precedence) [4]	3/88	• • with arrangements acting by a sucking or forcing effect, e.g. suction dredgers (pumps in general F04)
3/348	• • • Buckets emptying into a collecting or conveying device [4]	3/90	• • • Component parts, e.g. drives, control devices
3/352	• • • Buckets movable along a fixed guide [4]	3/92	• • • Digging elements, e.g. suction heads
3/355	• • • Buckets connected to the rear end of a tractor [4]	3/94	• • • Apparatus for separating stones from the dredged material
3/358	• • • Bucket-arms pivoted on a turntable being part of a tractor frame [4]	3/96	• • with arrangements for alternate use of different digging elements
3/36	• • • Component parts	5/00	Dredgers or soil-shifting machines for special purposes
3/38	• • • Cantilever beams; Dipper-arms; Bucket-arms [4]	5/02	• • for digging trenches or ditches (agricultural ploughs for working ridges A01B 13/02)
3/39	• • • with telescopic arms [4]	5/04	• • with digging screws
3/40	• • • Dippers; Buckets [4]	5/06	• • with digging elements mounted on an endless chain
3/407	• • • with ejecting device [4]	5/08	• • with digging wheels turning round an axis
3/413	• • • with grabbing device (grab equipment for cranes B66C) [4]	5/10	• • with arrangements for reinforcing trenches or ditches; with arrangements for making or assembling conduits or for laying conduits or cables (laying pipes <i>per se</i> F16L 1/00; making pipes <i>in situ</i> F16L 1/038; laying electric cables <i>per se</i> H02G 1/06) [6]
3/42	• • • Drives for dippers, buckets, dipper-arms or bucket-arms [4]		

- 5/12 • • with equipment for back-filling trenches or ditches (E02F 5/10 takes precedence) [3]
- 5/14 • • Component parts for trench excavators, e.g. indicating devices
- 5/16 • Machines for digging other holes in the soil (earth drilling E21)
- 5/18 • • for horizontal holes
- 5/20 • • for vertical holes
- 5/22 • for making embankments; for back-filling (in combination with trench excavators E02F 5/12)
- 5/24 • • Depositing dredged material in mounds
- 5/26 • • Combined conveying-bridges and dredgers
- 5/28 • for cleaning watercourses or other waters
- 5/30 • Auxiliary apparatus, e.g. for thawing, cracking, blowing-up, or other preparatory treatment of the soil
- 5/32 • • Rippers [4]
- 7/00 Equipment for conveying or separating excavated material** (barges adapted for carrying-away material from floating dredgers B63B 35/28)
- 7/02 • Conveying equipment mounted on a dredger (conveyers in general B65G)
- 7/04 • Loading devices mounted on a dredger (loading devices in general B65G)
- 7/06 • Delivery chutes or screening plants mounted on a dredger (separating equipment in general B03; delivery chutes in general B65G)
- 7/10 • Pipe-lines for conveying excavated materials (pipes in general F16L; pipe-line systems F17D)
- 9/00 Component parts of dredgers or soil-shifting machines, not restricted to one of the kinds covered by groups E02F 3/00-E02F 7/00** (laying-out or take-up devices for trailing electric cables B66C) [3]
- 9/02 • Travelling gear (for motor vehicles B60B, B60G; undercarriages for locomotives or railroad cars B61F; track-laying vehicles B62D; for cranes B66C)
- 9/04 • • Walking gears moving the dredger forward step-by-step
- 9/06 • Floating substructures as supports
- 9/08 • Superstructures; Supports for superstructures
- 9/10 • • Supports for movable superstructures mounted on travelling or walking gears or on other superstructures
- 9/12 • • • Slewing or traversing gears (roller and ball bearings F16C)
- 9/14 • Booms; Cable suspensions
- 9/16 • Cabins, platforms, or the like for the driver (for cranes B66C 13/54)
- 9/18 • Counterweights
- 9/20 • Drives; Control devices (gearing in general F16H; controlling in general G05; electric multi-motor drives H02K, H02P)
- 9/22 • • Hydraulic or pneumatic drives
- 9/24 • Safety devices
- 9/26 • Indicating devices
- 9/28 • Small metalwork for digging elements, e.g. teeth