

CPC COOPERATIVE PATENT CLASSIFICATION

B PERFORMING OPERATIONS; TRANSPORTING

(NOTES omitted)

SHAPING

B22 CASTING; POWDER METALLURGY

B22D CASTING OF METALS; CASTING OF OTHER SUBSTANCES BY THE SAME PROCESSES OR DEVICES (shaping of plastics or substances in a plastic state [B29C](#); metallurgical processing, selection of substances to be added to metal [C21](#), [C22](#))

WARNING

In this subclass non-limiting references (in the sense of paragraph 39 of the Guide to the IPC) may still be displayed in the scheme.

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| <p>1/00 Treatment of fused masses in the ladle or the supply runners before casting {(for continuous casting B22D 11/10; metallurgical processing, e.g. refining of iron or other metal C21, C22, C25C)}</p> <p>1/002 . {Treatment with gases (C21C 7/072, C22B 9/05 take precedence)}</p> <p>1/005 . . {Injection assemblies therefor (features relating to gas injection, provided on closures of the sliding gate type B22D 41/42; provided on pouring nozzles B22D 41/58; provided on closures of the stopper-rod type B22D 41/186)}</p> <p>1/007 . {Treatment of the fused masses in the supply runners (B22D 1/002, B22D 1/005 take precedence)}</p> <p>2/00 Arrangement of indicating or measuring devices, e.g. for temperature or viscosity of the fused mass</p> <p>2/001 . {for the slag appearance in a molten metal stream}</p> <p>2/003 . {for the level of the molten metal (B22D 11/181 and B22D 11/201 take precedence; level indicators in general G01F 23/00)}</p> <p>2/005 . {for the thickness of a frozen shell (B22D 11/188 and B22D 11/207 take precedence)}</p> <p>2/006 . {for the temperature of the molten metal (measuring temperature in general G01K)}</p> <p>2/008 . {for the viscosity of the molten metal (measuring viscosity in general G01N 11/00)}</p> | <p>7/005 . {from non-ferrous metals}</p> <p>7/02 . Casting compound ingots of two or more different metals in the molten state, i.e. integrally cast</p> <p>7/04 . Casting hollow ingots</p> <p>7/06 . Ingot moulds or their manufacture</p> <p>7/062 . . {Stools for ingot moulds}</p> <p>7/064 . . {Cooling the ingot moulds}</p> <p>7/066 . . {Manufacturing, repairing or reinforcing ingot moulds}</p> <p>7/068 . . . {characterised by the materials used therefor}</p> <p>7/08 . . Divided ingot moulds</p> <p>7/10 . . Hot tops therefor {(heating the top discard of ingots B22D 27/06)}</p> <p>7/102 . . . {from refractorial material only}</p> <p>7/104 . . . {from exothermic material only}</p> <p>7/106 . . . {Configuration of hot tops}</p> <p>7/108 . . . {Devices for making or fixing hot tops}</p> <p>7/12 . Appurtenances, e.g. for sintering, for preventing splashing</p> <p>9/00 Machines or plants for casting ingots</p> <p>9/003 . {for top casting}</p> <p>9/006 . {for bottom casting}</p> |
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Casting of pigs, i.e. metal castings suitable for subsequently melting; similar casting

- 3/00** Pig or like casting (equipment for conveying molten metal [B22D 35/00](#))
- 3/02 . Moulding of beds
- 5/00** Machines or plants for pig or like casting
- 5/005 . {Devices for stacking pigs; Pigforms to be stacked}
- 5/02 . with rotary casting tables
- 5/04 . with endless casting conveyors

Casting of ingots, i.e. metal castings suitable for subsequently rolling or forging

- 7/00** Casting ingots, {e.g. from ferrous metals} (equipment for conveying molten metal [B22D 35/00](#))

Particular casting processes; Machines or apparatus therefor

- 11/00** Continuous casting of metals, i.e. casting in indefinite lengths (metal drawing, metal extruding [B21C](#))
- 11/001 . {of specific alloys}
- 11/002 . . {Stainless steels}
- 11/003 . . {Aluminium alloys}
- 11/004 . . {Copper alloys}
- 11/005 . {of wire (casting on wire [B22D 19/14](#))}
- 11/006 . {of tubes}
- 11/007 . {of composite ingots, i.e. two or more molten metals of different compositions being used to integrally cast the ingots (casting of composite ingots in definite lengths [B22D 7/02](#))}
- 11/008 . {of clad ingots, i.e. the molten metal being cast against a continuous strip forming part of the cast product}

- 11/009 . {of work of special cross-section, e.g. I-beams, U-profiles}
- 11/01 . without moulds, e.g. on molten surfaces
- 11/015 . . {using magnetic field for conformation, i.e. the metal is not in contact with a mould}
- 11/04 . into open-ended moulds ([B22D 11/06](#), [B22D 11/07](#) take precedence; plants for continuous casting, e.g. for upwardly drawing the strand [B22D 11/14](#))
- 11/0401 . . {Moulds provided with a feed head}
- 11/0403 . . {Multiple moulds}
- 11/0405 . . {Rotating moulds}
- 11/0406 . . {Moulds with special profile}
- 11/0408 . . {Moulds for casting thin slabs}
- 11/041 . . for vertical casting ([B22D 11/043](#), [B22D 11/049](#) - [B22D 11/059](#) take precedence)
- 11/043 . . Curved moulds ([B22D 11/049](#) - [B22D 11/059](#) take precedence)
- 11/045 . . for horizontal casting ([B22D 11/049](#) - [B22D 11/059](#) take precedence)
- 11/0455 . . . {Bidirectional horizontal casting}
- 11/047 . . . Means for joining tundish to mould
- 11/0475 . . . {characterised by use of a break ring}
- 11/049 . . for direct chill casting, e.g. electromagnetic casting
- 11/05 . . into moulds having adjustable walls
- 11/051 . . into moulds having oscillating walls
- 11/053 . . Means for oscillating the moulds
- 11/0535 . . . {in a horizontal plane}
- 11/055 . . Cooling the moulds {([B22D 11/04](#) takes precedence)}
- 11/057 . . Manufacturing or calibrating the moulds
- 11/059 . . Mould materials or platings
- 11/06 . into moulds with travelling walls, e.g. with rolls, plates, belts, caterpillars
- 11/0602 . . {formed by a casting wheel and belt, e.g. Properzi-process}
- 11/0605 . . {formed by two belts, e.g. Hazelett-process}
- 11/0608 . . {formed by caterpillars}
- 11/0611 . . {formed by a single casting wheel, e.g. for casting amorphous metal strips or wires}
- 11/0614 . . . {the casting wheel being immersed in a molten metal bath, and drawing out upwardly the casting strip}
- 11/0617 . . . {the casting wheel having its axis vertical and a casting strip formed in a peripheral groove of the wheel}
- 11/062 . . . {the metal being cast on the inside surface of the casting wheel}
- 11/0622 . . {formed by two casting wheels}
- 11/0625 . . . {the two casting wheels being immersed in a molten metal bath and drawing out upwardly the casting strip}
- 11/0628 . . {formed by more than two casting wheels}
- 11/0631 . . {formed by a travelling straight surface, e.g. through-like moulds, a belt}
- 11/0634 . . {formed by a casting wheel and a co-operating shoe}
- 11/0637 . . {Accessories therefor}
- 11/064 . . . {for supplying molten metal (supplying molten metal to open-ended moulds [B22D 11/10](#))}
- 11/0642 {Nozzles (nozzles used in open-ended moulds [B22D 41/50](#))}
- 11/0645 {Sealing means for the nozzle between the travelling surfaces}
- 11/0648 . . . {Casting surfaces}
- 11/0651 {Casting wheels ([B22D 11/0682](#) takes precedence)}
- 11/0654 {Casting belts ([B22D 11/0685](#) takes precedence)}
- 11/0657 {Caterpillars ([B22D 11/0688](#) takes precedence)}
- 11/066 {Side dams ([B22D 11/0691](#) takes precedence)}
- 11/0662 {having electromagnetic confining means}
- 11/0665 . . . {for treating the casting surfaces, e.g. calibrating, cleaning, dressing, preheating}
- 11/0668 {for dressing, coating or lubricating}
- 11/0671 {for heating or drying}
- 11/0674 {for machining}
- 11/0677 . . . {for guiding, supporting or tensioning the casting belts}
- 11/068 . . . {for cooling the cast product during its passage through the mould surfaces (cooling open-ended moulds [B22D 11/04](#); secondary cooling [B22D 11/124](#))}
- 11/0682 {by cooling the casting wheel}
- 11/0685 {by cooling the casting belts ([B22D 11/0677](#) takes precedence)}
- 11/0688 {by cooling the caterpillars}
- 11/0691 {by cooling the side dams}
- 11/0694 . . . {for peeling-off or removing the cast product}
- 11/0697 . . . {for casting in a protected atmosphere}
- 11/07 . Lubricating the moulds
- 11/08 . Accessories for starting the casting procedure
- 11/081 . . {Starter bars}
- 11/083 . . . {Starter bar head; Means for connecting or detaching starter bars and ingots}
- 11/085 . . {Means for storing or introducing the starter bars in the moulds}
- 11/086 . . {Means for connecting cast ingots of different sizes or compositions}
- 11/088 . . {Means for sealing the starter bar head in the moulds}
- 11/10 . Supplying or treating molten metal ([B22D 41/00](#) takes precedence)
- 11/103 . . Distributing the molten metal, e.g. using runners, floats, distributors
- 11/106 . . Shielding the molten jet {([B22D 41/50](#) takes precedence)}
- 11/108 . . Feeding additives, powders, or the like
- 11/11 . . Treating the molten metal
- 11/111 . . . by using protecting powders
- 11/112 . . . by accelerated cooling
- 11/113 . . . by vacuum treating
- 11/114 . . . by using agitating or vibrating means ([B22D 11/117](#) takes precedence)
- 11/115 by using magnetic fields
- 11/116 . . . Refining the metal
- 11/117 by treating with gases ([B22D 11/118](#), [B22D 11/119](#) take precedence)
- 11/118 by circulating the metal under, over or around weirs ([B22D 11/119](#) takes precedence)
- 11/119 by filtering

- 11/12 . Accessories for subsequent treating or working cast stock in situ (rolling immediately subsequent to continuous casting [B21B 1/46](#), [B21B 13/22](#))
- 11/1206 . . {for plastic shaping of strands (rolling mills [B21B 1/46](#))}
- 11/1213 . . {for heating or insulating strands}
- 11/122 . . {using magnetic fields}
- 11/1226 . . {for straightening strands}
- 11/1233 . . {for marking strands}
- 11/124 . . for cooling
- 11/1241 . . . {by transporting the cast stock through a liquid medium bath or a fluidized bed}
- 11/1243 . . . {by using cooling grids or cooling plates}
- 11/1245 . . . {using specific cooling agents}
- 11/1246 . . . {Nozzles; Spray heads}
- 11/1248 . . . {Means for removing cooling agent from the surface of the cast stock}
- 11/126 . . for cutting
- 11/1265 . . . {having auxiliary devices for deburring}
- 11/128 . . for removing
- 11/1281 . . . {Vertical removing}
- 11/1282 . . . {Vertical casting and curving the cast stock to the horizontal}
- 11/1284 . . . {Horizontal removing}
- 11/1285 . . . {Segment changing devices for supporting or guiding frames}
- 11/1287 . . . {Rolls; Lubricating, cooling or heating rolls while in use}
- 11/1288 . . . {Walking bar members}
- 11/14 . Plants for continuous casting
- 11/141 . . {for vertical casting}
- 11/142 . . {for curved casting}
- 11/143 . . {for horizontal casting}
- 11/144 . . {with a rotating mould}
- 11/145 . . {for upward casting}
- 11/146 . . {for inclined casting}
- 11/147 . . {Multi-strand plants}
- 11/148 . . {Safety arrangements}
- 11/16 . Controlling or regulating processes or operations
- 11/161 . . {for automatic starting the casting process}
- 11/163 . . {for cutting cast stock}
- 11/165 . . {for the supply of casting powder}
- 11/166 . . {for mould oscillation}
- 11/168 . . {for adjusting the mould size or mould taper}
- 11/18 . . for pouring ([B22D 11/20](#) takes precedence)
- 11/181 . . . {responsive to molten metal level or slag level}
- 11/182 {by measuring temperature}
- 11/183 {by measuring molten metal weight}
- 11/185 {by using optical means}
- 11/186 {by using electric, magnetic, sonic or ultrasonic means}
- 11/187 {by using X-rays or nuclear radiation}
- 11/188 . . . {responsive to thickness of solidified shell}
- 11/20 . . for removing cast stock
- 11/201 . . . {responsive to molten metal level or slag level}
- 11/202 {by measuring temperature}
- 11/203 {by measuring molten metal weight}
- 11/204 {by using optical means}
- 11/205 {by using electric, magnetic, sonic or ultrasonic means}
- 11/206 {by using X-rays or nuclear radiation}
- 11/207 . . . {responsive to thickness of solidified shell}
- 11/208 . . . {for aligning the guide rolls}
- 11/22 . . for cooling cast stock or mould
- 11/225 . . . {for secondary cooling}
- 13/00 Centrifugal casting; Casting by using centrifugal force**
- 13/02 . of elongated solid or hollow bodies, e.g. pipes, in moulds rotating around their longitudinal axis
- 13/023 . . {the longitudinal axis being horizontal}
- 13/026 . . {the longitudinal axis being vertical}
- 13/04 . of shallow solid or hollow bodies, e.g. wheels or rings, in moulds rotating around their axis of symmetry
- 13/06 . of solid or hollow bodies in moulds rotating around an axis arranged outside the mould
- 13/063 . . {for dentistry or jewellery}
- 13/066 . . {several moulds being disposed in a circle}
- 13/08 . in which a stationary mould is fed from a rotating mass of liquid metal
- 13/10 . Accessories for centrifugal casting apparatus, e.g. moulds, linings therefor, means for feeding molten metal, cleansing moulds, removing castings ([making or lining moulds B22C](#))
- 13/101 . . {Moulds}
- 13/102 . . . {Linings for moulds ([making or lining moulds B22C](#))}
- 13/104 . . . {Cores}
- 13/105 . . . {Cooling for moulds or cores}
- 13/107 . . {Means for feeding molten metal}
- 13/108 . . {Removing of casting}
- 13/12 . Controlling, supervising, specially adapted to centrifugal casting, e.g. for safety reasons ([controlling or regulating in general G05](#))
- 15/00 Casting using a mould or core of which a part significant to the process is of high thermal conductivity, e.g. chill casting; Moulds or accessories specially adapted therefor**
- 15/005 . {of rolls, wheels or the like ([B22D 19/16](#) takes precedence)}
- 15/02 . of cylinders, pistons, bearing shells or like thin-walled objects
- 15/04 . Machines or apparatus for chill casting ([B22D 15/005](#), [B22D 15/02](#) take precedence)
- 17/00 Pressure die casting or injection die casting, i.e. casting in which the metal is forced into a mould under high pressure**
- 17/002 . {using movable moulds ([for plastics B29C 45/04](#))}
- 17/005 . {using two or more fixed moulds ([for plastics B29C 45/12](#))}
- 17/007 . {Semi-solid pressure die casting}
- 17/02 . Hot chamber machines, i.e. with heated press chamber in which metal is melted
- 17/04 . . Plunger machines
- 17/06 . . Air injection machines
- 17/08 . Cold chamber machines, i.e. with unheated press chamber into which molten metal is ladled
- 17/10 . . with horizontal press motion
- 17/12 . . with vertical press motion
- 17/14 . Machines with evacuated die cavity
- 17/145 . . {Venting means therefor ([for permanent moulds B22C 9/067](#))}
- 17/16 . specially adapted for casting slide fasteners or elements therefor

- 17/18 . . . Machines built up from units providing for different combinations
- 17/20 . . . Accessories: Details
- 17/2007 . . . {Methods or apparatus for cleaning or lubricating moulds}
- 17/2015 . . . {Means for forcing the molten metal into the die (for plastics [B29C 45/46](#))}
- 17/2023 . . . {Nozzles or shot sleeves}
- 17/203 . . . {Injection pistons ([B22D 17/2053](#) takes precedence; for plastics [B29C 45/53](#))}
- 17/2038 . . . {Heating, cooling or lubricating the injection unit (for plastics [B29C 45/74](#), [B29C 45/83](#))}
- 17/2046 . . . {with provisions for damping the pressure peak}
- 17/2053 . . . {using two or more cooperating injection pistons}
- 17/2061 . . . {using screws}
- 17/2069 . . . {Exerting after-pressure on the moulding material}
- 17/2076 . . . {Cutting-off equipment for sprues or ingates (for plastics [B29C 45/38](#))}
- 17/2084 . . . {Manipulating or transferring devices for evacuating cast pieces}
- 17/2092 . . . {Safety devices (for plastics [B29C 45/84](#))}
- 17/22 . . . Dies (manufacture, [see the appropriate class](#), e.g. [B23P 15/24](#)); Die plates; Die supports; Cooling equipment for dies; Accessories for loosening and ejecting castings from dies
- 17/2209 . . . {Selection of die materials (for permanent moulds [B22C 9/061](#))}
- 17/2218 . . . {Cooling or heating equipment for dies (for permanent moulds [B22C 9/065](#); for plastics [B29C 45/73](#))}
- 17/2227 . . . {Die seals (for plastics [B29C 45/2608](#))}
- 17/2236 . . . {Equipment for loosening or ejecting castings from dies (for plastics [B29C 45/40](#))}
- 17/2245 . . . {having walls provided with means for marking or patterning}
- 17/2254 . . . {having screw-threaded die walls}
- 17/2263 . . . {having tubular die cavities}
- 17/2272 . . . {Sprue channels}
- 17/2281 {closure devices therefor}
- 17/229 . . . {with exchangeable die part ([B22D 17/2245](#) takes precedence)}
- 17/24 . . . Accessories for locating and holding cores or inserts
- 17/26 . . . Mechanisms or devices for locking or opening dies
- 17/263 . . . {mechanically}
- 17/266 . . . {hydraulically}
- 17/28 . . . Melting pots
- 17/30 . . . Accessories for supplying molten metal, e.g. in rations ([supplying molten metal in ration in general B22D 39/00](#))
- 17/32 . . . Controlling equipment
- 18/00** . . . **Pressure casting; Vacuum casting** ([B22D 17/00](#) takes precedence; treating the metal in the mould by using pressure or vacuum [B22D 27/00](#))
- 18/02 . . . Pressure casting making use of mechanical pressure devices, e.g. cast-forging ([B22D 18/04](#) takes precedence)
- 18/04 . . . Low pressure casting, i.e. making use of pressures up to a few bars to fill the mould
- 18/06 . . . Vacuum casting, i.e. making use of vacuum to fill the mould
- 18/08 . . . Controlling, supervising, e.g. for safety reasons ([controlling or regulating in general G05](#))
- 19/00** . . . **Casting in, on, or around objects which form part of the product** ([B22D 23/04](#) takes precedence; [alumino-thermic welding B23K 23/00](#); coating by casting molten material on the substrate [C23C 6/00](#))
- 19/0009 . . . {Cylinders, pistons}
- 19/0018 . . . {cylinders with fins}
- 19/0027 . . . {pistons}
- 19/0036 . . . {gears}
- 19/0045 . . . {household utensils}
- 19/0054 . . . {rotors, stators for electrical motors}
- 19/0063 . . . {finned exchangers ([cylinders B22D 19/0018](#))}
- 19/0072 . . . {for making objects with integrated channels}
- 19/0081 . . . {pretreatment of the insert, e.g. for enhancing the bonding between insert and surrounding cast metal}
- 19/009 . . . {for casting objects the members of which can be separated afterwards}
- 19/02 . . . for making reinforced articles ([B22D 19/14](#) takes precedence)
- 19/04 . . . for joining parts
- 19/045 . . . {for joining tubes}
- 19/06 . . . for manufacturing or repairing tools
- 19/08 . . . for building-up linings or coverings, e.g. of anti-frictional metal
- 19/085 . . . {of anti-frictional metal}
- 19/10 . . . Repairing defective or damaged objects by metal casting procedures (by other procedures [B23P 6/04](#); [ingot mould B22D 7/06](#); [B22D 19/06](#) takes precedence)
- 19/12 . . . for making objects, e.g. hinges, with parts which are movable relatively to one another
- 19/14 . . . the objects being filamentary or particulate in form (making alloys containing fibres or filaments by contacting the fibres or filaments with molten metal [C22C 47/08](#))
- 19/16 . . . for making compound objects cast of two or more different metals, e.g. for making rolls for rolling mills ([casting compound ingots B22D 7/02](#))
- 21/00** . . . **Casting non-ferrous metals or metallic compounds so far as their metallurgical properties are of importance for the casting procedure; Selection of compositions therefor** {(non-ferrous ingots [B22D 7/005](#))}
- 21/002 . . . {Castings of light metals}
- 21/005 . . . {with high melting point, e.g. Be 1280 degrees C, Ti 1725 degrees C}
- 21/007 . . . {with low melting point, e.g. Al 659 degrees C, Mg 650 degrees C}
- 21/02 . . . Casting exceedingly oxidisable non-ferrous metals, e.g. in inert atmosphere ([use of inert atmosphere in casting metals in general B22D 23/00](#); apparatus for vacuum casting [B22D 27/15](#))
- 21/022 . . . {Casting heavy metals, with exceedingly high melting points, i.e. more than 1600 degrees C, e.g. W 3380 degrees C, Ta 3000 degrees C, Mo 2620 degrees C, Zr 1860 degrees C, Cr 1765 degrees C, V 1715 degrees C}

21/025	. . {Casting heavy metals with high melting point, i.e. 1000 - 1600 degrees C, e.g. Co 1490 degrees C, Ni 1450 degrees C, Mn 1240 degrees C, Cu 1083 degrees C}	27/18	. Measures for using chemical processes for influencing the surface composition of castings, e.g. for increasing resistance to acid attack
21/027	. . {Casting heavy metals with low melting point, i.e. less than 1000 degrees C, e.g. Zn 419 degrees C, Pb 327 degrees C, Sn 232 degrees C}	27/20	. Measures not previously mentioned for influencing the grain structure or texture; Selection of compositions therefor
21/04	. . Casting aluminium or magnesium {(no material; see B22D 21/007)}	Final measures after casting (cleaning of castings by sand-blasting B24C)	
21/06	. Casting non-ferrous metals with a high melting point, e.g. metallic carbides (B22D 21/02 takes precedence)	29/00	Removing castings from moulds, not restricted to casting processes covered by a single main group; Removing cores; Handling ingots {(B22D 13/10, B22D 11/124, B22D 17/00 take precedence)}
23/00	Casting processes not provided for in groups B22D 1/00 - B22D 21/00 (making metallic powder by casting B22F 9/08; aluminothermic welding B23K 23/00; remelting metals C22B 9/16)	29/001	. {Removing cores}
23/003	. {Moulding by spraying metal on a surface}	29/002	. . {by leaching, washing or dissolving}
23/006	. {Casting by filling the mould through rotation of the mould together with a molten metal holding recipient, about a common axis}	29/003	. . {using heat}
23/02	. Top casting	29/005	. . {by vibrating or hammering}
23/04	. Casting by dipping (hot-dipping or immersion processes for applying coating material in the molten state without affecting the shape C23C 2/00)	29/006	. . {by abrasive, water or air blasting}
23/06	. Melting-down metal, e.g. metal particles, in the mould	29/007	. . {by using explosive shock waves}
23/10	. . Electroslag casting {(electroslag remelting C22B 9/18)}	29/008	. . . {in a liquid medium}
25/00	Special casting characterised by the nature of the product (B22D 15/02, B22D 17/16, B22D 19/00 take precedence; casting stereotype plates B41D 3/00)	29/02	. Vibratory apparatus specially designed for shaking out flasks
25/005	. {Casting metal foams}	29/04	. Handling or stripping castings or ingots (grippers in general, see the relevant subclasses, e.g. B66C)
25/02	. by its peculiarity of shape; of works of art {(cylinders, pistons B22D 15/02)}	29/06	. . Strippers actuated by fluid pressure
25/023	. . {Casting chains or the like}	29/08	. . Strippers actuated mechanically
25/026	. . {Casting jewelry articles (B22D 13/063 takes precedence)}	30/00	Cooling castings, not restricted to casting processes covered by a single main group (accessories for cooling cast stock in continuous casting of metals B22D 11/124; controlling or regulating processes or operations for cooling cast stock or mould in continuous casting of metals B22D 11/22; chill casting B22D 15/00)
25/04	. . Casting metal electric battery plates or the like (manufacture thereof by multi-step processes H01M 4/82)	31/00	Cutting-off surplus material, e.g. gates; {Cleaning and working on castings (B22D 17/2076 takes precedence)}
25/06	. by its physical properties (B22D 27/00 takes precedence)	31/002	. {Cleaning, working on castings}
25/08	. . by uniform hardness (B22D 15/00 takes precedence)	31/005	. . {Sealing or impregnating porous castings}
27/00	Treating the metal in the mould while it is molten or ductile (B22D 7/12, B22D 11/10, B22D 43/00 take precedence); {Pressure or vacuum casting (B22D 17/00 takes precedence)}	31/007	. . {Tumbling mills}
27/003	. {by using inert gases}	Other equipment for casting (arrangement of indicating or measuring devices B22D 2/00)	
27/006	. {by using reactive gases}	33/00	Equipment for handling moulds
27/02	. Use of electric or magnetic effects {(for continuous casting B22D 11/015, B22D 11/11)}	33/005	. {Transporting flaskless moulds}
27/04	. Influencing the temperature of the metal, e.g. by heating or cooling the mould	33/02	. Turning or transposing moulds
27/045	. . {Directionally solidified castings}	33/04	. Bringing together or separating moulds
27/06	. . Heating the top discard of ingots (hot tops for ingot moulds B22D 7/10)	33/06	. Burdening or relieving moulds
27/08	. Shaking, vibrating, or turning of moulds	35/00	Equipment for conveying molten metal into beds or moulds (B22D 37/00 - B22D 41/00 take precedence; specially adapted to particular processes or machines, see the relevant groups)
27/09	. by using pressure	35/02	. into beds
27/11	. . making use of mechanical pressing devices	35/04	. into moulds, e.g. base plates, runners
27/13	. . making use of gas pressure	35/045	. . {Runner base plates for bottom casting ingots}
27/15	. by using vacuum	35/06	. Heating or cooling equipment
		37/00	Controlling or regulating the pouring of molten metal from a casting melt-holding vessel ((B22D 11/18 takes precedence) B22D 39/00, B22D 41/00 take precedence; specially adapted to particular processes or machines, see the relevant groups of this subclass)

- 37/005 . {Shielding the molten metal stream ([B22D 11/106](#), [B22D 41/50](#) take precedence)}
- 39/00 Equipment for supplying molten metal in rations**
(specially adapted to particular processes or machines, see the relevant groups of this subclass)
- 39/003 . {using electromagnetic field}
- 39/006 . . {Electromagnetic conveyors}
- 39/02 . having means for controlling the amount of molten metal by volume
- 39/023 . . {using a displacement member}
- 39/026 . . {using a ladler}
- 39/04 . having means for controlling the amount of molten metal by weight
- 39/06 . having means for controlling the amount of molten metal by controlling the pressure above the molten metal
- 41/00 Casting melt-holding vessels, e.g. ladles, tundishes, cups or the like** ([B22D 39/00](#), [B22D 43/00](#) take precedence)
- 41/001 . {devices for cleaning ladles (cleaning in general [B08B](#))}
- 41/003 . {with impact pads}
- 41/005 . with heating or cooling means
- 41/01 . . Heating means
- 41/015 . . . with external heating, i.e. the heat source not being a part of the ladle
- 41/02 . Linings
- 41/023 . . {Apparatus used for making or repairing linings (equipment used for making or repairing converter linings [C21C 5/441](#))}
- 41/026 . . {Apparatus used for fracturing and removing of linings}
- 41/04 . tiltable
- 41/05 . . Tea-pot spout ladles
- 41/06 . Equipment for tilting
- 41/08 . for bottom pouring ([B22D 41/14](#), [B22D 41/50](#) take precedence)
- 41/12 . Travelling ladles or similar containers; Cars for ladles (casting cranes [B66C](#))
- 41/13 . . Ladle turrets
- 41/14 . Closures
- 41/16 . . stopper-rod type, i.e. a stopper-rod being positioned downwardly through the vessel and the metal therein, for selective registry with the pouring opening
- 41/18 . . . Stopper-rods therefor
- 41/183 {with cooling means}
- 41/186 {with means for injecting a fluid into the melt}
- 41/20 . . . Stopper-rod operating equipment
- 41/22 . . sliding-gate type, i.e. having a fixed plate and a movable plate in sliding contact with each other for selective registry of their openings
- 41/24 . . . characterised by a rectilinearly movable plate ([B22D 41/38](#) - [B22D 41/42](#) take precedence)
- 41/26 . . . characterised by a rotatively movable plate ([B22D 41/38](#) - [B22D 41/42](#) take precedence)
- 41/28 . . . Plates therefor ([B22D 41/38](#) - [B22D 41/42](#) take precedence)
- 41/30 Manufacturing or repairing thereof
- 41/32 characterised by the materials used therefor
- 41/34 Supporting, fixing or centering means therefor
- 41/36 Treating the plates, e.g. lubricating, heating (ladles, cups or the like with heating means [B22D 41/01](#))
- 41/38 . . . Means for operating the sliding gate
- 41/40 . . . Means for pressing the plates together
- 41/42 . . . Features relating to gas injection
- 41/44 . . Consumable closure means, i.e. closure means being used only once
- 41/46 . . . Refractory plugging masses
- 41/465 {Unplugging a vessel discharge port}
- 41/48 . . . Meltable closures
- 41/50 . Pouring-nozzles
- 41/502 . . {Connection arrangements; Sealing means therefor}
- 41/505 . . {Rings, inserts or other means preventing external nozzle erosion by the slag}
- 41/507 . . {giving a rotating motion to the issuing molten metal}
- 41/52 . . Manufacturing or repairing thereof
- 41/54 . . . characterised by the materials used therefor
- 41/56 . . Means for supporting, manipulating or changing a pouring-nozzle
- 41/58 . . with gas injecting means
- 41/60 . . with heating or cooling means
- 41/62 . . with stirring or vibrating means
- 43/00 Mechanical cleaning, e.g. skimming of molten metals**
- 43/001 . {Retaining slag during pouring molten metal}
- 43/002 . . {by using floating means}
- 43/004 . . {by using filtering means ([B22C 9/086](#) takes precedence)}
- 43/005 . {Removing slag from a molten metal surface}
- 43/007 . . {by using scrapers}
- 43/008 . . {by suction}
- 45/00 Equipment for casting, not otherwise provided for**
- 45/005 . {Evacuation of fumes, dust or waste gases during manipulations in the foundry (during steel manufacture [C21C 5/38](#); evacuation from furnaces [F27D 17/001](#))}
- 46/00 Controlling, supervising, not restricted to casting covered by a single main group, e.g. for safety reasons** ([controlling or regulating in general G05](#))
- 47/00 Casting plants**
- 47/02 . for both moulding and casting