

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.

<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>Casting of ingots, i.e. metal castings suitable for subsequently rolling or forging</p> <p>7/00 Casting ingots, {e.g. from ferrous metals}(equipment for conveying molten metal B22D 35/00)</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>
<p>Casting of pigs, i.e. metal castings suitable for subsequently melting; similar casting</p> <p>3/00 Pig or like casting (equipment for conveying molten metal B22D 35/00)</p> <p>3/02 . Moulding of beds</p> <p>5/00 Machines or plants for pig or like casting</p> <p>5/005 . {Devices for stacking pigs; Pigforms to be stacked}</p> <p>5/02 . with rotary casting tables</p> <p>5/04 . with endless casting conveyors</p>	<p>Particular casting processes; Machines or apparatus therefor</p> <p>11/00 Continuous casting of metals, i.e. casting in indefinite lengths (metal drawing, metal extruding B21C)</p> <p>11/001 . {of specific alloys}</p> <p>11/002 . . {Stainless steels}</p> <p>11/003 . . {Aluminium alloys}</p> <p>11/004 . . {Copper alloys}</p> <p>11/005 . {of wire (casting on wire B22D 19/14)}</p> <p>11/006 . {of tubes}</p>

- 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}
- 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}
- 21/04 . . Casting aluminium or magnesium {(no material; see [B22D 21/007](#))}
- 21/06 . Casting non-ferrous metals with a high melting point, e.g. metallic carbides ([B22D 21/02](#) takes precedence)
- 23/00 Casting processes not provided for in groups [B22D 1/00](#) - [B22D 21/00](#) (making metallic powder by casting [B22F 9/08](#); alumino-thermic welding [B23K 23/00](#); remelting metals [C22B 9/16](#))**
- 23/003 . {Moulding by spraying metal on a surface}
- 23/006 . {Casting by filling the mould through rotation of the mould together with a molten metal holding recipient, about a common axis}
- 23/02 . Top casting
- 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](#))
- 23/06 . Melting-down metal, e.g. metal particles, in the mould
- 23/10 . . Electroslag casting {(electroslag remelting [C22B 9/18](#))}
- 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](#))**
- 25/005 . {Casting metal foams}
- 25/02 . by its peculiarity of shape; of works of art {(cylinders, pistons [B22D 15/02](#))}
- 25/023 . . {Casting chains or the like}
- 25/026 . . {Casting jewelry articles ([B22D 13/063](#) takes precedence)}
- 25/04 . . Casting metal electric battery plates or the like (manufacture thereof by multi-step processes [H01M 4/82](#))
- 25/06 . by its physical properties ([B22D 27/00](#) takes precedence)
- 25/08 . . by uniform hardness ([B22D 15/00](#) takes precedence)
- 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)}**
- 27/003 . {by using inert gases}
- 27/006 . {by using reactive gases}
- 27/02 . Use of electric or magnetic effects {(for continuous casting [B22D 11/015](#), [B22D 11/11](#))}
- 27/04 . Influencing the temperature of the metal, e.g. by heating or cooling the mould
- 27/045 . . {Directionally solidified castings}
- 27/06 . . Heating the top discard of ingots (hot tops for ingot moulds [B22D 7/10](#))
- 27/08 . Shaking, vibrating, or turning of moulds
- 27/09 . by using pressure
- 27/11 . . making use of mechanical pressing devices
- 27/13 . . making use of gas pressure
- 27/15 . by using vacuum
- 27/18 . Measures for using chemical processes for influencing the surface composition of castings, e.g. for increasing resistance to acid attack
- 27/20 . Measures not previously mentioned for influencing the grain structure or texture; Selection of compositions therefor
- Final measures after casting (cleaning of castings by sand-blasting [B24C](#))**
- 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)}**
- 29/001 . {Removing cores}
- 29/002 . . {by leaching, washing or dissolving}
- 29/003 . . {using heat}
- 29/005 . . {by vibrating or hammering}
- 29/006 . . {by abrasive, water or air blasting}
- 29/007 . . {by using explosive shock waves}
- 29/008 . . . {in a liquid medium}
- 29/02 . Vibratory apparatus specially designed for shaking out flasks
- 29/04 . Handling or stripping castings or ingots (grippers in general, see the relevant subclasses, e.g. [B66C](#))
- 29/06 . . Strippers actuated by fluid pressure
- 29/08 . . Strippers actuated mechanically
- 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](#))**
- 31/00 Cutting-off surplus material, e.g. gates; {Cleaning and working on castings ([B22D 17/2076](#) takes precedence)}**
- 31/002 . {Cleaning, working on castings}
- 31/005 . . {Sealing or impregnating porous castings}
- 31/007 . . {Tumbling mills}
- Other equipment for casting (arrangement of indicating or measuring devices [B22D 2/00](#))**
- 33/00 Equipment for handling moulds**
- 33/005 . {Transporting flaskless moulds}
- 33/02 . Turning or transposing moulds
- 33/04 . Bringing together or separating moulds
- 33/06 . Burdening or relieving 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)**
- 35/02 . into beds
- 35/04 . into moulds, e.g. base plates, runners
- 35/045 . . {Runner base plates for bottom casting ingots}
- 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)	41/28	. . . Plates therefor (B22D 41/38 - B22D 41/42 take precedence)
37/005	. {Shielding the molten metal stream (B22D 11/106 , B22D 41/50 take precedence)}	41/30 41/32 41/34 41/36 Manufacturing or repairing thereof characterised by the materials used therefor Supporting, fixing or centering means therefor Treating the plates, e.g. lubricating, heating (ladles, cups or the like with heating means B22D 41/01)
39/00	Equipment for supplying molten metal in rations (specially adapted to particular processes or machines, see the relevant groups of this subclass)	41/38	. . . Means for operating the sliding gate
39/003	. {using electromagnetic field}	41/40	. . . Means for pressing the plates together
39/006	. . {Electromagnetic conveyors}	41/42	. . . Features relating to gas injection
39/02	. having means for controlling the amount of molten metal by volume	41/44	. . Consumable closure means, i.e. closure means being used only once
39/023	. . {using a displacement member}	41/46	. . . Refractory plugging masses
39/026	. . {using a ladler}	41/465 {Unplugging a vessel discharge port}
39/04	. having means for controlling the amount of molten metal by weight	41/48	. . . Meltable closures
39/06	. having means for controlling the amount of molten metal by controlling the pressure above the molten metal	41/50 41/502 41/505	. Pouring-nozzles . {Connection arrangements; Sealing means therefor} . {Rings, inserts or other means preventing external nozzle erosion by the slag}
41/00	Casting melt-holding vessels, e.g. ladles, tundishes, cups or the like (B22D 39/00 , B22D 43/00 take precedence)	41/507	. . {giving a rotating motion to the issuing molten metal}
41/001	. {devices for cleaning ladles (cleaning in general B08B)}	41/52	. . Manufacturing or repairing thereof
41/003	. {with impact pads}	41/54	. . . characterised by the materials used therefor
41/005	. with heating or cooling means	41/56	. . Means for supporting, manipulating or changing a pouring-nozzle
41/01	. . Heating means	41/58	. . with gas injecting means
41/015	. . . with external heating, i.e. the heat source not being a part of the ladle	41/60	. . with heating or cooling means
41/02	. Linings	41/62	. . with stirring or vibrating means
41/023	. . {Apparatus used for making or repairing linings (equipment used for making or repairing converter linings C21C 5/441)}	43/00	Mechanical cleaning, e.g. skimming of molten metals
41/026	. . {Apparatus used for fracturing and removing of linings}	43/001	. {Retaining slag during pouring molten metal}
41/04	. tiltable	43/002	. . {by using floating means}
41/05	. . Tea-pot spout ladles	43/004	. . {by using filtering means (B22C 9/086 takes precedence)}
41/06	. Equipment for tilting	43/005	. {Removing slag from a molten metal surface}
41/08	. for bottom pouring (B22D 41/14 , B22D 41/50 take precedence)	43/007	. . {by using scrapers}
41/12	. Travelling ladles or similar containers; Cars for ladles (casting cranes B66C)	43/008	. . {by suction}
41/13	. . Ladle turrets	45/00	Equipment for casting, not otherwise provided for
41/14	. Closures	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)}
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	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)
41/18	. . . Stopper-rods therefor	47/00	Casting plants
41/183 {with cooling means}	47/02	. for both moulding and casting
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)		