

# 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](#))

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| <p><b>1/00</b> Treatment of fused masses in the ladle or the supply runners before casting {(for continuous casting <a href="#">B22D 11/10</a>; metallurgical processing, e.g. refining of iron or other metal <a href="#">C21</a>, <a href="#">C22</a>, <a href="#">C25C</a>)}</p> <p>1/002 . {Treatment with gases (<a href="#">C21C 7/072</a>, <a href="#">C22B 9/05</a> take precedence)}</p> <p>1/005 . . {Injection assemblies therefor (features relating to gas injection, provided on closures of the sliding gate type <a href="#">B22D 41/42</a>; provided on pouring nozzles <a href="#">B22D 41/58</a>; provided on closures of the stopper-rod type <a href="#">B22D 41/186</a>)}</p> <p>1/007 . {Treatment of the fused masses in the supply runners (<a href="#">B22D 1/002</a>, <a href="#">B22D 1/005</a> take precedence)}</p> <p><b>2/00</b> 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 (<a href="#">B22D 11/181</a> and <a href="#">B22D 11/201</a> take precedence; level indicators in general <a href="#">G01F 23/00</a>)}</p> <p>2/005 . {for the thickness of a frozen shell (<a href="#">B22D 11/188</a> and <a href="#">B22D 11/207</a> take precedence)}</p> <p>2/006 . {for the temperature of the molten metal (measuring temperature in general <a href="#">G01K</a>)}</p> <p>2/008 . {for the viscosity of the molten metal (measuring viscosity in general <a href="#">G01N 11/00</a>)}</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 <a href="#">B22D 27/06</a>)}</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><b>9/00</b> 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](#))
- 7/005 . {from non-ferrous metals}
- 7/02 . Casting compound ingots of two or more different metals in the molten state, i.e. integrally cast
- 7/04 . Casting hollow ingots

#### 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}
- 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)
- 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