

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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|-------|---|-------|---|
| 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)} | 7/06 | . Ingot moulds or their manufacture |
| 1/002 | . {Treatment with gases (C21C 7/072 , C22B 9/05 take precedence)} | 7/062 | . . {Stools for ingot moulds} |
| 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)} | 7/064 | . . {Cooling the ingot moulds} |
| 1/007 | . {Treatment of the fused masses in the supply runners (B22D 1/002 , B22D 1/005 take precedence)} | 7/066 | . . {Manufacturing, repairing or reinforcing ingot moulds} |
| 2/00 | Arrangement of indicating or measuring devices, e.g. for temperature or viscosity of the fused mass | 7/068 | . . . {characterised by the materials used therefor} |
| 2/001 | . {for the slag appearance in a molten metal stream} | 7/08 | . . Divided ingot moulds |
| 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)} | 7/10 | . . Hot tops therefor {(heating the top discard of ingots B22D 27/06)} |
| 2/005 | . {for the thickness of a frozen shell (B22D 11/188 and B22D 11/207 take precedence)} | 7/102 | . . . {from refractorial material only} |
| 2/006 | . {for the temperature of the molten metal (measuring temperature in general G01K)} | 7/104 | . . . {from exothermic material only} |
| 2/008 | . {for the viscosity of the molten metal (measuring viscosity in general G01N 11/00)} | 7/106 | . . . {Configuration of hot tops} |
| | | 7/108 | . . . {Devices for making or fixing hot tops} |
| | | 7/12 | . Appurtenances, e.g. for sintering, for preventing splashing |
| | | 9/00 | Machines or plants for casting ingots |
| | | 9/003 | . {for top casting} |
| | | 9/006 | . {for bottom casting} |

Casting of pigs, i.e. metal castings suitable for subsequently melting; similar casting

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|-------|--|
| 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

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|-------|---|
| 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

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|---------|---|
| 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