

**CPC****COOPERATIVE PATENT CLASSIFICATION****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](#)).

**B22D 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](#))}

## B22D 1/002

- {Treatment with gases ([C21C 7/072](#), [C22B 9/05](#) take precedence)}

## B22D 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](#))}

## B22D 1/007

- {Treatment of the fused masses in the supply runners ([B22D 1/002](#), [B22D 1/005](#) take precedence)}

**B22D 2/00**

**Arrangement of indicating or measuring devices, e.g. for temperature or viscosity of the fused mass.**

## B22D 2/001

- {for the slag appearance in a molten metal stream}

## B22D 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](#))}

## B22D 2/005

- {for the thickness of a frozen shell ([B22D 11/188](#) and [B22D 11/207](#) take precedence)}

## B22D 2/006

- {for the temperature of the molten metal (measuring temperature in general [G01K](#))}

## B22D 2/008

- {for the viscosity of the molten metal (measuring viscosity in general [G01N 11/00](#))}

**Casting of pigs, i.e. metal castings suitable for subsequently melting; similar casting****B22D 3/00**

**Pig or like casting** (equipment for conveying molten metal [B22D 35/00](#))

## B22D 3/02

- Moulding of beds

**B22D 5/00**

**Machines or plants for pig or like casting**

## B22D 5/005

- {Devices for stacking pigs; Pigforms to be stacked}

## B22D 5/02

- with rotary casting tables

## B22D 5/04

- with endless casting conveyers

**Casting of ingots, i.e. metal castings suitable for subsequently rolling or forging****B22D 7/00**

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

## B22D 7/005

- {from non-ferrous metals}

- B22D 7/02
  - Casting compound ingots of two or more different metals in the molten state, i.e. integrally cast
- B22D 7/04
  - Casting hollow ingots
- B22D 7/06
  - Ingot moulds or their manufacture
- B22D 7/062
  - . {Stools for ingot moulds}
- B22D 7/064
  - . {Cooling the ingot moulds}
- B22D 7/066
  - . {Manufacturing, repairing or reinforcing ingot moulds}
- B22D 7/068
  - . . {characterised by the materials used therefor}
- B22D 7/08
  - . Divided ingot moulds
- B22D 7/10
  - . Hot tops therefor {(heating the top discard of ingots [B22D 27/06](#))}
- B22D 7/102
  - . . {from refractorial material only}
- B22D 7/104
  - . . {from exothermic material only}
- B22D 7/106
  - . . {Configuration of hot tops}
- B22D 7/108
  - . . {Devices for making or fixing hot tops}
- B22D 7/12
  - Appurtenances, e.g. for sintering, for preventing splashing
- B22D 9/00**
  - Machines or plants for casting ingots**
- B22D 9/003
  - {for top casting}
- B22D 9/006
  - {for bottom casting}

**Particular casting processes; Machines or apparatus therefor**

- B22D 11/00**
  - Continuous casting of metals, i.e. casting in indefinite lengths ([metal drawing, metal extruding B21C](#))**
- B22D 11/001
  - {of specific alloys}
- B22D 11/002
  - . {Stainless steels}
- B22D 11/003
  - . {Aluminium alloys}
- B22D 11/004
  - . {Copper alloys}
- B22D 11/005
  - {of wire ([casting on wire B22D 19/14](#))}
- B22D 11/006
  - {of tubes}
- B22D 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](#))}
- B22D 11/008
  - {of clad ingots, i.e. the molten metal being cast against a continuous strip forming part of the cast product}
- B22D 11/009
  - {of work of special cross-section, e.g. I-beams, U-profiles}
- B22D 11/01
  - without moulds, e.g. on molten surfaces
- B22D 11/015
  - . {using magnetic field for conformation, i.e. the metal is not in contact with a mould}
- B22D 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](#))
- B22D 11/0401
  - . {Moulds provided with a feed head}
- B22D 11/0403
  - . {Multiple moulds}

- B22D 11/0405 . . {Rotating moulds}
- B22D 11/0406 . . {Moulds with special profile}
- B22D 11/0408 . . {Moulds for casting thin slabs}
- B22D 11/041 . . for vertical casting ([B22D 11/043](#), [B22D 11/049](#) to [B22D 11/059](#) take precedence)
- B22D 11/043 . . Curved moulds ([B22D 11/049](#) to [B22D 11/059](#) take precedence)
- B22D 11/045 . . for horizontal casting ([B22D 11/049](#) to [B22D 11/059](#) take precedence)
- B22D 11/0455 . . . {Bidirectional horizontal casting}
- B22D 11/047 . . . Means for joining tundish to mould
- B22D 11/0475 . . . . {characterised by use of a break ring}
- B22D 11/049 . . for direct chill casting, e.g. electromagnetic casting
- B22D 11/05 . . into moulds having adjustable walls
- B22D 11/051 . . into moulds having oscillating walls
- B22D 11/053 . . Means for oscillating the moulds
- B22D 11/0535 . . . {in a horizontal plane}
- B22D 11/055 . . Cooling the moulds ({[B22D 11/04](#) takes precedence})
- B22D 11/057 . . Manufacturing or calibrating the moulds
- B22D 11/059 . . Mould materials or platings
- B22D 11/06 . . into moulds with travelling walls, e.g. with rolls, plates, belts, caterpillars
- B22D 11/0602 . . {formed by a casting wheel and belt, e.g. Properzi-process}
- B22D 11/0605 . . {formed by two belts, e.g. Hazelett-process}
- B22D 11/0608 . . {formed by caterpillars}
- B22D 11/0611 . . {formed by a single casting wheel, e.g. for casting amorphous metal strips or wires}
- B22D 11/0614 . . . {the casting wheel being immersed in a molten metal bath, and drawing out upwardly the casting strip}
- B22D 11/0617 . . . {the casting wheel having its axis vertical and a casting strip formed in a peripheral groove of the wheel}
- B22D 11/062 . . . {the metal being cast on the inside surface of the casting wheel}
- B22D 11/0622 . . {formed by two casting wheels}
- B22D 11/0625 . . . {the two casting wheels being immersed in a molten metal bath and drawing out upwardly the casting strip}
- B22D 11/0628 . . {formed by more than two casting wheels}
- B22D 11/0631 . . {formed by a travelling straight surface, e.g. through-like moulds, a belt}
- B22D 11/0634 . . {formed by a casting wheel and a co-operating shoe}
- B22D 11/0637 . . {Accessories therefor}
- B22D 11/064 . . . {for supplying molten metal (supplying molten metal to open-ended moulds [B22D 11/10](#))}
- B22D 11/0642 . . . . {Nozzles (nozzles used in open-ended moulds [B22D 41/50](#))}
- B22D 11/0645 . . . . {Sealing means for the nozzle between the travelling surfaces}
- B22D 11/0648 . . . {Casting surfaces}
- B22D 11/0651 . . . . {Casting wheels ([B22D 11/0682](#) takes precedence)}

B22D 11/0654	. . . . {Casting belts ( <a href="#">B22D 11/0685</a> takes precedence)}
B22D 11/0657	. . . . {Caterpillars ( <a href="#">B22D 11/0688</a> takes precedence)}
B22D 11/066	. . . . {Side dams ( <a href="#">B22D 11/0691</a> takes precedence)}
B22D 11/0662	. . . . . {having electromagnetic confining means}
B22D 11/0665	. . . {for treating the casting surfaces, e.g. calibrating, cleaning, dressing, preheating}
B22D 11/0668	. . . . {for dressing, coating or lubricating}
B22D 11/0671	. . . . {for heating or drying}
B22D 11/0674	. . . . {for machining}
B22D 11/0677	. . . {for guiding, supporting or tensioning the casting belts}
B22D 11/068	. . . {for cooling the cast product during its passage through the mould surfaces ( <a href="#">cooling open-ended moulds B22D 11/04</a> ; <a href="#">secondary cooling B22D 11/124</a> )}
B22D 11/0682	. . . . {by cooling the casting wheel}
B22D 11/0685	. . . . {by cooling the casting belts ( <a href="#">B22D 11/0677</a> takes precedence)}
B22D 11/0688	. . . . {by cooling the caterpillars}
B22D 11/0691	. . . . {by cooling the side dams}
B22D 11/0694	. . . {for peeling-off or removing the cast product}
B22D 11/0697	. . . {for casting in a protected atmosphere}
B22D 11/07	. Lubricating the moulds
B22D 11/08	. Accessories for starting the casting procedure
B22D 11/081	. . {Starter bars}
B22D 11/083	. . . {Starter bar head; Means for connecting or detaching starter bars and ingots}
B22D 11/085	. . {Means for storing or introducing the starter bars in the moulds}
B22D 11/086	. . {Means for connecting cast ingots of different sizes or compositions}
B22D 11/088	. . {Means for sealing the starter bar head in the moulds}
B22D 11/10	. Supplying or treating molten metal ( <a href="#">B22D 41/00</a> takes precedence)
B22D 11/103	. . Distributing the molten metal, e.g. using runners, floats, distributors
B22D 11/106	. . Shielding the molten jet {( <a href="#">B22D 41/50</a> takes precedence)}
B22D 11/108	. . Feeding additives, powders, or the like
B22D 11/11	. . Treating the molten metal
B22D 11/111	. . . by using protecting powders
B22D 11/112	. . . by accelerated cooling
B22D 11/113	. . . by vacuum treating
B22D 11/114	. . . by using agitating or vibrating means ( <a href="#">B22D 11/117</a> takes precedence)
B22D 11/115	. . . . by using magnetic fields
B22D 11/116	. . . Refining the metal
B22D 11/117	. . . . by treating with gases ( <a href="#">B22D 11/118</a> , <a href="#">B22D 11/119</a> take precedence)
B22D 11/118	. . . . by circulating the metal under, over or around weirs ( <a href="#">B22D 11/119</a> takes precedence)

- B22D 11/119 . . . . by filtering
- B22D 11/12 . Accessories for subsequent treating or working cast stock in situ (rolling immediately subsequent to continuous casting [B21B 1/46](#), [B21B 13/22](#))
- B22D 11/1206 . . {for plastic shaping of strands (rolling mills [B21B 1/46](#))}
- B22D 11/1213 . . {for heating or insulating strands}
- B22D 11/122 . . {using magnetic fields}
- B22D 11/1226 . . {for straightening strands}
- B22D 11/1233 . . {for marking strands}
- B22D 11/124 . . for cooling
- B22D 11/1241 . . . {by transporting the cast stock through a liquid medium bath or a fluidized bed}
- B22D 11/1243 . . . {by using cooling grids or cooling plates}
- B22D 11/1245 . . . {using specific cooling agents}
- B22D 11/1246 . . . {Nozzles; Spray heads}
- B22D 11/1248 . . . {Means for removing cooling agent from the surface of the cast stock}
- B22D 11/126 . . for cutting
- B22D 11/1265 . . . {having auxiliary devices for deburring}
- B22D 11/128 . . for removing
- B22D 11/1281 . . . {Vertical removing}
- B22D 11/1282 . . . {Vertical casting and curving the cast stock to the horizontal}
- B22D 11/1284 . . . {Horizontal removing}
- B22D 11/1285 . . . {Segment changing devices for supporting or guiding frames}
- B22D 11/1287 . . . {Rolls; Lubricating, cooling or heating rolls while in use}
- B22D 11/1288 . . . {Walking bar members}
- B22D 11/14 . Plants for continuous casting
- B22D 11/141 . . {for vertical casting}
- B22D 11/142 . . {for curved casting}
- B22D 11/143 . . {for horizontal casting}
- B22D 11/144 . . {with a rotating mould}
- B22D 11/145 . . {for upward casting}
- B22D 11/146 . . {for inclined casting}
- B22D 11/147 . . {Multi-strand plants}
- B22D 11/148 . . {Safety arrangements}
- B22D 11/16 . Controlling or regulating processes or operations
- B22D 11/161 . . {for automatic starting the casting process}
- B22D 11/163 . . {for cutting cast stock}
- B22D 11/165 . . {for the supply of casting powder}
- B22D 11/166 . . {for mould oscillation}
- B22D 11/168 . . {for adjusting the mould size or mould taper}
- B22D 11/18 . . for pouring ([B22D 11/20](#) takes precedence)

- B22D 11/181 . . . {responsive to molten metal level or slag level}
- B22D 11/182 . . . . {by measuring temperature}
- B22D 11/183 . . . . {by measuring molten metal weight}
- B22D 11/185 . . . . {by using optical means}
- B22D 11/186 . . . . {by using electric, magnetic, sonic or ultrasonic means}
- B22D 11/187 . . . . {by using X-rays or nuclear radiation}
- B22D 11/188 . . . {responsive to thickness of solidified shell}
- B22D 11/20 . . for removing cast stock
- B22D 11/201 . . . {responsive to molten metal level or slag level}
- B22D 11/202 . . . . {by measuring temperature}
- B22D 11/203 . . . . {by measuring molten metal weight}
- B22D 11/204 . . . . {by using optical means}
- B22D 11/205 . . . . {by using electric, magnetic, sonic or ultrasonic means}
- B22D 11/206 . . . . {by using X-rays or nuclear radiation}
- B22D 11/207 . . . {responsive to thickness of solidified shell}
- B22D 11/208 . . . {for aligning the guide rolls}
- B22D 11/22 . . for cooling cast stock or mould
- B22D 11/225 . . . {for secondary cooling}

**B22D 13/00****Centrifugal casting; Casting by using centrifugal force**

- B22D 13/02 . . of elongated solid or hollow bodies, e.g. pipes, in moulds rotating around their longitudinal axis
- B22D 13/023 . . {the longitudinal axis being horizontal}
- B22D 13/026 . . {the longitudinal axis being vertical}
- B22D 13/04 . . of shallow solid or hollow bodies, e.g. wheels or rings, in moulds rotating around their axis of symmetry
- B22D 13/06 . . of solid or hollow bodies in moulds rotating around an axis arranged outside the mould
- B22D 13/063 . . {for dentistry or jewellery}
- B22D 13/066 . . {several moulds being disposed in a circle}
- B22D 13/08 . . in which a stationary mould is fed from a rotating mass of liquid metal
- B22D 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](#))
- B22D 13/101 . . {Moulds}
- B22D 13/102 . . . {Linings for moulds ([making or lining moulds B22C](#))}
- B22D 13/104 . . . {Cores}
- B22D 13/105 . . . {Cooling for moulds or cores}
- B22D 13/107 . . {Means for feeding molten metal}
- B22D 13/108 . . {Removing of casting}
- B22D 13/12 . . Controlling, supervising, specially adapted to centrifugal casting, e.g. for safety reasons ([controlling or regulating in general G05](#))

**B22D 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**

- B22D 15/005      . {of rolls, wheels or the like ([B22D 19/16](#) takes precedence)}
- B22D 15/02      . of cylinders, pistons, bearing shells or like thin-walled objects
- B22D 15/04      . Machines or apparatus for chill casting ({[B22D 15/005](#)}, [B22D 15/02](#) take precedence)

**B22D 17/00**      **Pressure die casting or injection die casting, i.e. casting in which the metal is forced into a mould under high pressure**

- B22D 17/002      . {using movable moulds (for plastics [B29C 45/04](#))}
- B22D 17/005      . {using two or more fixed moulds (for plastics [B29C 45/12](#))}
- B22D 17/007      . {Semi-solid pressure die casting}
- B22D 17/02      . Hot chamber machines, i.e. with heated press chamber in which metal is melted
- B22D 17/04      . . Plunger machines
- B22D 17/06      . . air injection machines
- B22D 17/08      . Cold chamber machines, i.e. with unheated press chamber into which molten metal is ladled
- B22D 17/10      . . with horizontal press motion
- B22D 17/12      . . with vertical press motion
- B22D 17/14      . Machines with evacuated die cavity
- B22D 17/145      . . {Venting means therefor (for permanent moulds [B22C 9/067](#))}
- B22D 17/16      . specially adapted for casting slide fasteners or elements therefor
- B22D 17/18      . Machines built up from units providing for different combinations
- B22D 17/20      . Accessories: Details
- B22D 17/2007      . . {Methods or apparatus for cleaning or lubricating moulds}
- B22D 17/2015      . . {Means for forcing the molten metal into the die (for plastics [B29C 45/46](#))}
- B22D 17/2023      . . . {Nozzles or shot sleeves}
- B22D 17/203      . . . {Injection pistons ([B22D 17/2053](#) takes precedence; for plastics [B29C 45/53](#))}
- B22D 17/2038      . . . {Heating, cooling or lubricating the injection unit (for plastics [B29C 45/74](#), [B29C 45/83](#))}
- B22D 17/2046      . . . {with provisions for damping the pressure peak}
- B22D 17/2053      . . . {using two or more cooperating injection pistons}
- B22D 17/2061      . . . {using screws}
- B22D 17/2069      . . . {Exerting after-pressure on the moulding material}
- B22D 17/2076      . . {Cutting-off equipment for sprues or ingates (for plastics [B29C 45/38](#))}
- B22D 17/2084      . . {Manipulating or transferring devices for evacuating cast pieces}
- B22D 17/2092      . . {Safety devices (for plastics [B29C 45/84](#))}
- B22D 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



- B22D 17/2209 . . . {Selection of die materials (for permanent moulds [B22C 9/061](#))}
- B22D 17/2218 . . . {Cooling or heating equipment for dies (for permanent moulds [B22C 9/065](#); for plastics [B29C 45/73](#))}
- B22D 17/2227 . . . {Die seals (for plastics [B29C 45/2608](#))}
- B22D 17/2236 . . . {Equipment for loosening or ejecting castings from dies (for plastics [B29C 45/40](#))}
- B22D 17/2245 . . . {having walls provided with means for marking or patterning}
- B22D 17/2254 . . . {having screw-threaded die walls}
- B22D 17/2263 . . . {having tubular die cavities}
- B22D 17/2272 . . . {Sprue channels}
- B22D 17/2281 . . . . {closure devices therefor}
- B22D 17/229 . . . {with exchangeable die part ([B22D 17/2245](#) takes precedence)}
- B22D 17/24 . . . Accessories for locating and holding cores or inserts
- B22D 17/26 . . . Mechanisms or devices for locking or opening dies
- B22D 17/263 . . . {mechanically}
- B22D 17/266 . . . {hydraulically}
- B22D 17/28 . . . Melting pots
- B22D 17/30 . . . Accessories for supplying molten metal, e.g. in rations ([supplying molten metal in ration in general B22D 39/00](#))
- B22D 17/32 . . . Controlling equipment
  
- B22D 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](#))
- B22D 18/02 . . . Pressure casting making use of mechanical pressure devices, e.g. cast-forging ([B22D 18/04](#) takes precedence)
- B22D 18/04 . . . Low pressure casting, i.e. making use of pressures up to a few bars to fill the mould
- B22D 18/06 . . . Vacuum casting, i.e. making use of vacuum to fill the mould
- B22D 18/08 . . . Controlling, supervising, e.g. for safety reasons ([controlling or regulating in general G05](#))
  
- B22D 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](#))
- B22D 19/0009 . . . {Cylinders, pistons}
- B22D 19/0018 . . . {cylinders with fins}
- B22D 19/0027 . . . {pistons}
- B22D 19/0036 . . . {gears}
- B22D 19/0045 . . . {household utensils}
- B22D 19/0054 . . . {rotors, stators for electrical motors}
- B22D 19/0063 . . . {finned exchangers ([cylinders B22D 19/0018](#))}
- B22D 19/0072 . . . {for making objects with integrated channels}
- B22D 19/0081 . . . {pretreatment of the insert, e.g. for enhancing the bonding between insert and surrounding cast metal}



- B22D 19/009 . {for casting objects the members of which can be separated afterwards}
- B22D 19/02 . for making reinforced articles ([B22D 19/14](#) takes precedence)
- B22D 19/04 . for joining parts
- B22D 19/045 . . {for joining tubes}
- B22D 19/06 . for manufacturing or repairing tools
- B22D 19/08 . for building-up linings or coverings, e.g. of anti-frictional metal
- B22D 19/085 . . {of anti-frictional metal}
- B22D 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)
- B22D 19/12 . for making objects, e.g. hinges, with parts which are movable relatively to one another
- B22D 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](#))
- B22D 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](#))
  
- B22D 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](#))}**
- B22D 21/002 . {Castings of light metals}
- B22D 21/005 . . {with high melting point, e.g. Be 1280 degrees C, Ti 1725 degrees C}
- B22D 21/007 . . {with low melting point, e.g. Al 659 degrees C, Mg 650 degrees C}
- B22D 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](#))
- B22D 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}
- B22D 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}
- B22D 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}
- B22D 21/04 . . Casting aluminium or magnesium {(no material; see [B22D 21/007](#))}
- B22D 21/06 . Casting non-ferrous metals with a high melting point, e.g. metallic carbides ([B22D 21/02](#) takes precedence)
  
- B22D 23/00** **Casting processes not provided for in groups [B22D 1/00](#) to [B22D 21/00](#) (making metallic powder by casting [B22F 9/08](#); alumino-thermic welding [B23K 23/00](#); remelting metals [C22B 9/16](#))**
- B22D 23/003 . {Moulding by spraying metal on a surface}
- B22D 23/006 . {Casting by filling the mould through rotation of the mould together with a molten metal holding recipient, about a common axis}
- B22D 23/02 . Top casting

- B22D 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](#))
- B22D 23/06
  - Melting-down metal, e.g. metal particles, in the mould
- B22D 23/10
  - • Electroslag casting {(electroslag remelting [C22B 9/18](#))}
- B22D 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](#))
- B22D 25/005
  - {Casting metal foams}
- B22D 25/02
  - by its peculiarity of shape; of works of art {(cylinders, pistons [B22D 15/02](#))}
- B22D 25/023
  - • {Casting chains or the like}
- B22D 25/026
  - • {Casting jewelry articles ([B22D 13/063](#) takes precedence)}
- B22D 25/04
  - • Casting metal electric battery plates or the like (manufacture thereof by multi-step processes [H01M 4/82](#))
- B22D 25/06
  - by its physical properties ([B22D 27/00](#) takes precedence)
- B22D 25/08
  - • by uniform hardness ([B22D 15/00](#) takes precedence)
- B22D 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)}
- B22D 27/003
  - {by using inert gases}
- B22D 27/006
  - {by using reactive gases}
- B22D 27/02
  - Use of electric or magnetic effects {(for continuous casting [B22D 11/015](#), [B22D 11/11](#))}
- B22D 27/04
  - Influencing the temperature of the metal, e.g. by heating or cooling the mould
- B22D 27/045
  - • {Directionally solidified castings}
- B22D 27/06
  - • Heating the top discard of ingots (hot tops for ingot moulds [B22D 7/10](#))
- B22D 27/08
  - Shaking, vibrating, or turning of moulds
- B22D 27/09
  - by using pressure
- B22D 27/11
  - • making use of mechanical pressing devices
- B22D 27/13
  - • making use of gas pressure
- B22D 27/15
  - by using vacuum
- B22D 27/18
  - Measures for using chemical processes for influencing the surface composition of castings, e.g. for increasing resistance to acid attack
- B22D 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](#))

- B22D 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)}
- B22D 29/001
  - {Removing cores}
- B22D 29/002
  - • {by leaching, washing or dissolving}
- B22D 29/003
  - • {using heat}

- B22D 29/005 . . {by vibrating or hammering}
- B22D 29/006 . . {by abrasive, water or air blasting}
- B22D 29/007 . . {by using explosive shock waves}
- B22D 29/008 . . . {in a liquid medium}
- B22D 29/02 . Vibratory apparatus specially designed for shaking out flasks
- B22D 29/04 . Handling or stripping castings or ingots (grippers in general, [see the relevant subclasses, e.g. B66C](#))
- B22D 29/06 . . Strippers actuated by fluid pressure
- B22D 29/08 . . Strippers actuated mechanically

**B22D 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](#))

**B22D 31/00** **Cutting-off surplus material, e.g. gates; {Cleaning and working on castings ([B22D 17/2076](#) takes precedence)}**

- B22D 31/002 . {Cleaning, working on castings}
- B22D 31/005 . . {Sealing or impregnating porous castings}
- B22D 31/007 . . {Tumbling mills}

**Other equipment for casting** ([arrangement of indicating or measuring devices B22D 2/00](#))

**B22D 33/00** **Equipment for handling moulds**

- B22D 33/005 . {Transporting flaskless moulds}
- B22D 33/02 . Turning or transposing moulds
- B22D 33/04 . Bringing together or separating moulds
- B22D 33/06 . Burdening or relieving moulds

**B22D 35/00** **Equipment for conveying molten metal into beds or moulds** ([B22D 37/00](#) to [B22D 41/00](#) take precedence; specially adapted to particular processes or machines, [see the relevant groups](#))

- B22D 35/02 . into beds
- B22D 35/04 . into moulds, e.g. base plates, runners
- B22D 35/045 . . {Runner base plates for bottom casting ingots}
- B22D 35/06 . Heating or cooling equipment

**B22D 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](#))

- B22D 37/005 . {Shielding the molten metal stream ([B22D 11/106](#), [B22D 41/50](#) take precedence)}

<b>B22D 39/00</b>	<b>Equipment for supplying molten metal in rations</b> (specially adapted to particular processes or machines, see the relevant groups of this subclass)
B22D 39/003	<ul style="list-style-type: none"> <li>• {using electromagnetic field}</li> </ul>
B22D 39/006	<ul style="list-style-type: none"> <li>• • {Electromagnetic conveyers}</li> </ul>
B22D 39/02	<ul style="list-style-type: none"> <li>• having means for controlling the amount of molten metal by volume</li> </ul>
B22D 39/023	<ul style="list-style-type: none"> <li>• • {using a displacement member}</li> </ul>
B22D 39/026	<ul style="list-style-type: none"> <li>• • {using a ladler}</li> </ul>
B22D 39/04	<ul style="list-style-type: none"> <li>• having means for controlling the amount of molten metal by weight</li> </ul>
B22D 39/06	<ul style="list-style-type: none"> <li>• having means for controlling the amount of molten metal by controlling the pressure above the molten metal</li> </ul>
<b>B22D 41/00</b>	<b>Casting melt-holding vessels, e.g. ladles, tundishes, cups or the like</b> (B22D 39/00, B22D 43/00 take precedence)
B22D 41/001	<ul style="list-style-type: none"> <li>• {devices for cleaning ladles (cleaning in general B08B)}</li> </ul>
B22D 41/003	<ul style="list-style-type: none"> <li>• {with impact pads}</li> </ul>
B22D 41/005	<ul style="list-style-type: none"> <li>• with heating or cooling means</li> </ul>
B22D 41/01	<ul style="list-style-type: none"> <li>• • Heating means</li> </ul>
B22D 41/015	<ul style="list-style-type: none"> <li>• • • with external heating, i.e. the heat source not being a part of the ladle</li> </ul>
B22D 41/02	<ul style="list-style-type: none"> <li>• Linings</li> </ul>
B22D 41/023	<ul style="list-style-type: none"> <li>• • {Apparatus used for making or repairing linings (equipment used for making or repairing converter linings C21C 5/441)}</li> </ul>
B22D 41/026	<ul style="list-style-type: none"> <li>• • {Apparatus used for fracturing and removing of linings}</li> </ul>
B22D 41/04	<ul style="list-style-type: none"> <li>• tiltable</li> </ul>
B22D 41/05	<ul style="list-style-type: none"> <li>• • Tea-pot spout ladles</li> </ul>
B22D 41/06	<ul style="list-style-type: none"> <li>• Equipment for tilting</li> </ul>
B22D 41/08	<ul style="list-style-type: none"> <li>• for bottom pouring (B22D 41/14, B22D 41/50 take precedence)</li> </ul>
B22D 41/12	<ul style="list-style-type: none"> <li>• Travelling ladles or similar containers; Cars for ladles (casting cranes B66C)</li> </ul>
B22D 41/13	<ul style="list-style-type: none"> <li>• • Ladle turrets</li> </ul>
B22D 41/14	<ul style="list-style-type: none"> <li>• Closures</li> </ul>
B22D 41/16	<ul style="list-style-type: none"> <li>• • 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</li> </ul>
B22D 41/18	<ul style="list-style-type: none"> <li>• • • Stopper-rods therefor</li> </ul>
B22D 41/183	<ul style="list-style-type: none"> <li>• • • • {with cooling means}</li> </ul>
B22D 41/186	<ul style="list-style-type: none"> <li>• • • • {with means for injecting a fluid into the melt}</li> </ul>
B22D 41/20	<ul style="list-style-type: none"> <li>• • • Stopper-rod operating equipment</li> </ul>
B22D 41/22	<ul style="list-style-type: none"> <li>• • 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</li> </ul>
B22D 41/24	<ul style="list-style-type: none"> <li>• • • characterised by a rectilinearly movable plate (B22D 41/38 to B22D 41/42 take precedence)</li> </ul>
B22D 41/26	<ul style="list-style-type: none"> <li>• • • characterised by a rotatively movable plate (B22D 41/38 to B22D 41/42 take precedence)</li> </ul>
B22D 41/28	<ul style="list-style-type: none"> <li>• • • Plates therefor (B22D 41/38 to B22D 41/42 take precedence)</li> </ul>

B22D 41/30	. . . . Manufacturing or repairing thereof
B22D 41/32	. . . . . characterised by the materials used therefor
B22D 41/34	. . . . Supporting, fixing or centering means therefor
B22D 41/36	. . . . Treating the plates, e.g. lubricating, heating (ladles, cups or the like with heating means <a href="#">B22D 41/01</a> )
B22D 41/38	. . . Means for operating the sliding gate
B22D 41/40	. . . Means for pressing the plates together
B22D 41/42	. . . Features relating to gas injection
B22D 41/44	. . Consumable closure means, i.e. closure means being used only once
B22D 41/46	. . . Refractory plugging masses
B22D 41/465	. . . . {Unplugging a vessel discharge port}
B22D 41/48	. . . Meltable closures
B22D 41/50	. Pouring-nozzles
B22D 41/502	. . {Connection arrangements; Sealing means therefor}
B22D 41/505	. . {Rings, inserts or other means preventing external nozzle erosion by the slag}
B22D 41/507	. . {giving a rotating motion to the issuing molten metal}
B22D 41/52	. . Manufacturing or repairing thereof
B22D 41/54	. . . characterised by the materials used therefor
B22D 41/56	. . Means for supporting, manipulating or changing a pouring-nozzle
B22D 41/58	. . with gas injecting means
B22D 41/60	. . with heating or cooling means
B22D 41/62	. . with stirring or vibrating means
<b>B22D 43/00</b>	<b>Mechanical cleaning, e.g. skimming of molten metals</b>
B22D 43/001	. {Retaining slag during pouring molten metal}
B22D 43/002	. . {by using floating means}
B22D 43/004	. . {by using filtering means ( <a href="#">B22C 9/086</a> takes precedence)}
B22D 43/005	. {Removing slag from a molten metal surface}
B22D 43/007	. . {by using scrapers}
B22D 43/008	. . {by suction}
<b>B22D 45/00</b>	<b>Equipment for casting, not otherwise provided for</b>
B22D 45/005	. {Evacuation of fumes, dust or waste gases during manipulations in the foundry (during steel manufacture <a href="#">C21C 5/38</a> ; evacuation from furnaces <a href="#">F27D 17/001</a> )}
<b>B22D 46/00</b>	<b>Controlling, supervising, not restricted to casting covered by a single main group, e.g. for safety reasons (<a href="#">controlling or regulating in general G05</a>)</b>
<b>B22D 47/00</b>	<b>Casting plants</b>
B22D 47/02	. for both moulding and casting