

**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](#) ) }

**Guidance heading:**

**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

**Guidance heading: 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](#) } 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 }

**Guidance heading: 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 <a href="#">B22D 11/10</a> ) }
B22D 11/0642	....	{ Nozzles ( nozzles used in open-ended moulds <a href="#">B22D 41/50</a> ) }
B22D 11/0645	....	{ Sealing means for the nozzle between the travelling surfaces }
B22D 11/0648	...	{ Casting surfaces }
B22D 11/0651	....	{ Casting wheels ( <a href="#">B22D 11/0682</a> 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 ( cooling open-ended moulds <a href="#">B22D 11/04</a> ; secondary cooling <a href="#">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 ( [B22D 11/117](#) takes precedence )
  - B22D 11/115 .... by using magnetic fields
  - B22D 11/116 ... Refining the metal
    - B22D 11/117 .... by treating with gases ( [B22D 11/118](#), [B22D 11/119](#) take precedence )
    - B22D 11/118 .... by circulating the metal under, over or around weirs ( [B22D 11/119](#) 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](#), [B22D 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 27/16](#) )
- [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

**Guidance heading:** **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** }

**Guidance heading:** **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 39/00](#) , **B22D 41/00T** take precedence; specially adapted to particular processes or machines, see the relevant groups of this subclass ) { [B22D 11/18](#) takes precedence }

- 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	. { using electromagnetic field }
B22D 39/006	.. { Electromagnetic conveyers }
B22D 39/02	. having means for controlling the amount of molten metal by volume
B22D 39/023	.. { using a displacement member }
B22D 39/026	.. { using a ladler }
B22D 39/04	. having means for controlling the amount of molten metal by weight
B22D 39/06	. having means for controlling the amount of molten metal by controlling the pressure above the molten metal
<b>B22D 41/00</b>	<b>Casting melt-holding vessels, e.g. ladles, tundishes, cups or the like</b> ( <a href="#">B22D 39/00</a> , <a href="#">B22D 43/00</a> take precedence )
B22D 41/001	. { devices for cleaning ladles ( cleaning in general <a href="#">B08B</a> ) }
B22D 41/003	. { with impact pads }
B22D 41/005	. with heating or cooling means
B22D 41/01	.. Heating means
B22D 41/015	... with external heating, i.e. the heat source not being a part of the ladle
B22D 41/02	. Linings
B22D 41/023	.. { Apparatus used for making or repairing linings ( equipment used for making or repairing converter linings <a href="#">C21C 5/441</a> ) }
B22D 41/026	.. { Apparatus used for fracturing and removing of linings }
B22D 41/04	. tiltable
B22D 41/05	.. Tea-pot spout ladles
B22D 41/06	. Equipment for tilting
B22D 41/08	. for bottom pouring ( <a href="#">B22D 41/14</a> , <a href="#">B22D 41/50</a> take precedence )
B22D 41/12	. Travelling ladles or similar containers; Cars for ladles ( casting cranes <a href="#">B66C</a> )
B22D 41/13	.. Ladle turrets
B22D 41/14	. Closures
B22D 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
B22D 41/18	... Stopper-rods therefor
B22D 41/183	.... { with cooling means }
B22D 41/186	.... { with means for injecting a fluid into the melt }

- B22D 41/20 . . . Stopper-rod operating equipment
- B22D 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
- B22D 41/24 . . . characterised by a rectilinearly movable plate ( [B22D 41/38](#) to [B22D 41/42](#) take precedence )
- B22D 41/26 . . . characterised by a rotatively movable plate ( [B22D 41/38](#) to [B22D 41/42](#) take precedence )
- B22D 41/28 . . . Plates therefor ( [B22D 41/38](#) to [B22D 41/42](#) take precedence )
- 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 B22D 41/01](#) )
- 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

## **B22D 43/00 Mechanical cleaning, e.g. skimming of molten metals**

- B22D 43/001 . { [Retaining slag during pouring molten metal](#) }
- B22D 43/002 . . { [by using floating means](#) }
- B22D 43/004 . . { [by using filtering means \( \[B22C 9/086\]\(#\) takes precedence \)](#) }
  
- B22D 43/005 . { [Removing slag from a molten metal surface](#) }
- B22D 43/007 . . { [by using scrapers](#) }
- B22D 43/008 . . { [by suction](#) }

## **B22D 45/00 Equipment for casting, not otherwise provided for**

- B22D 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](#) ) }
- B22D 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](#) )**
- B22D 47/00** **Casting plants**
- B22D 47/02
  - . for both moulding and casting