

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](#) 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 (B22D 11/0685 takes precedence) }
B22D 11/0657	....	{Caterpillars (B22D 11/0688 takes precedence) }
B22D 11/066	....	{Side dams (B22D 11/0691 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 [B22D 11/04](#); secondary cooling [B22D 11/124](#))}
- B22D 11/0682 {by cooling the casting wheel}
- B22D 11/0685 {by cooling the casting belts ([B22D 11/0677](#) 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 ([B22D 41/00](#) takes precedence)
- B22D 11/103 . . Distributing the molten metal, e.g. using runners, floats, distributors
- B22D 11/106 . . Shielding the molten jet ([B22D 41/50](#) 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](#), [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 39/00](#) ,[B22D 41/00](#) 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)}

B22D 39/00 **Equipment for supplying molten metal in rations** (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

B22D 41/00	Casting melt-holding vessels, e.g. ladles, tundishes, cups or the like (B22D 39/00 , B22D 43/00 take precedence)
B22D 41/001	. {devices for cleaning ladles (cleaning in general B08B)}
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 C21C 5/441)}
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 (B22D 41/14 , B22D 41/50 take precedence)
B22D 41/12	. Travelling ladles or similar containers; Cars for ladles (casting cranes B66C)
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