

**B28 WORKING CEMENT, CLAY, OR STONE**

**B28B SHAPING CLAY OR OTHER CERAMIC COMPOSITIONS, SLAG OR MIXTURES CONTAINING CEMENTITIOUS MATERIAL, E.G. PLASTER** (foundry moulding B22C; working stone or stone-like material B28D; shaping of substances in a plastic state, in general B29C; making layered products not composed wholly of these substances B32B; shaping in situ, see the relevant classes of section E)

**Note**

In this subclass, the following term is used with the meaning indicated:

- “the material” means:
  - (a) clay or other ceramic compositions;
  - (b) slag;
  - (c) mixtures with water-setting properties given by clay, cementitious material, or slag.

**Subclass Index**

## PRODUCING ARTICLES

Shaping articles characterised by method of production, machines therefor ..... 1/00, 3/00, 5/00

Coating of surfaces ..... 19/00

## APPARATUS OR PROCESSES FOR

TREATING OR WORKING ARTICLES ..... 11/00

MOULDS; AUXILIARY EQUIPMENT ..... 7/00; 13/00, 17/00

GENERAL LAYOUT OF PLANT ..... 15/00

PRODUCTION OF TUBULAR OR REINFORCED ARTICLES ..... 21/00, 23/00

**1/00 Producing shaped articles from the material** (using presses B28B 3/00; shaping on moving conveyers B28B 5/00; producing tubular articles B28B 21/00)

1/02 . . . by turning or jiggering

1/04 . . . by tamping or ramming (followed by pressing B28B 3/02)

1/08 . . . by vibrating or jolting

1/087 . . . by means acting on the mould [6]

1/093 . . . by means directly acting on the material, e.g. by cores wholly or partly immersed in the material (internal vibrators for compacting concrete in situ E04G 21/08) [6]

1/10 . . . and applying pressure otherwise than by the use of presses

1/14 . . . by simple casting, the material being neither forcibly fed nor positively compacted (for molten material B28B 1/54)

1/16 . . . for producing layered articles (coating B28B 11/04)

1/20 . . . by centrifugal or rotational casting (slip-casting involving rotation of the mould B28B 1/28; for molten material B28B 1/54)

1/24 . . . by injection moulding

1/26 . . . by slip-casting, i.e. by casting a suspension or dispersion of the material in a liquid-absorbent or porous mould, the liquid being allowed to soak into or pass through the walls of the mould; Moulds therefor (B28B 1/52 takes precedence)

1/28 . . . involving rotation of the mould

1/29 . . . by profiling or strickling the material in open moulds or on moulding surfaces

1/30 . . . by applying the material on to a core, or other moulding surface to form a layer thereon (to form a permanent layer B28B 19/00)

1/32 . . . by projecting, e.g. spraying (spraying in general B05B, B05D)

1/34 . . . . by centrifugal force

1/38 . . . by dipping (in general B05C, B05D)

1/40 . . . by wrapping, e.g. winding

1/42 . . . using mixtures containing fibres, e.g. for making sheets by slitting the wound layer

1/44 . . . by forcing cores into filled moulds for forming hollow articles

1/48 . . . by removing material from solid section preforms for forming hollow articles, e.g. by punching or boring

1/50 . . . specially adapted for producing articles of expanded material, e.g. cellular concrete (chemical aspects C04B)

1/52 . . . specially adapted for producing articles from mixtures containing fibres (by wrapping on to mandrels B28B 1/42)

1/54 . . . specially adapted for producing articles from molten material, e.g. slag (chemical aspects C04B)

**3/00 Producing shaped articles from the material by using presses** (shaping on moving conveyers B28B 5/00); **Presses specially adapted therefor** (presses in general B30B)

3/02 . . . wherein a ram exerts pressure on the material in a moulding space; Ram heads of special form

3/04 . . . with one ram per mould (B28B 3/10 takes precedence)

3/06 . . . . with two or more ram and mould sets

3/08 . . . with two or more rams per mould

3/10 . . . each charge of material being compressed against previously formed body

3/12 . . . wherein one or more rollers exert pressure on the material

3/14 . . . with co-operating pocketed rollers

3/16 . . . with co-operating profiled rollers

3/18 . . . Roller-and-ring machines, i.e. with roller disposed within a ring and co-operating with the inner surface of the ring

3/20 . . . wherein the material is extruded

3/22 . . . by screw or worm

3/24 . . . by reciprocating plunger

3/26 . . . Extrusion dies

- 5/00 Producing shaped articles from the material in moulds or on moulding surfaces, carried or formed by, in, or on conveyers irrespective of the manner of shaping** (shaping aspects, see the relevant groups)
- 5/02 . on conveyers of the endless-belt or chain type (in combination with pressing rollers B28B 3/12)
  - 5/04 . in moulds moved in succession past one or more shaping stations (on turntables B28B 5/06)
  - 5/06 . in moulds on a turntable
  - 5/08 . . intermittently rotated
  - 5/10 . in moulds carried on the circumference of a rotating drum
  - 5/12 . . intermittently rotated
- 7/00 Moulds; Cores; Mandrels** (specially adapted for the production of tubular articles B28B 21/00)
- 7/02 . Moulds with adjustable parts
  - 7/04 . . one or more of the parts being pivotally mounted
  - 7/06 . Moulds with flexible parts
  - 7/08 . Moulds provided with means for tilting or inverting
  - 7/10 . Moulds with means incorporated therein, or carried thereby, for ejecting the moulded article (devices, not forming part of the mould, for ejecting the moulded article B28B 13/06)
  - 7/12 . . by fluid pressure
  - 7/14 . Moulds with means incorporated therein, or carried thereby, for cutting the moulded article into parts (cutting means independent of the mould B28B 11/14)
  - 7/16 . Moulds for making shaped articles with cavities or holes open to the surface
  - 7/18 . . the holes passing completely through the article
  - 7/20 . Moulds for making shaped articles with undercut recesses, e.g. dovetails
  - 7/22 . Moulds for making units for prefabricated buildings; Moulds for making prefabricated stair units
  - 7/24 . Unitary mould structures with a plurality of moulding spaces
  - 7/26 . Assemblies of separate moulds
  - 7/28 . Cores; Mandrels
  - 7/30 . . adjustable, collapsible, or expanding
  - 7/32 . . . inflatable (connection of valves to inflatable elastic bodies B60C 29/00)
  - 7/34 . Moulds, cores, or mandrels of special material, e.g. destructible materials (for slip-casting B28B 1/26)
  - 7/36 . Linings or coatings (lubricating surfaces of moulds, cores, or mandrels B28B 7/38)
  - 7/38 . Treating surfaces of moulds, cores, or mandrels to prevent sticking
  - 7/40 . characterised by means for modifying the properties of the moulding material [5]
  - 7/42 . . for heating or cooling, e.g. steam jackets [5]
  - 7/44 . . for treating with gases or degassing, e.g. for de-aerating [5]
  - 7/46 . . for humidifying or dehumidifying [5]
- 11/00 Apparatus or processes for treating or working the shaped articles** (specially adapted for tubular articles B28B 21/92; decoration or surface treatment in general B05, B44; compacting concrete in situ in connection with building E04G 21/06; drying F26)
- 11/02 . for attaching appendages, e.g. handles, spouts
  - 11/04 . for coating (glazing, engobing C04B)
  - 11/06 . . with powdered or granular material
  - 11/08 . for reshaping the surface, e.g. smoothing, roughening, corrugating, making screw-threads
  - 11/10 . . by using presses
  - 11/12 . for removing parts of the articles by cutting
  - 11/14 . for dividing shaped articles by cutting
  - 11/16 . . for extrusion
  - 11/18 . for removing burr
  - 11/22 . for cleaning
  - 11/24 . for curing, setting or hardening (processes for influencing or modifying the setting or hardening ability of mortars, concrete or artificial stone compositions, in general C04B 40/00) [6]
- 13/00 Feeding the unshaped material to moulds or apparatus for producing shaped articles; Discharging shaped articles from such moulds or apparatus** (feeding or discharging devices incorporated in, or operatively associated with, a particular type of shaping apparatus, or specially designed to supply materials to a particular type of shaping apparatus, see the relevant groups for the apparatus)
- 13/02 . Feeding the unshaped material to moulds or apparatus for producing shaped articles
  - 13/04 . Discharging the shaped articles (conveying systems for ceramic mouldings B65G 49/08)
  - 13/06 . . Removing the shaped articles from moulds (by means incorporated in, or carried by, the moulds B28B 7/10)
- 15/00 General arrangement or layout of plant**
- 17/00 Details of, or accessories for, apparatus for shaping the material; Auxiliary measures taken in connection with such shaping** (moulds B28B 7/00; after-treatment B28B 11/00; feeding or discharging B28B 13/00; arrangements for embedding elements in the material B28B 23/00; details, accessories, or auxiliary measures special to any one type of shaping, machine or method of shaping, see the relevant groups for such machines or methods)
- 17/02 . Conditioning the material prior to shaping
  - 17/04 . Exhausting or laying dust
- 19/00 Machines or methods for applying the material to surfaces to form a permanent layer thereon** (making shaped articles on mandrels B28B 1/30; applying liquids or other fluent materials to surfaces in general B05C; glazing or engobing C04B; applying the material to walls or other fixed structures, see the relevant classes of section E)
- Methods, apparatus, or machines, specially adapted for the production of tubular or reinforced articles**
- 21/00 Methods or machines specially adapted for the production of tubular articles**
- 21/02 . by casting into moulds
  - 21/04 . . by simple casting, the material being neither positively compacted nor forcibly fed
  - 21/06 . . into moulds having sliding parts (B28B 21/26 takes precedence; forms, shutterings, or falsework for making rooms as a whole, whole stories, or whole buildings in situ E04G 11/02)
  - 21/08 . . by slip-casting; Moulds therefor
  - 21/10 . . using compacting means
  - 21/12 . . . tamping or ramming the material or the mould elements
  - 21/14 . . . vibrating, e.g. the surface of the material
  - 21/16 . . . . one or more mould elements
  - 21/18 . . . using expansible or retractable mould or core elements

21/20	. . . . using inflatable cores, e.g. having a frame inside the inflatable part of the core (connection of valves to inflatable elastic bodies B60C 29/00) [2]	21/74	. . . Producing pipe bends, sockets, sleeves; Moulds therefor (combined with extrusion presses B28B 21/54)
21/22	. . . using rotatable mould or core parts	21/76	. Moulds
21/24	. . . . using compacting heads, rollers, or the like	21/78	. . with heating or cooling means, e.g. steam jackets
21/26	. . . . with a packer head serving as a sliding mould or provided with guiding means for feeding the material	21/80	. . adapted to centrifugal or rotational moulding
21/28	. . . . combined with vibration means	21/82	. . built-up from several parts; Multiple moulds; Moulds with adjustable parts
21/30	. . . . Centrifugal moulding	21/84	. . . Moulds with one or more pivotable parts
21/32	. . . . Feeding the material into the moulds	21/86	. Cores (in general B28B 7/00)
21/34	. . . . combined with vibrating or other additional compacting means	21/88	. . adjustable, collapsible or expansible (using inflatable cores B28B 21/20)
21/36	. . . applying fluid pressure or vacuum to the material (combined with slip-casting B28B 21/08)	21/90	. Methods or apparatus for discharging after shaping
21/38	. . . . introducing the material wholly or partly under pressure	21/92	. Methods or apparatus for treating or reshaping
21/40	. . . . by evacuating one or more of the mould parts	21/94	. . for impregnating or coating by applying liquids or semi-liquids
21/42	. by shaping on or against mandrels or like moulding surfaces	21/96	. . for smoothing, roughening, corrugating or for removing burr
21/44	. . by projecting, e.g. spraying	21/98	. . for reshaping, e.g. by means of reshape moulds
21/46	. . by dipping	<b>23/00</b>	<b>Arrangements specially adapted for the production of shaped articles with elements wholly or partly embedded in the moulding material</b> (B28B 21/00 takes precedence; in units for prefabricated buildings B28B 7/22)
21/48	. . by wrapping, e.g. winding	23/02	. wherein the elements are reinforcing members
21/50	. . Details of compression or compacting means	23/04	. . the elements being stressed
21/52	. by extruding	23/06	. . . for the production of elongated articles
21/54	. . Mouthpieces for shaping sockets, bends, or like peculiarly-shaped tubular articles	23/08	. . . . the articles being of tubular form
21/56	. incorporating reinforcements	23/10	. . . the shaping being effected by centrifugal or rotational moulding [2]
21/58	. . Steel tubes	23/12	. . . to form prestressed circumferential reinforcements [2]
21/60	. . prestressed reinforcements	23/14	. . . . by wrapping, e.g. winding apparatus [2]
21/62	. . . circumferential	23/16	. . . . Prestressed reinforcing nets [2]
21/64	. . . . Winding arrangements	23/18	. . for the production of elongated articles (B28B 23/06 takes precedence) [2]
21/66	. . . Reinforcing mats	23/20	. . the shaping being effected by centrifugal or rotational moulding (B28B 23/10 takes precedence) [2]
21/68	. . and applying centrifugal forces	23/22	. . assembled from preformed parts [2]
21/70	. by building-up from preformed elements		
21/72	. . Producing multilayer tubes		

## B28C PREPARING CLAY; PRODUCING MIXTURES CONTAINING CLAY OR CEMENTITIOUS MATERIAL, E.G. PLASTER (preparing material for foundry moulds B22C 5/00)

### Note

In this subclass, the following terms or expressions are used with the meanings indicated:

- “cement” or “mixtures of cement with other substances” includes plaster;
- “clay” includes like ceramic compositions.

<b>1/00</b>	<b>Apparatus or methods for obtaining or processing clay</b> (filtration in general B01D; separation of solids from solids B03, B07; chemical part C04B; by mining or quarrying E21C 41/16, E21C 41/26, E21C 47/10)	1/10	. for processing clay-containing substances in non-fluid condition (clay slurries B28C 1/02)
1/02	. for producing or processing clay suspensions (producing or processing suspensions in general B01)	1/12	. . Storing and conditioning in storage; Specially adapted storage spaces or devices for their filling or emptying (feeding clay to shaping apparatus B28B 13/00)
1/04	. . Producing suspensions, e.g. by blunging		
1/06	. . Processing suspensions		
1/08	. . . Separating suspensions, e.g. for obtaining clay, for removing stones (filtration in general B01D; separation of solids from solids B03, B07)		

## B28C – B28D

- 1/14 . . . specially adapted for homogenising, comminuting or conditioning clay in non-fluid condition or for separating undesired admixtures therefrom (processes involving conversion to a slurry B28C 1/02; conditioning in storage B28C 1/12; comminuting in general B02C; chemical features in eliminating iron or lime C04B)
- 1/16 . . . for homogenising, e.g. by mixing, kneading
- 1/18 . . . for comminuting
- 1/20 . . . for separating undesired admixed bodies
- 1/22 . . . combined with means for conditioning by heating, humidifying, or vacuum treatment

**Mixing clay or cement with other material** (general arrangement or layout of plant B28C 9/00; mixers in general B01F; concrete paving mixers combined with distributing devices E01C 19/00; machines for preparing mixtures of road-metal with bitumen E01C 19/10)

### Note

In groups B28C 3/00 to B28C 7/00, the following term is used with the meaning indicated:

- “mixing” includes preliminary mixing, e.g. of some of the ingredients, final mixing, and agitating the mixture to prevent segregation thereof.

- 3/00 Apparatus or methods for mixing clay with other substances** (producing clay suspensions B28C 1/02)
- 5/00 Apparatus or methods for producing mixtures of cement with other substances, e.g. slurries, mortars, porous or fibrous compositions** (controlling the mixing apparatus and supplying the ingredients B28C 7/00)
  - 5/02 . . . without using driven mechanical means effecting the mixing (B28C 5/48 takes precedence) [5]
  - 5/04 . . . Gravitational mixing; Mixing by intermingling streams of ingredients (ingredients projected by fluid pressure B28C 5/06)
  - 5/06 . . . the mixing being effected by the action of a fluid (in combination with driven mechanical means B28C 5/38)
  - 5/08 . . . using driven mechanical means affecting the mixing (B28C 5/40, B28C 5/42, B28C 5/48 take precedence; in combination with the action of a fluid B28C 5/38) [5]
  - 5/10 . . . Mixing in containers not actuated to effect the mixing
  - 5/12 . . . with stirrers sweeping through the materials
  - 5/14 . . . the stirrers having motion about a horizontal or substantially horizontal axis
  - 5/16 . . . the stirrers having motion about a vertical or steeply inclined axis

- 5/18 . . . Mixing in containers to which motion is imparted to effect the mixing
- 5/20 . . . rotating about a horizontal or substantially horizontal axis during mixing, e.g. without independent stirrers
  - 5/22 . . . with stirrers held stationary
  - 5/24 . . . with driven stirrers
  - 5/26 . . . rotating about a vertical or steeply inclined axis during the mixing
    - 5/28 . . . without independent stirrers
    - 5/30 . . . with stirrers held stationary
    - 5/32 . . . with driven stirrers
- 5/34 . . . Mixing on or by conveyers
  - 5/36 . . . Endless-belt mixers
  - 5/38 . . . wherein the mixing is effected both by the action of a fluid and by directly-acting driven mechanical means, e.g. stirring means
- 5/40 . . . Mixing specially adapted for preparing mixtures containing fibres
- 5/42 . . . Apparatus specially adapted for being mounted on vehicles with provision for mixing during transport (vehicle aspect B60P 3/16)
- 5/44 . . . Apparatus specially adapted for drive by muscle power
- 5/46 . . . Arrangements for applying super- or sub-atmospheric pressure during mixing; Arrangements for cooling or heating during mixing
- 5/48 . . . wherein the mixing is effected by vibrations (mixers with vibrating mechanisms in general B01F 11/00) [5]

### 7/00 Controlling the operation of apparatus for producing mixtures of clay or cement with other substances; Supplying or proportioning the ingredients for mixing clay or cement with other substances; Discharging the mixture

- 7/02 . . . Controlling the operation of the mixing
- 7/04 . . . Supplying or proportioning the ingredients
- 7/06 . . . Supplying the solid ingredients, e.g. by means of endless conveyers or jiggling conveyers
  - 7/08 . . . by means of scrapers or skips
  - 7/10 . . . by means of rotary members
- 7/12 . . . Supplying or proportioning liquid ingredients
- 7/14 . . . Supply means incorporated in or mounted on mixers
- 7/16 . . . Discharge means

### 9/00 General arrangement or layout of plant [2]

- 9/02 . . . for producing mixtures of clay or cement with other materials [2]
- 9/04 . . . the plant being mobile (B28C 5/42 takes precedence) [2]

## B28D WORKING STONE OR STONE-LIKE MATERIALS (machinery for, or methods of, mining or quarrying E21C)

- 1/00 Working stone or stone-like materials, e.g. brick, concrete, not provided for elsewhere; Machines, devices, tools therefor** (fine working of gems, jewels, crystals B28D 5/00; working by grinding or polishing B24; devices or means for dressing or conditioning abrasive surfaces B24B 53/00)
  - 1/02 . . . by sawing
  - 1/04 . . . with circular saw blades or saw discs (B28D 1/10 takes precedence)
    - 1/06 . . . with reciprocating saw blades (B28D 1/10 takes precedence)
    - 1/08 . . . with saw blades of endless cutter-type, e.g. chain saws, strap saws (B28D 1/10 takes precedence)
    - 1/10 . . . with provision for measuring
    - 1/12 . . . Saw blades specially adapted for working stone
    - 1/14 . . . by boring or drilling (rotary drilling machines B23B; percussive tools B25D; earth or rock drilling E21B) [1,7]
    - 1/16 . . . by turning

- 1/18 . by milling, e.g. channelling by means of milling tools
- 1/20 . by planing, e.g. channeling by means of planing tools
- 1/22 . by cutting, e.g. incising
- 1/24 . . with cutting discs
- 1/26 . by impact tools, e.g. by chisels or other tools having a cutting edge (portable percussive machines B25D)
- 1/28 . . without cutting edge
- 1/30 . to form contours, i.e. curved surfaces, irrespective of the method of working used (for artistic purposes B44B)
- 1/32 . Methods or apparatus specially adapted for working materials which can easily be split, e.g. mica, slate, schist
- 3/00 Dressing mill discs or rollers** (dressing the tools of sawing machines or sawing devices B23D 63/00; treating the cutting members of cutting machines to facilitate cutting B26D 7/08)
  - 3/02 . Machines
  - 3/04 . . for grooving rollers
- 5/00 Fine working of gems, jewels, crystals, e.g. of semiconductor material; Apparatus therefor** (working by grinding or polishing B24; for artistic purposes B44B; by non-mechanical methods C04B 41/00; non-mechanical after-treatment of single crystals C30B 33/00) [3]
  - 5/02 . by rotary tools, e.g. drills
  - 5/04 . by tools other than of rotary type, e.g. reciprocating tools
- 7/00 Accessories specially adapted for use with machines or devices of the other groups of this subclass**
  - 7/02 . for removing or laying dust, e.g. by spraying liquids; for cooling work
  - 7/04 . for supporting or holding work