

## SECTION B — PERFORMING OPERATIONS; TRANSPORTING

### 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(s)

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

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| <p><b>1/00 Producing shaped articles from the material</b> (using presses B28B 3/00; shaping on moving conveyers B28B 5/00; producing tubular articles B28B 21/00)</p> <p>1/02 • by turning or jiggering</p> <p>1/04 • by tamping or ramming (followed by pressing B28B 3/02)</p> <p>1/08 • by vibrating or jolting</p> <p>1/087 • • by means acting on the mould [6]</p> <p>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 <u>in situ</u> E04G 21/08) [6]</p> <p>1/10 • • and applying pressure otherwise than by the use of presses</p> <p>1/14 • by simple casting, the material being neither forcibly fed nor positively compacted (for molten material B28B 1/54)</p> <p>1/16 • • for producing layered articles (coating B28B 11/04)</p> <p>1/20 • by centrifugal or rotational casting (slip-casting involving rotation of the mould B28B 1/28; for molten material B28B 1/54)</p> <p>1/24 • by injection moulding</p> <p>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)</p> <p>1/28 • • involving rotation of the mould</p> <p>1/29 • by profiling or strickling the material in open moulds or on moulding surfaces</p> | <p>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)</p> <p>1/32 • • by projecting, e.g. spraying (spraying in general B05B, B05D)</p> <p>1/34 • • • by centrifugal force</p> <p>1/38 • • by dipping (in general B05C, B05D)</p> <p>1/40 • • by wrapping, e.g. winding</p> <p>1/42 • • • using mixtures containing fibres, e.g. for making sheets by slitting the wound layer</p> <p>1/44 • by forcing cores into filled moulds for forming hollow articles</p> <p>1/48 • by removing material from solid section preforms for forming hollow articles, e.g. by punching or boring</p> <p>1/50 • specially adapted for producing articles of expanded material, e.g. cellular concrete (chemical aspects C04B)</p> <p>1/52 • specially adapted for producing articles from mixtures containing fibres (by wrapping on to mandrels B28B 1/42)</p> <p>1/54 • specially adapted for producing articles from molten material, e.g. slag (chemical aspects C04B)</p> <p><b>3/00 Producing shaped articles from the material by using presses</b> (shaping on moving conveyers B28B 5/00); <b>Presses specially adapted therefor</b> (presses in general B30B)</p> <p>3/02 • wherein a ram exerts pressure on the material in a moulding space; Ram heads of special form</p> <p>3/04 • • with one ram per mould (B28B 3/10 takes precedence)</p> |
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- 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]
- 21/22 • • • using rotatable mould or core parts
- 21/24 • • • • using compacting heads, rollers, or the like
- 21/26 • • • • • with a packer head serving as a sliding mould or provided with guiding means for feeding the material
- 21/28 • • • • • combined with vibration means
- 21/30 • • • • Centrifugal moulding
- 21/32 • • • • Feeding the material into the moulds
- 21/34 • • • • • combined with vibrating or other additional compacting means
- 21/36 • • • applying fluid pressure or vacuum to the material (combined with slip-casting B28B 21/08)
- 21/38 • • • • introducing the material wholly or partly under pressure
- 21/40 • • • • by evacuating one or more of the mould parts
- 21/42 • by shaping on or against mandrels or like moulding surfaces
- 21/44 • • by projecting, e.g. spraying
- 21/46 • • by dipping
- 21/48 • • by wrapping, e.g. winding
- 21/50 • • Details of compression or compacting means
- 21/52 • by extruding
- 21/54 • • Mouthpieces for shaping sockets, bends, or like peculiarly-shaped tubular articles

- 21/56 • incorporating reinforcements
- 21/58 • • Steel tubes
- 21/60 • • prestressed reinforcements
- 21/62 • • • circumferential
- 21/64 • • • • Winding arrangements
- 21/66 • • • Reinforcing mats
- 21/68 • • and applying centrifugal forces
- 21/70 • by building-up from preformed elements
- 21/72 • • Producing multilayer tubes
- 21/74 • • Producing pipe bends, sockets, sleeves; Moulds therefor (combined with extrusion presses B28B 21/54)
- 21/76 • Moulds
- 21/78 • • with heating or cooling means, e.g. steam jackets
- 21/80 • • adapted to centrifugal or rotational moulding
- 21/82 • • built-up from several parts; Multiple moulds; Moulds with adjustable parts
- 21/84 • • • Moulds with one or more pivotable parts
- 21/86 • Cores (in general B28B 7/00)
- 21/88 • • adjustable, collapsible or expansible (using inflatable cores B28B 21/20)
- 21/90 • Methods or apparatus for discharging after shaping
- 21/92 • Methods or apparatus for treating or reshaping
- 21/94 • • for impregnating or coating by applying liquids or semi-liquids
- 21/96 • • for smoothing, roughening, corrugating or for removing burr
- 21/98 • • for reshaping, e.g. by means of reshape moulds

**23/00 Arrangements specially adapted for the production of shaped articles with elements wholly or partly embedded in the moulding material** (B28B 21/00 takes precedence; in units for prefabricated buildings B28B 7/22)

- 23/02 • wherein the elements are reinforcing members
- 23/04 • • the elements being stressed
- 23/06 • • • for the production of elongated articles
- 23/08 • • • • the articles being of tubular form
- 23/10 • • • the shaping being effected by centrifugal or rotational moulding [2]
- 23/12 • • • to form prestressed circumferential reinforcements [2]
- 23/14 • • • • by wrapping, e.g. winding apparatus [2]
- 23/16 • • • • Prestressed reinforcing nets [2]
- 23/18 • • for the production of elongated articles (B28B 23/06 takes precedence) [2]
- 23/20 • • the shaping being effected by centrifugal or rotational moulding (B28B 23/10 takes precedence) [2]
- 23/22 • • assembled from preformed parts [2]

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

**Note(s)**

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.

**1/00 Apparatus or methods for obtaining or processing clay** (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)

- 1/02 • for producing or processing clay suspensions (producing or processing suspensions in general B01)
- 1/04 • • Producing suspensions, e.g. by blunging
- 1/06 • • Processing suspensions

## B28C

- 1/08 • • • Separating suspensions, e.g. for obtaining clay, for removing stones (filtration in general B01D; separation of solids from solids B03, B07)
- 1/10 • for processing clay-containing substances in non-fluid condition (clay slurries B28C 1/02)
- 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)
- 1/14 • • 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

#### Note(s)

In groups B28C 3/00-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; general arrangement or layout of plant B28C 9/00)
- 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; general arrangement or layout of plant B28C 9/00)
- 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