

## SECTION B — PERFORMING OPERATIONS; TRANSPORTING

### B04 CENTRIFUGAL APPARATUS OR MACHINES FOR CARRYING-OUT PHYSICAL OR CHEMICAL PROCESSES

#### Note(s)

Attention is drawn to the Notes following the subsection title "SEPARATING; MIXING".

#### **B04B CENTRIFUGES** (high-speed drum mills B02C 19/11)

#### Note(s)

This subclass covers machines or apparatus for separating, mixing, drying, extracting, purifying, or like treating in which centrifugal effects are generated by rotary bowls or other rotors. Where such machines or apparatus involve pumping effects, such effects must be incidental or subsidiary to the treating.

#### Types of centrifuges; Centrifuges characterised by discharging means

- 1/00 Centrifuges with rotary bowls provided with solid jackets for separating predominantly liquid mixtures with or without solid particles**
  - 1/02 • without inserted separating walls
  - 1/04 • with inserted separating walls
  - 1/06 • • of cylindrical shape
  - 1/08 • • of conical shape
  - 1/10 • with discharging outlets in the plane of the maximum diameter of the bowl
  - 1/12 • • with continuous discharge
  - 1/14 • • with periodical discharge
  - 1/16 • • • with discharging outlets controlled by the rotational speed of the bowl
  - 1/18 • • • • controlled by the centrifugal force of an auxiliary liquid
  - 1/20 • discharging solid particles from the bowl by a conveying screw coaxial with the bowl axis and rotating relatively to the bowl
- 3/00 Centrifuges with rotary bowls in which solid particles or bodies become separated by centrifugal force and simultaneously sifting or filtering**
  - 3/02 • discharging solid particles from the bowl by means co-axial with the bowl axis and moving to and fro, i.e. push-type centrifuges
  - 3/04 • discharging solid particles from the bowl by a conveying screw co-axial with the bowl axis and rotating relatively to the bowl
  - 3/06 • discharging solid particles by vibrating the bowl
  - 3/08 • discharging solid particles by bowl walls in the form of endless bands
- 5/00 Other centrifuges**
  - 5/02 • Centrifuges consisting of a plurality of separate bowls rotating round an axis situated between the bowls
  - 5/04 • Radial chamber apparatus for separating predominantly liquid mixtures, e.g. butyrometers

- 5/06 • Centrifugal counter-current apparatus
- 5/08 • Centrifuges for separating predominantly gaseous mixtures
- 5/10 • Centrifuges combined with other apparatus, e.g. electrostatic separators; Sets or systems of several centrifuges (B04B 5/12 takes precedence) [2]
- 5/12 • Centrifuges in which rotors other than bowls generate centrifugal effects in stationary containers

#### Elements; Accessories

- 7/00 Elements of centrifuges** (drives B04B 9/00; feeding, charging, or discharging accessories or devices B04B 11/00)
  - 7/02 • Casings; Lids
  - 7/04 • • Casings facilitating discharge
  - 7/06 • • Safety devices
  - 7/08 • Rotary bowls
  - 7/10 • • Bowls for shaping solids
  - 7/12 • • Inserts, e.g. armouring plates
  - 7/14 • • • for separating walls of conical shape
  - 7/16 • • • Sieves or filters
  - 7/18 • • formed or coated with sieving or filtering elements
- 9/00 Drives specially designed for centrifuges; Arrangement or disposition of transmission gearing; Suspending or balancing rotary bowls**
  - 9/02 • Electric motor drives
  - 9/04 • • Direct drive
  - 9/06 • Fluid drive
  - 9/08 • Arrangement or disposition of transmission gearing
  - 9/10 • Control of the drive; Speed regulating
  - 9/12 • Suspending rotary bowls
  - 9/14 • Balancing rotary bowls
- 11/00 Feeding, charging, or discharging bowls** (B04B 1/00, B04B 3/00, B04B 7/04 take precedence)
  - 11/02 • Continuous feeding or discharging; Control arrangements therefor

## B04B

- 11/04 • Periodical feeding or discharging; Control arrangements therefor
- 11/05 • • Base discharge
- 11/06 • Arrangement of distributors or collectors in centrifuges
- 11/08 • Skimmers or scrapers for discharging
- 13/00 Control arrangements specially designed for centrifuges; Programme control of centrifuges** (control arrangements for feed, charge, or discharge B04B 11/00)

- 15/00 Other accessories for centrifuges**
- 15/02 • for cooling, heating, or heat insulating
- 15/04 • for suppressing the formation of foam
- 15/06 • for cleaning bowls, filters, sieves, inserts, or the like
- 15/08 • for ventilating or producing a vacuum in the centrifuge
- 15/10 • for forming a filtering layer in the rotary bowl
- 15/12 • for drying or washing the separated solid particles

**B04C APPARATUS USING FREE VORTEX FLOW, e.g. CYCLONES** (exhaust or silencing apparatus for machines or engines having means for removing solid constituents of exhaust, using inertial or centrifugal separators F01N 3/037; cyclonic type combustion apparatus F23)

### Note(s)

This subclass covers apparatus for separating, mixing or like treating in which centrifugal effects are generated by free vortex flow, otherwise than by rotary bowls, rotors or curved passages.

- 1/00 Apparatus in which the main direction of flow follows a flat spiral**
- 3/00 Apparatus in which the axial direction of the vortex remains unchanged**
  - 3/02 • with heating or cooling, e.g. quenching, means
  - 3/04 • Multiple arrangement thereof
  - 3/06 • Construction of inlets or outlets to the vortex chamber
- 5/00 Apparatus in which the axial direction of the vortex is reversed**
  - 5/02 • Construction of inlets by which the vortex flow is generated
  - 5/04 • • Tangential inlets
  - 5/06 • • Axial inlets
  - 5/08 • Vortex chamber constructions
  - 5/081 • • Shapes or dimensions
  - 5/085 • • with wear-resisting arrangements
  - 5/087 • • with flexible gas-tight walls
  - 5/10 • • with perforated walls
  - 5/103 • • Bodies or members, e.g. bulkheads, guides, in the vortex chamber (cores B04C 5/107)
  - 5/107 • • Cores; Devices for inducing an air-core in hydrocyclones (forming part of the outlet pipe B04C 5/13)
  - 5/12 • Construction of the overflow ducting, e.g. diffusing or spiral exits
  - 5/13 • • formed as a vortex finder and extending into the vortex chamber; Discharge from vortex finder otherwise than at the top of the cyclone; Devices for controlling the overflow
  - 5/14 • Construction of the underflow ducting; Apex constructions; Discharge arrangements
  - 5/15 • • with swinging flaps or revolving sluices; Sluices; Check-valves
  - 5/16 • • with variable-size outlets from the underflow ducting
  - 5/18 • • with auxiliary fluid assisting discharge
  - 5/181 • • Bulkheads or central bodies in the discharge opening
  - 5/185 • • Dust collectors
  - 5/187 • • • forming an integral part of the vortex chamber
  - 5/20 • with heating or cooling, e.g. quenching, means
  - 5/22 • with cleaning means
  - 5/23 • • using liquids
  - 5/24 • Multiple arrangement thereof
  - 5/26 • • for series flow
  - 5/28 • • for parallel flow
  - 5/30 • • Recirculation constructions in or with cyclones which accomplish a partial recirculation of the medium, e.g. by means of conduits
- 7/00 Apparatus not provided for in group B04C 1/00, B04C 3/00 or B04C 5/00; Multiple arrangements not provided for in one of the groups B04C 1/00, B04C 3/00, or B04C 5/00; Combinations of apparatus covered by two or more of the groups B04C 1/00, B04C 3/00, or B04C 5/00**
- 9/00 Combinations with other devices, e.g. fans** (with filters for separating particles from gases or vapour B01D 50/00; with dry electrostatic precipitation for separating particles from gases or vapour B03C 3/15)
- 11/00 Accessories, e.g. safety or control devices, not otherwise provided for**