

## B04B

**CENTRIFUGES** (high-speed drum mills [B02C 19/11](#); domestic spin driers [D06F](#); analysing, measuring or monitoring physical or chemical properties of samples during centrifuging, see the relevant subclasses for these procedures, e.g. [G01N](#))

### Definition statement

*This place covers:*

Centrifuges that are intended for separating, drying, extracting, purifying or other ways of treating mixtures composed of matter in the following physical states:

- liquid/liquid, liquid/gas or gas/gas mixtures;
- solid/liquid or solid/gas mixtures.

Such centrifuges may comprise centrifuges with rotary bowls provided with solid jackets for separating predominantly liquid mixtures with or without solid particles; centrifuges with rotary bowls in which solid particles or bodies become separated by centrifugal force and simultaneously sifted or filtered; or other centrifuges including radial chamber apparatus such as butyrometers or counter-current apparatus.

Elements or accessories of centrifuges such as casings, lids, rotary bowls, drives, gearing, suspending or balancing of rotary bowls, feeding, charging or discharging of bowls, control arrangements, heating, cooling or suppressing the formation of foam.

### Relationships with other classification places

Separation of isotopes of the same chemical element is covered by [B01D 59/00](#), whatever process or apparatus is employed. Processes for separation of different isotopes of the same chemical element by centrifuging are covered by [B01D 59/20](#).

Processes in general that use centrifugal force for separating, extracting or purifying components of mixtures are covered in subclasses [B01D](#) and [B07B](#), and not in subclass [B04B](#) with the apparatus for accomplishing these processes. Examples of such processes can be found in the "Informative References" section below.

### References

#### Limiting references

*This place does not cover:*

High-speed drum mills	<a href="#">B02C 19/11</a>
Cyclone separators	<a href="#">B04C</a>
Centrifugal casting machines	<a href="#">B22D</a>
Domestic spin driers	<a href="#">D06F</a>

#### Application-oriented references

*Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:*

Centrifuges for producing filtered coffee	<a href="#">A47J 31/22</a>
Dental appliances for receiving spittle, characterised by provisions for processing the collected matter, e.g. for separating solids or air	<a href="#">A61C 17/065</a>
Treatment of water, waste water or sewage by centrifugal separation	<a href="#">C02F 1/38</a>

Exhaust or silencing apparatus for machines or engines having means for removing solid constituents of exhaust, using inertial or centrifugal separators	<a href="#">F01N 3/037</a>
Drying solid material by using centrifuges	<a href="#">F26B 5/08</a>

### Informative references

Attention is drawn to the following places, which may be of interest for search:

Processes for separation of non-miscible liquids by centrifugal force	<a href="#">B01D 17/0217</a>
Processes for degasification of liquids in rotating vessels, vessels containing movable parts or in which centrifugal movement is caused	<a href="#">B01D 19/0026</a> , <a href="#">B01D 19/0052</a>
Processes for using centrifuges for separating sediment	<a href="#">B01D 21/26</a>
Processes for separating dispersed particles from gases or vapours by centrifugal forces, the centrifugal forces generated by rotating vanes, discs, drums or brushes	<a href="#">B01D 45/12</a> , <a href="#">B01D 45/14</a>
Processes for separation of gases or vapours or for recovering vapours of volatile solvents from gases by centrifugal force	<a href="#">B01D 53/24</a>
Magnetic or electrostatic separators	<a href="#">B03C</a>
Processes using centrifugal force for selective separation of solid materials carried by, or dispersed in, gas currents	<a href="#">B07B 7/08</a>
Lubrication of machines or engines in general, details of lubricant purifying means	<a href="#">F01M 11/03</a>
Shock absorbers, vibration dampers	<a href="#">F16F</a>
Analysing materials by determining their physical or chemical properties e.g. during centrifuging	<a href="#">G01N</a>

### Special rules of classification

If a document concerns embodiments which are covered by several subgroups the specific technical information is classified at inventive level in all subgroups.

## B04B 1/00

### Centrifuges with rotary bowls provided with solid jackets for separating predominantly liquid mixtures with or without solid particles

#### Definition statement

*This place covers:*

Centrifuges with rotary bowls with or without separating walls

## B04B 1/04

### with inserted separating walls

#### Definition statement

*This place covers:*

Documents with claims related to the separating walls and/or the construction of the discharging outlets of the lighter fluid(s)

## References

### Limiting references

*This place does not cover:*

Documents with claims related to the discharging outlets for the solids or solids/heavier fluid mixture and the mechanism	<a href="#">B04B 1/10 - B04B 1/18</a>
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### Informative references

*Attention is drawn to the following places, which may be of interest for search:*

Centrifuges with rotating separating walls without a rotary bowl	<a href="#">B04B 5/12</a>
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## B04B 1/20

**discharging solid particles from the bowl by a conveying screw coaxial with the bowl axis and rotating relatively to the bowl**

### Definition statement

*This place covers:*

Liquid and solids outlets for screw centrifuges

Documents with claims related to disc stacks in a screw centrifuge

Distributers for feeding the material into the bowl of a screw centrifuges

### Synonyms and Keywords

*In patent documents, the following words/expressions are often used as synonyms:*

- "screw centrifuge" "decanter" or decanting centrifuge"

*In patent documents, the word/expression in the first column is often used instead of the word/expression in the second column, which is used in the classification scheme of this place:*

"scroll, worm, auger, helical, spiral"	"screw"
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*In patent documents, the following words/expressions are often used with the meaning indicated:*

"beach"	"dewatering portion", which is the area of the bowl where the solids settle before they are discharged.
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## B04B 3/00

**Centrifuges with rotary bowls in which solid particles or bodies become separated by centrifugal force and simultaneous sifting or filtering**

### Definition statement

*This place covers:*

Any type of centrifuge having a screen, sieve or mesh associated with the bowl for the separation of solids from the liquid, having different types of mechanism for discharging the solid particles.

## References

### Limiting references

*This place does not cover:*

Drying solid material by using centrifuges	<a href="#">F26B 5/08</a>
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### Informative references

*Attention is drawn to the following places, which may be of interest for search:*

Filters with rotary cylindrical filtering surfaces arranged for outward flow filtration	<a href="#">B01D 33/11</a>
Separating crystals from mother liquor by centrifugal force	<a href="#">C13B 30/06</a>

## B04B 3/04

**discharging solid particles from the bowl by a conveying screw coaxial with the bowl axis and rotating relatively to the bowl**

## References

### Limiting references

*This place does not cover:*

The sifting or filtering part of the bowl	<a href="#">B04B 1/20</a>
Aspects relating to details not relating to	<a href="#">B04B 1/2008</a> , <a href="#">B04B 1/2016</a>

## B04B 5/00

### Other centrifuges

### Definition statement

*This place covers:*

Centrifugal separators for fluid circulation systems. Planetary centrifuges. Centrifuges having radially arranged separation chambers with or without separate fluid receptacles, like centrifuges comprising test tubes, flexible receptacles, flat or spatial spiral chambers etc..

## References

### Limiting references

*This place does not cover:*

Centrifugal cuvette type rotors	<a href="#">G01N 21/07</a>
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### Informative references

*Attention is drawn to the following places, which may be of interest for search:*

Suction or pumping devices for medical purposes, other treatment of blood in a by-pass of the natural circulatory system using separation based on different densities of components, e.g. centrifuging	<a href="#">A61M 1/3693</a>
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Combination of filters with centrifugal separation devices	<a href="#">B01D 36/045</a>
Test tubes specially adapted for centrifugation purposes	<a href="#">B01L 3/5021</a>
Crankcase ventilating or breathing having means for purifying air before leaving crankcase, e.g. removing oil	<a href="#">F01M 13/04</a>
Arrangements for conditioning of lubricants in the lubricating system by filtration	<b>F01N39/06</b>
Investigating sedimentation of particle suspensions by centrifuging and investigating centrifugates	<a href="#">G01N 15/042</a>
Centrifugal type cuvettes	<a href="#">G01N 21/07</a>
Field flow fractionation	<a href="#">G01N 30/0005</a>
Column chromatography using counter-current	<a href="#">G01N 30/42</a>
Investigating or analysing blood by separating the blood components	<a href="#">G01N 33/491</a>

## B04B 5/0442

{with means for adding or withdrawing liquid substances during the centrifugation, e.g. continuous centrifugation}

### Definition statement

*This place covers:*

Centrifuges for blood separation and blood washing including the 2-omega type (see e.g. US4221322) and rotary sealing type (see e.g. WO8000227) centrifuges.

Aspects of elutriation, tubings, interface detection, rotary sealings in connection with these centrifuges.

## B04B 5/08

**Centrifuges for separating predominantly gaseous mixtures**

### Definition statement

*This place covers:*

Centrifuges for separating different gases from each other, as well as separating solid or liquid particles from gases are classified in this group, see also [B01D 45/12](#) and [B01D 45/14](#).

### References

#### Informative references

*Attention is drawn to the following places, which may be of interest for search:*

Processes for separating dispersed particles from gases or vapours by centrifugal forces, the centrifugal forces generated by rotating vanes, discs, drums or brushes	<a href="#">B01D 45/12</a> , <a href="#">B01D 45/14</a>
Separation of gases or vapours by centrifugal force	<a href="#">B01D 53/24</a>

## B04B 7/00

**Elements of centrifuges (drives [B04B 9/00](#); feeding, charging, or discharging appurtenances or devices [B04B 11/00](#))**

### Definition statement

*This place covers:*

E.g. details relating to chucks (see e.g. US3785549), gripping arms (see e.g. US3837633), sealings.

### References

#### Limiting references

*This place does not cover:*

Rotary seals enclosing an aperture in a bowl body through which a feeding/discharging member is inserted (see e.g. WO8000227) and rotating seals carried on the processing chamber between ports in the chamber and the non-rotating portions of the system (see e.g. US4636193)	<a href="#">B04B 5/0442</a>
Seals in conjunction with bearings	<a href="#">B04B 9/12</a>

## B04B 7/06

**Safety devices {; Regulating}**

### Definition statement

*This place covers:*

E.g. door and lid locking devices, breaking point arrangements, leak detection systems

Safety measures in case of rotor fracturing

### References

#### Informative references

*Attention is drawn to the following places, which may be of interest for search:*

Domestic spin-dryers or similar; doors or covers; safety arrangements	<a href="#">D06F 49/003</a>
Safety devices acting in conjunction with the control or operation of a machine; in connection with the locking of doors, covers, guards, or like members giving access to moving machine parts	<a href="#">F16P 3/08</a>

## B04B 9/00

**Drives specially designed for centrifuges; Arrangement or disposition of transmission gearing; Suspending or balancing rotary bowls**

### Definition statement

*This place covers:*

All kind of centrifuge drives, transmission gearings, control of the drives and the suspension and balancing of the rotary bowls.

**B04B 9/10**

**Control of the drive; Speed regulating {(for solid bowl screw centrifuges [B04B 1/2016](#))}**

**Definition statement**

*This place covers:*

E.g. speed limiting arrangements

**B04B 9/12**

**Suspending rotary bowls {; Bearings; Packings for bearings}**

**Definition statement**

*This place covers:*

E.g. sealing, damping, lubricating, cooling of bearings

**B04B 11/00**

**Feeding, charging, or discharging bowls ([B04B 1/00](#), [B04B 3/00](#), [B04B 7/04](#) take precedence)**

**Definition statement**

*This place covers:*

All aspects of feeding, distributing and discharging arrangements in centrifuge bowls.

**B04B 11/04**

**Periodical feeding or discharging; Control arrangements therefor**

**Definition statement**

*This place covers:*

The handling e.g. loading/unloading of sample carriers like tubes or tube racks in close relation with the centrifuge .

**References****Informative references**

*Attention is drawn to the following places, which may be of interest for search:*

Automatic analysis and the handling of sample containers and devices for transferring samples in general	<a href="#">G01N 35/00</a>
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**B04B 13/00**

**Control arrangements specially designed for centrifuges; Programme control of centrifuges (control arrangements for feed, charge, or discharge [B04B 11/00](#))**

**Definition statement**

*This place covers:*

Control arrangements specially adapted for centrifuges.

**References****Limiting references***This place does not cover:*

Control arrangements for safety devices like door and lid locking devices	<a href="#">B04B 7/06</a>
Control arrangements for feed, charge or discharge	<a href="#">B04B 11/00</a>

**B04B 15/00****Other accessories for centrifuges****Definition statement***This place covers:*

Auxiliary equipment for centrifuges like cooling means, cleaning means, venting means and the like

**B04B 15/02****for cooling, heating, or heat insulating****References****Limiting references***This place does not cover:*

Cooling of bearings:	<a href="#">B04B 9/12</a>
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