

B04C

APPARATUS USING FREE VORTEX FLOW, e.g. CYCLONES ([N: centrifugal separation of water from steam F22B37/32;] jet mills B02C19/06; [N: wind sifters B07B7/00;] cyclonic type combustion apparatus F23; [N: vortex burners for cyclone-type combustion apparatus F23D1/02; cyclonic type combustion apparatus for gas turbines F23R3/00])

Definition statement

This subclass/group covers:

Apparatus for separating or like treating (e.g. drying, extracting, purifying) in which centrifugal or centripetal effects are generated by free vortex flow, otherwise than by rotary bowls, rotors or curved passages. The free vortex flow generated may follow a flat spiral, have an unchanged or constant axial direction, or have a reversible axial direction.

The mixtures treated are composed of the following physical states of matter:

- Liquid/liquid, liquid/gas or gas/gas mixtures.
- Solid/liquid or solid/gas mixtures; or combinations of such apparatus with other devices, e.g. fans.

Accessories for such devices e.g. safety or control devices.

References relevant to classification in this subclass

This subclass/group does not cover:

Combinations of cyclones with filters, for separating particles from gases or vapours	B01D 50/00
Combinations of cyclones with electrostatic precipitating arrangements	B03C 3/14
Cyclonic type combustion apparatus using fluent fuel	F23C 3/00
Vortex burners e.g. for cyclone-type combustion apparatus	F23D 1/00

Informative references

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

Arrangement or disposition of cyclones or other devices with centrifugal action, in suction cleaners	A47L 9/16
Separation of isotopes of the same chemical element by centrifuging	B01D 59/20
Separation of non-miscible liquids by centrifugal force	B01D 17/0217
Degasification of liquids in which centrifugal movement is caused by a vortex, e.g. using a cyclone, or by a tangential inlet	B01D 19/0057
Separating dispersed particles from gases or vapours by centrifugal forces	B01D 45/12
Separating dispersed particles from gases or vapours by centrifugal forces generated by the winding course of the gas stream	B01D 45/16
Chemical or physical processes in general, conducted in the presence of fluids and solid particles; separating solid material from the gas/liquid stream using cyclones	B01J 8/0055
Jet mills	B02C 19/06
Magnetic or electrostatic separators of solid materials or fluids; Separation by high-voltage electric fields	B03C
Centrifuges	B04B
Selective separation of solid materials carried by or dispersed in gas currents, using centrifugal force	B07B 7/08
Catalytic cracking with preheated moving solid catalysts according to the "fluidised-bed" technique	C10G 11/18

Purification of the pulp suspension by mechanical means with the aid of centrifugal force in cyclones	D21D 5/24
Mounting or connecting of lubricant purifying means relative to a machine or engine	F01M 11/03
Crankcase ventilating or breathing having means for purifying air before leaving crankcase, e.g. removing oil	F01M 13/04
Exhaust or silencing apparatus for machines or engines having means for removing solid constituents of exhaust, using inertial or centrifugal separators, e.g. of cyclone type	F01N 3/037
Fluid dynamics in general	F15D
Component parts or details of steam boilers; steam-separating arrangements using centrifugal force	F22B 37/32
Arrangement of devices for treating smoke or fumes of purifiers for removing solid particulate material from the gasflow using cyclone separators	F23J 15/027
Compression machines, plant or systems using vortex effect	F25B 9/04
Fluidised-bed furnaces; cyclones or chain of cyclones	F27B 15/003
Investigating or analysing materials by determining their physical or chemical properties, e.g. while the centrifugal or centripetal effects generated by a vortex flow are acting on the sample	G01N

Glossary of terms

In this subclass/group, the following terms (or expressions) are used with the

meaning indicated:

Vortex finder	overflow duct, which is the discharging outlet for the lighter fluid phase.
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B04C 1/00

Apparatus in which the main direction of flow follows a flat spiral ; [N: so-called flat cyclones or vortex chambers]

Definition statement

This subclass/group covers:

Flat cyclones or vortex chambers and cyclones where the inlet extends substantially over the whole height of the vortex chamber.

References relevant to classification in this group

This subclass/group does not cover:

Arrangements with curved passages	B01D 45/16
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B04C 3/00

Apparatus in which the axial direction of the vortex [N: (flow following a screw-thread type line)] remains unchanged [N: Also devices in which one of the two discharge ducts returns centrally through the vortex chamber, a reverse-flow vortex being prevented by bulkheads in the central discharge duct (combined with other devices B04C9/00)]

Definition statement

This subclass/group covers:

Cyclones where the direction of flow does not change, the fluid enters the cyclone on an upstream side and the separated phases are discharged on the downstream side.

B04C 5/00

Apparatus in which the axial direction of the vortex is reversed [N: (combined with other devices B04C9/00)]

Definition statement

This subclass/group covers:

Cyclones where the axial direction of the lighter fluid is reversed. The direction of flow does change, the fluid enters the cyclone on an upstream side and the separated heavier fluid is discharged on the downstream side, the lighter fluid travels back to the upstream side of the cyclone.

B04C 5/24

Multiple arrangement thereof [N: (combination types according to other groups, B04C7/00)]

Definition statement

This subclass/group covers:

Combinations of reverse flow cyclones of series flow and parallel flow where the features of the interactive connection are important.

B04C 7/00

Apparatus not provided in group B04C1/00, B04C3/00 or B04C5/00; Multiple arrangements not provided in one of the groups B04C1/00, B04C3/00 or B04C5/00; Combinations of apparatus covered by two or more of the groups B04C1/00, B04C3/00 or B04C5/00

Definition statement

This subclass/group covers:

All cases where the combination of different types of cyclones like a through flow type cyclone ([B04C 3/00](#) and sub-groups) and a reverse flow type cyclone ([B04C 5/00](#) and sub-groups) is claimed. Details relating to the one or the other type are classified in the relevant groups of the specific cyclone.

B04C 9/00

Combinations with other devices, e.g. fans, [N: expansion chambers, diffusors, water locks] (with filters B01D50/00)

Definition statement

This subclass/group covers:

Combinations of cyclones with expansion chambers, diffusors, water locks or sieves.

Combinations of cyclones with internally or externally arranged rotors like fans, ventilators, blowers, impellers, pumps.

Combinations of cyclones with internally or externally arranged filters.

Combinations of cyclones with electrostatic separation equipment.

Cyclones with injection or suction of liquid or gas into the cyclone chamber.

B04C 11/00

Accessories, e.g. safety or control devices, not otherwise provided [N: e.g. regulators, valves in inlet or overflow ducting] (with electrostatic precipitating arrangements B03C3/14)

Definition statement

This subclass/group covers:

Control arrangements per se, regulators, valves in inlet and/or overflow ducting.