

**CPC****COOPERATIVE PATENT CLASSIFICATION****B04C****APPARATUS USING FREE VORTEX FLOW, e.g. CYCLONES**

{centrifugal separation of water from steam [B01D 45/12](#); jet mills [B02C 19/06](#); {wind sifters [B07B 7/00](#); cyclonic type combustion apparatus [F23](#); {vortex burners for cyclone-type combustion apparatus [F23D 1/02](#); cyclonic type combustion apparatus for gas turbines [F23R 3/00](#)}

**NOTE**

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.

**B04C 1/00**

**Apparatus in which the main direction of flow follows a flat spiral; {so-called flat cyclones or vortex chambers}**

**B04C 3/00**

**Apparatus in which the axial direction of the vortex {(flow following a screw-thread type line)} remains unchanged {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 [B04C 9/00](#))}**

[B04C 2003/003](#)

. {Shapes or dimensions of vortex chambers}

[B04C 2003/006](#)

. {Construction of elements by which the vortex flow is generated or degenerated}

[B04C 3/02](#)

. with heating or cooling, e.g. quenching, means

[B04C 3/04](#)

. Multiple arrangement thereof {(combined with types according to other groups, [B04C 7/00](#))}

[B04C 3/06](#)

. Construction of inlets or outlets to the vortex chamber

**B04C 5/00**

**Apparatus in which the axial direction of the vortex is reversed {(combined with other devices [B04C 9/00](#))}**

[B04C 5/02](#)

. Construction of inlets by which the vortex flow is generated {e.g. tangential admission, the fluid flow being forced to follow a downward path by spirally wound bulkheads, or with slightly downwardly-directed tangential admission} (fluid dynamics in general [F15D](#))

[B04C 5/04](#)

.. Tangential inlets

[B04C 5/06](#)

.. Axial inlets

[B04C 5/08](#)

. Vortex chamber constructions

[B04C 5/081](#)

.. Shapes or dimensions

[B04C 5/085](#)

.. with wear-resisting arrangements

[B04C 5/087](#)

.. with flexible gas-tight walls

[B04C 5/10](#)

.. with perforated walls

[B04C 5/103](#)

.. Bodies or members, e.g. bulkheads, guides, in the vortex chamber (cores [B04C 5/107](#))

[B04C 5/107](#)

.. Cores; Devices for inducing an air-core in hydrocyclones (forming part of the outlet pipe [B04C 5/13](#))

B04C 5/12	. Construction of the overflow ducting, e.g. diffusing or spiral exits
B04C 5/13	. . formed as a vortex finder and extending into the vortex chamber <b>{(exits with bulkheads preventing reverse flow vortex B04C 3/00)}</b> ; Discharge from vortex finder otherwise than at the top of the cyclone; Devices for controlling the overflow
B04C 2005/133	. . . <b>{Adjustable vortex finder}</b>
B04C 2005/136	. . . <b>{Baffles in the vortex finder}</b>
B04C 5/14	. Construction of the underflow ducting; Apex constructions; Discharge arrangements; <b>{discharge through sidewall provided with a few slits or perforations (provided with a great number of slits or perforations B04C 5/10)}</b>
B04C 5/15	. . with swinging flaps or revolving sluices; Sluices; Check-valves
B04C 5/16	. . with variable-size outlets from the underflow ducting
B04C 5/18	. . with auxiliary fluid assisting discharge
B04C 5/181	. . Bulkheads or central bodies in the discharge opening
B04C 5/185	. . Dust collectors
B04C 5/187	. . . forming an integral part of the vortex chamber
B04C 5/20	. with heating or cooling, e.g. quenching, means
B04C 5/22	. with cleaning means
B04C 5/23	. . using liquids
B04C 5/24	. Multiple arrangement thereof <b>{(combination types according to other /00 groups, B04C 7/00)}</b>
B04C 5/26	. . for series flow
B04C 5/28	. . for parallel flow
B04C 5/30	. . Recirculation constructions in or with cyclones which accomplish a partial recirculation of the medium, e.g. by means of conduits
<b>B04C 7/00</b>	<b>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</b>
<b>B04C 9/00</b>	<b>Combinations with other devices, e.g. fans, {expansion chambers, diffusors, water locks} (with filters B01D 50/00)</b>
B04C 2009/001	. <b>{with means for electrostatic separation}</b>
B04C 2009/002	. <b>{with external filters}</b>
B04C 2009/004	. <b>{with internal filters, in the cyclone chamber or in the vortex finder}</b>
B04C 2009/005	. <b>{with external rotors, e.g. impeller, ventilator, fan, blower, pump}</b>
B04C 2009/007	. <b>{with internal rotors, e.g. impeller, ventilator, fan, blower, pump}</b>
B04C 2009/008	. <b>{with injection or suction of gas or liquid into the cyclone}</b>
<b>B04C 11/00</b>	<b>Accessories, e.g. safety or control devices, not otherwise provided for {e.g. regulators, valves in inlet or overflow ducting} (with electrostatic precipitating arrangements B03C 3/14)</b>